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Annual Report

2077/78 (2020/21)

Government of Nepal
Nepal Agricultural Research Council

National Maize Research Program

Rampur, Chitwan

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Foreword

Maize is the second most important cereal crop after rice in terms of area coverage, production, and productivity accounting for almost 20 percent of total cereal production and 30 percent of calories in Nepal. It is the potential crop to enhance the livelihoods of smallholder rural farmers of Nepal. National Maize Research Program (NMRP), Rampur publishes this annual report which depicts on-station and on-farm research, production, financial and administrative activities carried out by this program in the fiscal year 2077/78 (2020/21). NMRP aims to generate high yielding maize based eco-friendly technologies that contribute to the food, feed, nutritional security, employment generation, and livelihood enhancement of the Nepali people. It focuses on the development of high yielding hybrids and open-pollinated varieties, maintenance, multiplication of seeds, and development of appropriate maize-based cropping systems to enhance production and productivity in collaboration with national and international institutions. This annual report is a collective accomplishment, and we express our gratitude to all those who contributed to its publication. This report would not have been possible to bring in this form without the joint efforts and cooperation of the collaborators from RARSs, ARSs, commodity programs, disciplinary divisions, CIMMYT, AKCs, CBOs, I/NGOs, cooperatives and agricultural groups. I would like to express my sincere gratitude to all senior scientists, scientists, technical officers, technicians, support staff, and farmers who are directly or indirectly involved in research activities, seed production, data compilation, analysis, and reporting. We are also indebted to the administrative and financial staff for their contribution. On behalf of NMRP, I would like to thank NARC management; especially Executive Director, Director for Crops and Horticulture, Director for Planning and Coordination, Director for Administration, Director for Finance and Director for Livestock and Fisheries for their technical and financial support, guidance and encouragement to run the program smoothly and improve its performance. I would like to appreciate the tireless and continuous efforts of the entire workforce of NMRP and maize team members under NARC at various locations. Without them, our success in 2020/21 would not have been possible. Our thanks also go to those helping hands who directly or indirectly supported the Program's objectives to be met. Last but not least; I am also grateful to BN Adhikari, M Kandel and MP Tripathi for their efforts to shape this report. I hope this publication will provide consistent progress on maize research for increased productivity in Nepal and will prove useful to stakeholders. Productive opinions and noble ideas are very much appreciated.

Chitra Bahadur Kunwar
Coordinator
National Maize Research Program, Rampur, Chitwan, Nepal

Abbreviation and Acronyms

*	Significant in 0.05level
**	0.01 level of significance
A. Score	Aphid score at (0-5) scale
ACP	Aphid colony per plant,
AKC	Agricultural Knowledge Centre
ASI	Anthesis Silking Interval
AUDPC	Area under disease progress curve
BIP	Borer Infested Plant
BLSB	Banded Leaf and Sheath Blight
BTS	Before tasseling stage
CD	Cob Diameter
CFFT	Coordinated Farmer's Field Trial
CIMMYT	International Maize and Wheat Improvement Center
CL	Cob Length
CV	Coefficient of Variation
CVT	Coordinated Variety Trial
CW	Cob weight
DAS	Days after sowing
DH	Percent Dead Heart
DI	Disease incidence
DoAR	Directoriate of Agricultural Research
DTF	Days to flowering
DTM	Days to maturity
DTS	Days to silking
DTT	Days to tasseling,
E/P	Ear to plant ration
EA	Ear Aspect
EH	Exit hole
EHT	Ear Height
EL	Ear Length
EP	Ear position
FAT	Farmers' Acceptance Test
FDS	Final disease score
FPS	Final plant stand
GLS	Grey Leaf Spot
GP	Grains per panicle
GRP	Ginger Research Program
GS	Number of grains/spikes
GY	Grain yield

H	Hybrid
ha	Hectare
HC	Husk Cover
HCRP	Hill Crop Research Program
HTMA	Heat Stress Tolerant Maize for Asia
IAP	Infested aphid per plant
IFAW	Infestation of fall army worm
ILP	Infected leaf per plant
IPS	Initial Plant Stand
IS	Insect Score
IYT	Intermediate Yield Trial
kg/ha	Kilogram per hectare
KHS	Knee high stage
LL	Leison length
LR	Leaf rust
LSD	Least Significant Difference
mm	Millimeter
MNCH	Multinational Company Hybrid
MR	Moderately resistant
MS	Moderately susceptible
NEP	Number of ear/plot
NGPR	Number of grains/row
NGRPE	Number of grains rows/ear
NLB	Northern Leaf Blight
NLL	Number of leison per leaf
NMRP	National Maize Research Program
No Germ	Not Germinated
NOE	Number of ear/ha
NOP	Number of plant/ha
NPP	Number of plant /plot
NSB	Nepal Seed Board
OPV	Open Pollinated Variety
OR	Outreach Research
OT	Organoleptic test
PA	Plant Aspect
PDA	Potato Dextrose Agar
PHT	Plant Height
PL	Panicle length
PN	Number of panicle per square
ppm	Parts per million

PVS	Participatory Varietal Selection
QPM	Quality Protein Maize
R	Resistant
RC	Resistant Check
RCBD	Randomized Complete Block Design
RE	Rotten Ear
RL	Root Lodging
S	Susceptible
SB	Spot Blotch
SBI	Stem borer infestation
SC	Susceptible Check
SD	Standard Deviation
SE	Standard Error
SL	Shoot Lodging
SLB	Southern Leaf Blight
SR	Stalk rot
TIT	Terai and Inner Terai
TKW	Thousand Kernel Weight
TL	Tunnel Length
TR	Trace resistant
UGP	Unfilled grains per panicle
WP	Wettable powder
WVD	Wheat Varietal Display

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राष्ट्रिय मकैबाली अनुसन्धान कार्यक्रम, रामपुर मार्फत आ.व. २०७७/७८ मा नेपाल कृषि अनुसन्धान परिषद अन्तरगतका विभिन्न अनुसन्धान केन्द्र तथा कृषकको खेतवारीमा संचालित अनुसन्धान तथा स्रोत बीउ उत्पादन कार्यक्रमका उपलब्धीहरुलाई यस प्रतिवेदनमा प्रस्तुत गरिएको छ ।

बाली प्रजनन् :

रामपुरमा २०७७ हिँउदमा गरिएको सिंगलक्रस हाइब्रीडको अवलोकन नर्सरीको जातिय परीक्षण नतिजा हेर्दा आरएल-२३२, आरएल.-१११ (१४.७७८ टन/हे.) आरएमएल-८५, आरएमएल-१४६ (१२.७९८ टन/हे.), आरएमएल-१४५, आरएमएल-९८ (१२.७४९ टन/हे.), आरएमएल-११-१, आरएमएल-२९६ (१२.५०८ टन/हे.), आरएमएल-८६, आरएमएल-१४६ (१२.४४६ टन/हे.), आरएल- २९६, आरएमएल- १७० (१२.०१० टन/हे.), आरएमएल-११७/आरएल-१११ (११.९५२ टन/हे.) राम्रो उत्पादन दिएको पाइएको छ । नेपालगञ्ज, परवानीपुर, रामपुर र तरहरामा सिंगल क्रस हाईब्रीडमा गरिएको अवलोकन नर्सरीको जातिय परीक्षण नतिजा हेर्दा अनुजातहरु भीएच १८४६ (६.३९५ टन/हे.), आरएल-२१-१, आरएमएल-१४० (६.२८५ टन/हे.), आरएमएल-८९, आरएमएल-१४० (५.८२५ टन/हे.) ले तुलनात्मक रुपमा राम्रो उत्पादन दिएको पाइएको छ । सिंगलक्रस हाईब्रीडको समन्वयात्मक जातीय अनुसन्धानको नतिजा हेर्दा अनुजातहरुको उत्पादनमा ठाऊँ अनुसार फरक पाइएको भएतापनि रामपुरमा आरएमएल-२९४, आरएमएल-१७० (७.०९५ टन/हे.), आरएल-३६, आरएल-१०५ (५.७६० टन/हे.), तरहरामा डियमके २ (६.१०६ टन/हे.), परवानीपुरमा आरएमएल-२३६, आरएमएल-९६ (५.८१८ टन/हे.), बेलाचापीमा आरएमएल-१९१, आरएमएल- १७ (७.९५३ टन/हे.), नेपालगञ्जमा डियमके २ (६.१५२ टन/हे.), काव्रेमा सिययच १७१५ (९.२९७ टन/हे.), सुर्खेतमा आरएल-१४५, आर. एमएल-९८ (८.५०९ टन/हे.) र दैलेखमा आरएल-१४५, आरएमएल-९८ (१३.३८९ टन/हे.) ले तुलनात्मक रुपमा राम्रो उत्पादन दिएको पाइएको छ भने लुम्लेमा यस परीक्षणमा राखिएका अनुजातहरुले रामपुर हाईब्रीड-१० भन्दा बढि उत्पादन दिन नसकेको पाईयो । यसका साथै तराई भित्रीमधेस क्षेत्रको लागि गरिएको परीक्षणको नतिजा हेर्दा रामपुरमा सियएच १७१५, सियएच १९६, तरहरामा भिएच १८८६, सियएच ११९, बेलाचापीमा भिएच ३७२९, परवानीपुरमा भिएच १८४६, काव्रेमा आरएल-३६, आरएल-१०५ र नेपालगंजमा भिएच १८४६ र सियएच १९६ ले धेरै उत्पादन दिएको पाइएको छ ।

लामो समयमा पाक्ने जातहरुको पहाडि सेटको पाखिबास्, लुम्ले र काव्रेमा गरिएको प्रारम्भिक उत्पादन परीक्षणहरुको संयुक्त विश्लेषण गर्दा मनकामना-७ ले सबैभन्दा बढि (४.८७४ टन/हे.) उत्पादन दिएको पाईयो । त्यसपछि बढि उत्पादन क्रमश: रामपुरएस १० एफ १८

(४.७७४ टन/हे.) र पि ५०१ एसआरसिओ/पि ५०२ एसआरसिआ (४.४३५ टन/हे.) को देखियो। लामो समयमा पाक्ने जातहरुको पहाडि सेटको समन्वयात्मक जातिय परीक्षणहरुको संयुक्त विश्लेषण गर्दा बिजिबिवाईपप ले सबैभन्दा बढि (६.०५७ टन/हे.) उत्पादन दिएको पाईयो। त्यसपछि बढि उत्पादन दिनेमा क्रमशः मनकामना-७ (५.७६३ टन/हे.) र रामपुरएस १३ एफ ०१ (५.६८७ टन/हे.) देखियो । लामो समयमा पाक्ने जातहरुको पहाडि सेटको किसानको खेतमा गरिएको समन्वयात्मक जातिय परीक्षणहरुको संयुक्त विश्लेषण गर्दा केएसवाईएनएफ१०ले सबैभन्दा बढि (४.२९५ टन/हे.) उत्पादन दिएको पाईयो। त्यसपछि बढि उत्पादन दिनेमा क्रमशः किसानको जात (४.०६९ टन/हे.) र टिएलबिआरएस ०७ एफ १६ (४.०५० टन/हे.) देखियो। लामो समयमा पाक्ने जातहरुको तराई सेटको नेपालगन्ज, डोटी, सुर्खेत र रामपुरमा गरिएको प्रारम्भिक उत्पादन परीक्षणहरुको संयुक्त विश्लेषण गर्दा सबैभन्दा बढि पिएचआरए पिएचयुटिटिएबिएटि-एस ००३१ ले (४.३५५ टन/हे.) उत्पादन दिएको पाईयो । त्यसपछि बढि उत्पादन दिनेमा क्रमशः पोजारिका-एस ९६२७ (आर ई) (३.६८८ टन/हे.) र आरपप-३ (३.६८२ टन/हे.) देखियो। लामो समयमा पाक्ने जातहरुको तराई सेटको समन्वयात्मक जातिय परीक्षणहरुको संयुक्त विश्लेषण गर्दा सबैभन्दा बढि रामपुर एस ०३ एफ ०८ ले (५.१०३ टन/हे.) उत्पादन दिएको पाईयो । त्यसपछि बढि उत्पादन दिनेमा क्रमशः रामपुर एस १३ एफ २४ (४.६८६ टन/हे.) र सेल - ओएचजिवाइए × सेल-ओएचजिवाइबि (४.४१४ टन/हे.) देखियो । लामो समयमा पाक्ने जातहरुको पहाडि सेटको पाखिबास, लुम्ले र काब्रेमा गरिएको प्रारम्भिक उत्पादन परीक्षणहरुको संयुक्त विश्लेषण गर्दा मनकामना-७ ले सबैभन्दा बढि (४.८७४ टन/हे.) उत्पादन दिएको पाईयो । त्यसपछि बढि उत्पादन दिनेमा क्रमशः रामपुर एस१०एफ१८ (४.७७४ टन/हे.) र पि ५०१ एसआरसिओ/पि ५०२ एसआरसिआ (४.४३५ टन/हे.) देखियो । लामो समयमा पाक्ने जातहरुको पहाडि सेटको समन्वयात्मक जातिय परीक्षणहरुको संयुक्त विश्लेषण गर्दा बिजिबिवाईपप ले सबैभन्दा बढि (६.०५७ टन/हे.) उत्पादन दिएको पाईयो। त्यसपछि बढि उत्पादन दिनेमा क्रमशः मनकामना-७ (५.७६३ टन/हे.) र रामपुरएस १३ एफ०१ (५.६८७ टन/हे.) देखियो । लामो समयमा पाक्ने जातहरुको पहाडि सेटको किसानको खेतमा गरिएको समन्वयात्मक जातिय परीक्षणहरुको संयुक्त विश्लेषण गर्दा केएसवाईएनएफ१०ले सबैभन्दा बढि (४.२९५ टन/हे.) उत्पादन दिएको पाईयो। त्यसपछि बढि उत्पादन दिनेमा क्रमशः किसानको जात (४.०६९ टन/हे.) र टिएलबिआरएस ०७ एफ १६ (४.०५० टन/हे.) देखियो।

छिटो पाक्ने खुलासिंचित मकैको प्रारम्भिक उत्पादन परीक्षणमा वढि उत्पादन दिने मकैका जातहरु SO3TEY/LN र 02SADVI उत्पादन क्रमशः ४.०६२ टन/हे. र ३.९३० टन/हे. पाईयो। त्यस्तै विभिन्न स्थानमा गरिएको समन्वयात्मक जातीय परीक्षणको संयुक्त विश्लेषण नतिजानुसार वढि उत्पादन दिने मकैका जात SO3TEY/LNPP को उत्पादन ५.४५० टन/हे. पाईयो। कृषकको खेतवारीमा गरिएको परीक्षणको नतिजाको संयुक्त विश्लेषण गर्दा

POOL-16 र ACROSS 99402 राम्रा देखियो जसको उत्पादन क्रमशः ५.४६६ टन/हे. र ५.३०६ टन/हे. पाईयो । रामपुरमा संचालित फुल उठ्ने मकैको परीक्षणमा Australian ठुलो दाना Y (६.७९४ टन/हे.), Pop४५/Pool १७ (४.०८९ टन/हे.) उत्कृष्ट थिए । त्यस्तै गुलियो मकै परीक्षणमा हरियो घोगा उत्पादन बढि दिने जातहरु ID-807R, ID-8002W ले क्रमशः १३.६२ टन/हे. र १३.३५ टन/हे. पाईयो । कर्णाली क्षेत्रको लागि मकैको जातिय विकाशको लागि र्सचालित परीक्षणको नतिजा अनुसार परीक्षणमा राखिएका जातहरुले स्थानिय जातले भन्दा बढि उत्पादन दिएको देखिएन । सुख्खा सहने मकैमा गरिएको परीक्षणमा रामपुर २६ उत्कृष्ट देखियो ।

बाली विज्ञान

वर्णशंकर मकैका उपयुक्त घनत्तव र नाईट्रोजन खाद्यतत्व पता लगाउने अभिप्रायले गरिएको परीक्षणमा, दुई वटा वर्णशंकर जात मध्य आरएमएल-८६/आरएमएल-९६ को धेरै उत्पादन (६.६९३ टन/हे.) पाईयो । नाईट्रोजन खाधतत्व २६० के.जी./हे. का दरले हालेको प्लटमा उत्पादन (६.४३६ टन/हे.) उत्पादन पाईयो । त्यसैगरी १,००,००० प्रति हेक्टर मकैको बोट सख्या राखिएको प्लटमा उत्पादन (६.६९८ टन/हे.) बढी पाईयो । वर्षभरि हरेक १० दिनको फरकमा मकै लगाउदा वर्णशंकर मकै आरएमएल-८६/आरएमएल-९६ को हकमा कात्तिक १० कात्तिक २० लगाएको मकैमा उत्पादन क्रमशः (८.९७१ टन/हे., ७.१३५ टन/हे.) पाईयो । त्यसै गरी, मकैको उन्नत जात जेड.एम ४०१ को हकमा उत्पादन असोज ३० र भाद्र २० मा लगाउदा यसको बढि उत्पादन क्रमशः (६.१२१ टन/हे, ५.४०४ के.जी./हे) पाईयो । ईनब्रिड मकैका विभिन्न जातको लगाउने समय र धनत्व पत्ता लगाउने अभिप्रायले गरिएको परीक्षणमा बढी उत्पादन आरएमएल-९५ (२.७१३ टन/हे.) मा पाईयो । बोटको संख्याले (१००००० बोट/हे.) उत्पादनमा असर पर्ने देखियो । बढी उत्पादन (२.५५९ टन/हे.) ५० से.मि ह २० से.मी. मा पाईयो । त्यसै गरी मकैको उत्पादनमा दानको साइजले असर गर्ने देखियो । विभिन्न समयमा मकै रोप्दा मकैको १००० दानाको तौलमा असर पर्ने देखियो ।

माटो विज्ञान

२०७७ को हिउँदे मौसममा लामो समयमा पाक्ने मकैको जात मनकामना-९ मा एकिकृत खाद्यतत्व व्यवस्थापन सम्बन्धि परीक्षण संचालन गरिएको थियो । यस परीक्षणमा रासायनिक मल (नाईट्रोजन, फस्फोरस र पोटास) र प्रांगारीक मलका विभिन्न श्रोतहरुको (गोबर मल, कुखुराको मल, तोरीको पिना र हड्डीको धुलो) विभिन्न मात्राहरु प्रयोग गरी परीक्षण संचालन गरिएको थियो । उक्त परीक्षणमा सिफारीस गरिएको रासायनिक मलको पूरा मात्रा र ५ टन कुखूराको मल प्रयोग गर्दा सबैभन्दा बढी उत्पादन ७.७३४ टन प्रति हे. दिएको पाईयो ।

त्यसैगरि २०७७ हिउँदमा मौसममा मकैका दई वर्णशंकर जातहरु आरएमएल-८६/आरएमएल-९६, र सिएएच १७१५ मा मलका विभिन्न बाह्र मात्राहरु प्रयोग गरी मकैको संयुक्त परीक्षण (VCFT) संचालन गरिएको थियो । यस परीक्षणमा प्रयोग गरिएको ना.फो.पो. को मात्रालाई जमिन तयारीको समय, पहिलो गोडाई र धान चमरा आउन भन्दा अगाडि पटक पटक प्रयोग गरीएको थियो । प्रयोग गरिएका वर्णशंकर जातहरु आरएमएल-८६/आरएमएल-९६ ले सबैभन्दा बढी ९.२८३ टन प्रति हे. (२१०:८०:४० के.जी. ना.फो.पो.प्रति हे. दरमा प्रयोग गर्दा) र सिएएच १७१५ ले ९.९३० टन प्रति हे. (१५०:८०:६० के.जी. ना.फो.पो. प्रति हे. दरमा प्रयोग गर्दा) उत्पादन दिएको पाईयो ।

त्यस्तै २०७७/७८ को बसन्ते मौसममा छिटो पाक्ने मकै इइसिवाइ-१ मा गरिएको परीक्षणमा सबैभन्दा बढी ५.९९४ टन प्रति हे. (१५०:८०:४० के.जी. ना.फो.पो. प्रति हे. दरमा प्रयोग गर्दा) उत्पादन दिएको पाईयो । त्यसपछि बढी उत्पादन ५.९७४ टन प्रति हे. (९०:८०:४० के.जी. ना.फो.पो. प्रति हे. दरमा प्रयोग गर्दा) पाईयो । जसमा मलका विभिन्न बाह्य मात्राहरु प्रयोग गरी परीक्षण संचालन गरिएको थियो । यस परीक्षणमा प्रयोग गरिएको ना.फो.पो. को मात्रालाई जमिन तयारीको समय, पहिलो गोडाई र धान चमरा आउन भन्दा अगाडि पटक-पटक प्रयोग गरीएको थियो ।

वर्णशंकर मकै उत्पादनको लागि यसका बाबु आमाको गुणस्तर र उत्पादन वृद्धिको पनि उत्तिकै महत्व हुन्छ । वर्णशंकर मकैको बाबु आमाको उत्पादनमा मलखादको प्रभाव हेर्नका लागि २०७७/७८ को बसन्ते मौसममा रामपुरमा एउटा अनुसन्धान संचालन गरिएको थियो । जसमा इन्ब्रेड लाइन आरएमएल–८६, आरएमएल–९६ र आरएमएल–९५ को प्रयोग गरिएको थियो । यस परीक्षणमा नाइट्रोजन, फोस्फोरस र पोटासको विभिन्न मात्रा र वृद्धि हर्मोनको रुपमा जिबरेलिक एसिड, अक्सिन, र २,४-डि प्रयोग गरिएको थियो । जसमा आरएमएल–८६ ले सबैभन्दा बढी १.९५० टन प्रति हे.(१२०:६०:४० के.जी. ना.फो.पो .प्रति हे.को दरले प्रयोग गर्दा) उत्पादन दिएको पाईयो । त्यसैगरी आरएमएल–९६ ले सबैभन्दा बढी २.९३० टन प्रति हे.(१२०:६०:४० के.जी. ना.फो.पो.प्रति हे.को दरले प्रयोग गर्दा) उत्पादन दिएको पाईयो । त्यस्तै आरएमएल–९५ ले सबैभन्दा बढी ३३२५ टन प्रति हे.(१२०:९०:४० के.जी. ना.फो.पो.प्रति हे.को दरले प्रयोग गर्दा) उत्पादन दिएको पाईयो । त्यसै गरि सोहि वर्ष गरिएको एउटा अर्को अनुसन्धानमा कृषि चुन, सुक्ष्म तत्व, सिफारिस गरिएको ना.फो.पो, गोठे मल र हरियो मल समावेश गरिएको थियो । उक्त अनुसन्धानमा गोठेमल, सिफारिस ना.फो.पो., कृषि चुन र सुक्ष्म तत्वको संयुक्त प्रयोगले अधिक उत्पादन (५.३५९ टन/हे.) दिएको थियो । यस परीक्षणबाट माटोको पिएच जाँच गरिआवश्यक मात्रामा कृषि चुन र सुक्ष्म तत्वको संयुक्त प्रयोगले मकैको उत्पादन बढाउन सकिन्छ भन्ने सन्देश पाईयो । त्यसै गरि वर्णशंकर मकैको उत्पादनको लागि यसका बाबु आमाको गुणस्तर

र उत्पादन वृद्धि को पनि उत्तिकै महत्व हुन्छ । वर्णशंकर मकैको बाबु आमाको (इन्बेड लाइन) उत्पादनमा मलखादको प्रभाव हेर्नका लागि रामपुरमा एउटा अनुसन्धान गरिएको थियो । वर्णशंकर मकैका बाबु (आरएमएल-९६) को लागि नाइट्रोजनको तीन वटा मात्रा र आमा (आरएमएल-८६ र आरएमएल-९५) को लागि फोसफोरसको तीन वटा मात्रा र वृद्धि होर्मोन को रुपमा २,४-डि पनि राखिएको थियो । सबै भन्दा बढी उत्पादन (४.६४० टन/हे.), आरएमएल-९६ को नाइट्रोजन (१५० के.जी./हे.) मा छ भने आरएमएल ९५ को (फोसफोरस ९० के.जी./हे.) मा ४.५४० टन/हे उत्पादन छ । तिनवटै जातको लागि नाइट्रोजन (१५० के.जी./हे.) र फोसफोरस को मात्रा (९० के.जी./हे.) सम्म बढाएर दिंदा उत्पादन बढेको देखिएको छ ।

त्यसैगरि २०७७/७८ को बसन्ते मौसममा सिफारिसको क्रममा रहेका वर्णशंकर जातहरुको बाबु आमाको उत्पादनमा मलखादको प्रभाव हेर्नका लागि एउटा अनुसन्धान संचालन गरिएको थियो । जसमा इन्ब्रेड लाइन आरएमएल–१८ र आरएमएल–१५० को प्रयोग गरिएको थियो । यस परीक्षणमा नाइट्रोजनको ३ वटा मात्रा, फोस्फोरसको २ वटा मात्रा र पोटासको २ मात्रालाई प्रयोग गरी इन्ब्रेड लाइनको संयुक्त परीक्षण संचालन गरिएको थियो । जसमा आरएमएल–१८ ले सबैभन्दा बढी २.७६२ टन प्रति हे.(९०:६०:६० के.जी. ना.फो.पो .प्रति हे.को दरले प्रयोग गर्दा) उत्पादन दिएको पाईयो । त्यसपछि बढी उत्पादन २.७१६ टन प्रति हे. (१५०:६०:४० के.जी. ना.फो.पो. प्रति हे. दरमा प्रयोग गर्दा) पाईयो । त्यसैगरी आरएमएल–१५० ले सबैभन्दा बढी १.२०५ टन प्रति हे.(९०:६०:४० के.जी. ना.फो.पो.प्रति हे.को दरले प्रयोग गर्दा) उत्पादन दिएको पाईयो । त्यसपछि बढी उत्पादन १.१०१ टन प्रति हे. (१५०:६०:६० के.जी. ना.फो.पो. प्रति हे. दरमा प्रयोग गर्दा) पाईयो ।

कीट विज्ञान

रामपुरमा मकैको धर्के गबारो अबरोधक जातहरुको छनोट गर्ने उद्देश्ययले आ.व. २०७७/७८ को बसन्त ऋतुमा ६० वटा मकैका वर्णशंकर जातहरु सम्मिलित छनोट नर्सरी संचालन गरिएको थियो । जसमा आरएमएल-५७/आरएल-१७४ (४.७९%), आरएमएल-८८/आरएमएल-१८ (५.३३%), आरएल-१५३/आरएल-१०५ (५.७६%), आरएल-२०८/आरएल-१७४ (५.९४%), आरएमएल-५७/आरएमएल-१७ (६.६९%) जातहरुमा अन्य जातहरुको तुलनामा गबारोको क्षती कम भएको पाईयो । उच्च उत्पादन दिने जातहरुमा आरएमएल-४/आरएल-१११ (९.५८३ टन/हे.), आरएल-२४२/आरएल-१०५ (९.२७६ टन/हे.), आरएच-१० (८.४७६ टन/हे.), टिएक्स ३६९ (८.३०७ के.जी./हे.), आरएमएल-८३/आरएमएल-१४६ (८.२८५ टन/हे.), आरएल-१०७/आरएमएल-८४ (८.०३८ टन/हे.) आरएमएल-९८/आरएमएल-१७ (८.०२३ टन/हे.) पाईयो ।

बजारमा प्रचलित विभिन्न विषादीहरुले मकैमा लाग्ने धर्के गबारो किराको नियन्त्रण प्रभावकारिता सम्बन्धी परीक्षणको नतिजा अनुसार किटनाशक विषादी डेलिगेट स्पिनोटोरम ११.७% एससि (०.४ एमएल/लिटर) पानीमा मिसाई छर्दा बर्णशंकर जात रामपुर हाईब्रिड-१० मा धर्के गबारोको आक्रमण कम (३.७०%) साथै मृत गुभोको संख्या पनि कम (२.०८%) पाईयो भने सबैभन्दा बढी उत्पादन (११.७६० टन./हे.) भएको पाईयो । केहि पनि नछरेको प्लटमा मृत गुभोको संख्या (९.५१%) र धर्के गबारोको आक्रमण बढी (११%) साथै उत्पादन ६.१४८ टन./हे. मात्र भएको पाईयो ।

धर्के गबारो किराको आक्रमणले मकैका १० वटा सिफारिस तथा सिफारिसउन्मुख जातहरुको उत्पादनमा हुने क्षति मापनको लागि किटनाशक विषादी स्पिनोस्याड (०.३ एमएल/लिटर) छरेको प्लट र किटनासक विषादी नछरेको प्लटमा अनुसन्धान परीक्षण संचालन गरिएको थियो । अनुसन्धानको नतिजा अनुसार स्पिनोस्याड (०.३ एमएल/लिटर) छरेको प्लटमा, किटनासक विषादी नछरेको प्लटमा भन्दा मकैको बिभिन्न सिफारिस तथा सिफारिस उन्मुख जातहरुमा १४.३% ले उत्पादनमा वृद्धि भएको पाईयो भने धर्के गबारोको आक्रमण (१%) र मृत गुभोको संख्या पनि कम (१.१३%) भएको पाईयो । साथै बाह्य अनुसन्धान स्थल पुर्बी नवलपुरको देबचुली, रजहर र चितवनको माडीमा ४ जना कृषकको खेतबारीमा धर्के गबारो किराको आक्रमणले मकैका २ वटा सिफारिस तथा सिफारिसउन्मुख जातहरु (रामपुर हाईब्रिड-१० र सिएएच १७१५) को उत्पादनमा हुने क्षति मापनको लागि किटनाशक विषादी स्पिनोस्याड (०.३ एम.एल/लि.) छरेको प्लट र किटनासक विषादी नछरेको प्लटमा अनुसन्धान परीक्षण संचालन गरिएको थियो । अनुसन्धानको नतिजा अनुसार स्पिनोस्याड छरेको प्लटमा, धर्के गबारोको आक्रमण (५%) र मृत गुभोको संख्या पनि कम (३.७%) भएको पाईयो । किटनासक विषादी नछरेको प्लटमा धर्के गबारोको आक्रमण (१२.२३%) र मृत गुभोको संख्या पनि बढी (६.५%) भएको पाईयो ।

नेपालमा २०७६ बैशाखमा भित्रिएको अमेरिकन फौजीकीराले मकैबालीमा निकै ठूलो नोक्सानी गरिरहेको छ । यसको व्यवस्थापनमा राष्ट्रिय मकैबाली अनुसन्धान कार्यक्रमले संचालन गरेका कृयाकलाप र त्यसबाट आएका नतिजाहरु यहाँ सारशंमा प्रस्तुत गरिएको छ । राष्ट्रिय मकैबाली अनुसन्धान कार्यक्रमबाट उन्मोचन गरिएका र उन्मोचोन्उन्मुख ३८ वटा जाहहरु राखि गरिएको जातीय छनौट परीक्षणको नतिजालाई हेर्दा सबैजसो जातहरु फौजीकीराबाट क्षति गरेको पाईयो । त्यसमा पनि Arun-3, EEYC-1, SPPTLYQ-A, CORRALJOS002SIYQ, Mankamana-3, Rampur-4, Deuti, BGBYPOP, 05SAVDI, R-POP-2, KSYNF10, S0128, Rampur hybrid-10 र CAH 1715 जातहरु अरुको तुलनामा थोरै कम क्षति गरेको पाईयो । त्यसैगरी, यो कीराको व्यवस्थापनको लागि बजारमा उपलब्ध भएका सुरक्षित विषादीको परीक्षण असोज महिनामा मनकामना-३ जातको मकैमा गरिएको थियो । उक्त परीक्षणबाट स्पीनोस्याड ४५% एस.सी. ०.३

एम.एल.- प्रति लिटर पानीका दरले छर्दा सबैभन्दा कम क्षति (१०.४%) मा सबैभन्दा बढी उत्पादन ५.१९८ टन प्रतिहेक्टर पाईयो, दोश्रोमा क्लोरान्ट्रानिलिप्रोल १८.५% एस.सी. ०.४ एमएल प्रति लिटर पानीका दरले छरेकोमा पाईयो भने तेश्रोमा स्पीनोटोराम ११.७% एस.सी. ०.४ एमएल प्रति लिटर पानीका दरले छरेकोमा पाईयो । उक्त विषादीहरु १० दिनको अन्तरालमा ३ पटकसम्म छरिएको थियो । नेपियर घाँसलाई पासोबालीको रुपमा र डेस्मोडियम घाँसलाई बिकर्षण बालीको रुपमा लगाउँदा फौजीकीराको क्षति (१३.३%) पाईयो जहाँ मकैमात्र लगाएको बालीमा (६२.८%) सम्म क्षति भएको पाइएको थियो । यसको प्रभावकारीताको बारेमा आउँदो बर्षहरु पनि अध्ययन गरेपछि मात्र निचोड गर्न सकिनेछ । अमेरिकन फौजीकीराले भदौ-असोज र बैशाखदेखि असार सम्ममा मकैबालीमा ५० प्रतिशत भन्दा क्षति गरेको पाईयो । यो कीराले औसत तापक्रम १० डिग्री सेन्टीग्रेट सम्म हुँदा पनि क्षति गरेको पाइनुले यो कीरा चितवन र चितवन जस्तै हावापानी भएको ठाउँमा अमेरिकन फौजीकीराको सक्रियता बर्षभरी हुने जानकारी पाईयो ।

मकैमा लाग्ने गवारो कीराको वातावरण मैत्री व्यवस्थापन परीक्षणबाट स्पीनोस्याड ४५% ई.सी. ०.३ एम.एल.- प्रतिलिटर पानीको दरले सबैभन्दा कम क्षति (४.८४%) मा सबैभन्दा बढी उत्पादन (४.८० टन/हे.) पाईयो । त्यसपछि गवारोको अण्डाको परजिवि कीरा ट्राइकोग्रामा नामक बारुलो १ लाख प्रति हेक्टरका दरले १५ दिनको अन्तरालमा २ पटक छर्दा ११.१% को क्षतिमा ४.४९ टन/हे. उत्पादन दिएको पाईयो । भण्डारणमा लाग्ने कीराको व्यबस्थापनमा बोझ्को बिभिन्न मात्रा सम्बन्धि अध्ययन गर्दा सबैभन्दा प्रभावकारी १० ग्राम बोझ्को धुलो प्रति के.जी.का दरले उपचार गर्दा सबैभन्दा कम क्षति (१.०२%) गरेको पाईयो । त्यसैगरी सेलफोसको प्रयोगले मकैको उमारशक्तिमा पार्ने असर सम्बन्धि परीक्षणमा ४ पटकसम्म राख्दा पनि मकैको उमारशक्ति (९१.०%) कायम रहेको पाईयो ।

रोग विज्ञान

चितवन, मकवानपुर, लम्जुङ्ग, झापा, दाङ्ग, रुपन्देही, धनगढी र बाँकेमा गरिएको मकैको रोगहरुको अनुगमन गर्दा उत्तरी पात डडुवा रोग प्रमुख रुपमा पाईयो । रामपुरमा रामपुर हाईब्रिड १० का आमा बाउ आरएमएल-१५० र आरएमएल-१८ मा उत्तरी पात डडुवा रोग देखिएको थियो भने धनगढी, दाङ्ग र बाँकेमा सो अवधिमा यो रोग देखिएन ।

रामपुरमा गरिएको उत्तरी पात डडुवा रोग अवरोधकजात छनौट परीक्षणमा राखिएका १२५ जातहरु मध्ये २३ वटा जातहरुमा उक्त रोग देखिएन । सुर्खेतमा ३२ वटा वर्णशंकर मकै गरिएको डांठ कुहीने रोग अवरोधकजात छनौट परीक्षणवाट ६ ओटा जातहरुमा उक्त रोग देखिएन ।

वाह्य अनुसन्धान

माडी, चितवन र सुपिङ्ग मकवानपुरका कृषकहरुका खेतवारीमा गरिएका वर्णशंकर मकैको समन्वयात्मक जातिय परीक्षणको नतिजा अनुसार धेरै उत्पादन दिने मकैको जातहरुमा सि.ए.यच. १७१५ (५.०३४ टन/हे.) र सि.ए.यच. १९६ (४.६४५ टन/हे.) रहेको थियो । त्यस्तै खुला सिंचित ढिलो पाक्ने जातहरुमा मनकामना ७ सगै रामपुर यस १३ यफ २८ र KSYNF १० राम्रो पाईयो भने छिटो पाक्ने जातहरुमा HGA, S०१२८ राम्रा देखियो ।

मसिना तथा बास्नादार जातको समन्वयात्मक जातिय परीक्षणको नतिजा अनुसार धेरै उत्पादन दिने धानको जातहरुमा एनआर २१९१-१-६-२-१-२-१ टि.पी.ले धेरै उत्पादन दियो । पानी कम लाग्ने खेतमा गरिएको धानको परीक्षणमा HHZ २६ DT १-L११ १-L११, छिटो पाक्ने धानको परीक्षणमा टि.पी. ३०६१७ र टि.पी. २६७७७ सबैभन्दा वढि उत्पादन दिने पाईयो । माडी, तथा रजहरमा कृषकहरुका खेतवारीमा गरिएका गहुंको समन्वयात्मक परीक्षणको नतिजा अनुसार बाणगंगा जातले सबै भन्दा धेरै उत्पादन दियो ।

बहुपक्षीय प्रविधि विकास

धान

रामपुरको सिंचित खेतमा गरिएको सामन्य धानको समन्बयात्मक जातीय परीक्षणमा यानआर २१८७-२५-२-४-३-१ (४.९०० टन/हे.) र SVIN ३२३ (४.४३० टन/हे.) ले बढि उत्पादन दिएको पाईयो । त्यस्तै सिंचित खेतमा गरिएको मसिना धानको समन्बयात्मक जातीय परीक्षणमा SVIN ०५५४ (४.७७० टन/हे.) र यान. आर. २१९५-२२-१-१-२-१ (३.७८० टन/हे.) ले बढि उत्पादन दिएको पाईयो । छिटो पाक्ने धानको समन्बयात्मक जातीय परीक्षणमा TP ३०५३५ (५.१७० टन/हे.) र आई. आर. १५L१७१७ (४.९६० टन/हे.) ले धेरै उत्पादन दिएको पाईयो ।

गहूंको प्रारम्भिक मुल्यांकन परीक्षणमा बि.एल.-५०६६ (४.३१० टन/हे.), यानएल- १४९९ (४.१८० टन/हे.) ले तुलना गरिने जातहरु गौतम र भृकुटीले भन्दा बढि उत्पादन दिएको पाईयो । समन्वायत्मक जातीय परीक्षणमा यानएल-१४५२ (३.८६० टन/हे.), यानएल-१४२३ (३.७८० टन/हे.), यानएल-१४३७ (३.७५० टन/हे.) ले बढि उत्पादन दिएको देखियो ।

बीउ उत्पादन

राष्ट्रिय मकैबाली अनुसन्धान कार्यक्रममा २१,३६८ टन मकैको प्रजनन तथा मुल बीउ उत्पादन भएको थियो । त्यसैगरि, धान, सन्हेम्प र ढैचा अन्तर्गत क्रमश: १७,०७९ टन, २०० टन र ३५० टन मुल बीउ उत्पादन भएको थियो ।

मेन्टेनेन्स (जातिय गुण कायम)

रामपुर कम्पोजिट र देउतीमा ग्रिड छनौट पुरा गरियो । त्यसैगरि, अरुण २, मनकामना ३ र पोषिलो मकै १ मा हाफसिब जातिय छनौट पूरा गरि क्रमशः २.५ टन ३.० टन र २.० टन न्युक्लियस बीउ उत्पादन गरियो ।

मकै आत्मनिर्भर परियोजना (सामुदायिक बीउ उत्पादन कार्यक्रम)

गोर्खा, गुल्मी, अर्घाखाँची, प्युठान र रोल्पाका सामुदायिक बीउ उत्पादन समुहहरु मार्फत १२ हजार ९०० टन खुलासिंचीत मकैको मुल बीउ उत्पादन गरियो साथै विभिन्न बीउ उत्पादन कम्पनी मार्फत रामपुर हाईब्रिड १० को ५० टन वीउ उत्पादन गरियो ।

विशेष परियोजना

प्रधानमत्री कृषि आधुनिकरण परियोजना

यो परियोजना मार्फत रामपुर हाईब्रिड १० को ६ टन र रामपुर कम्पोजिटको ५ टन विउ उत्पादन भएको छ । रामपुरमा १.५ टन प्रति घण्टाको क्षमताले बीउ छनौट गर्ने आधुनिक मेशीन जडान गरिएको छ । १२ टन र २ टन क्षमताका शीत भण्डारण उपकरण राखिएको छ ।

एशिया क्षेत्रको लागि तातो सहन सक्ने मकैका जातहरुको विकाश कार्यक्रम

रामपुरमा गरिएको तातो सहन सक्ने मकैका जातहरुको परीक्षणबाट VH १८६८७, VH १८४६, VH १७११४३ र CAH १९६ उत्कृष्ट देखियो । विभिन्न जातका सत्ताइस टन वर्णशंकर मकै बीउ उत्पादन गरियो ।

नेपाल वीउ तथा मलखाद परियोजना

रा.म.अ.का. रामपुरमा संचालित धेरै तनाव सहने उच्च भिटामिन ए बढि भएका वर्णशंकर मकैको परीक्षणमा PVAEH-१ (७.४१० टन/हे.) र A१८०४-१४(८.०५० टन/हे.) राम्रा देखिए ।

वहु राष्ट्रिय कम्पनी हाईब्रिड परीक्षण कार्यक्रम

बहुराष्ट्रिय कम्पनीका ८८ ओटा हाइब्रिड जातहरुलाई चारबटा विभिन्न हाइब्रिड चेकसग रामपुरमा संचालन गरिएको परीक्षणको नतिजालाई विश्लेषण गर्दा सबै भन्दा बढि उत्पादन MRM४०६५ (९.४२२ टन/हे.), ४११८ (९.०१८ टन/हे.) र ADV७५७ (८.९०८ टन/हे.) को उत्पादन धेरै देखियो ।

भविष्यका लागि खुवाउने नेपाल : एकिकृत शत्रुजीव व्यवस्थापन (FTFNIPM)

अमेरीकन फौजीकीरा र गबारो कीराको दिगो व्यवस्थापनको लागि राष्ट्रिय मकैबाली अनुसन्धान कार्यक्रमको कीट विज्ञान प्रयोगशालामा अण्डाको परजिवी कीरा (ट्राइकोग्रामा बारुलो) पालन शुरु गरिएको छ । हाल कुनै संस्था वा प्रयोगशालाले मागेको खण्डमा वर्षभरी नै मास्टर कार्ड दिनसक्ने अवस्थामा पुगेका छौ ।

Executive Summary

Plant Breeding

During the winter season of 2020/21 at Rampur, among the 110 NMRP developed single cross hybrids, high yielding genotypes were RL232/RL111 (14.778 t ha^{-1}), RML85/RML146 (12.798 t ha^{-1}), RML145/RML98 (12.749 t ha^{-1}), RML11-1/RML298 (12.508 t ha^{-1}), RML86/RML146 (12.446 t ha^{-1}), RL296/RML170 (12.010 t ha^{-1}), RML117/RL111 (11.952 t ha^{-1}), RML76/RL105 (11.175 t ha^{-1}), RML94/RL298 (11.031 t ha^{-1}) and RL294/RML170 (10.878 t ha^{-1}). Similarly, during 2021, NMRP developed 145 single cross hybrids were evaluated at Rampur, Tarahara, Parwanipur and Nepalgunj. Among those evaluated genotypes, high yielding genotypes across locations were VH1846 (6.395 t ha^{-1}), RL21-1/RML140 (6.285 t ha^{-1}), RML89/RML140 (5.825 t ha^{-1}), RML150/RML98 (5.595 t ha^{-1}), RML4/RL111 (5.535 t ha^{-1}), RL232/RML18 (5.494 t ha^{-1}), RML76/RL105 (5.483 t ha^{-1}), RML58/RL111 (5.475 t ha^{-1}), RML107/RL111 (5.434 t ha^{-1}) and RL236/RML96 (5.322 t ha^{-1}). Likewise, NMRP developed 195 genotypes of single cross hybrids of maize were also evaluated in spring season of 2021 at NMRP, Rampur. Among those high yielding genotypes were RL272/RML96 (8.082 t ha^{-1}), RML242/RL105 (7.700 t ha^{-1}), RL244/RML140 (7.677 t ha^{-1}), RL242/RML84 (7.028 t ha^{-1}), RL21-1/RL101 (6.621 t ha^{-1}), RML95/RML140 (6.415 t ha^{-1}), RL249/RML96 (5.994 t ha^{-1}), RL249/RML17 (5.984 t ha^{-1}), RML150/RML140 (5.965 t ha^{-1}), and RL269/RL174 (5.843 t ha^{-1}).

Coordinated varietal trial was conducted during summer season across the hilly region (Kabre, Lumle, Dailekh, Pakhribas and Surkhet) and during winter across terai and inner terai region (Rampur, Tarahara, Parwanipur, Nepalgunj, Belachapi and Nawalpur) during 2020/21 for the identification of high yielding hybrids adaptive to specific or wider range of environment. At Rampur, high yielding genotypes were RML-294/RML-170 (7.095 t ha^{-1}), RL-36/ RML-105 (5.760 t ha^{-1}), RML-76/RML-146 (5.733 t ha^{-1}) while at Tarahara DMK 2 (6.106 t ha^{-1}), RL-236/RML-96 (5.679 t ha^{-1}), RML-4/RML-111 (5.584 t ha^{-1} were the high yielding genotypes. Single cross hybrids namely RML-236/ RML-96 (5.818 t ha^{-1}), RML-85/RML-146 (5.700 t ha^{-1}), RML-4/RML-111 (5.401 t ha^{-1}) were among the higher yielders at Parwanipur while RML-191/RML-17 (7.953 t ha^{-1}) and RML-294/RML-170 (6.484 t ha^{-1}) found superior at Belachapi. At Nepalgunj, DMK 2 (6.152 t ha^{-1}), RML-4/RL-111 (5.734 t ha^{-1}), CAH 196 (5.669 t ha^{-1}) were found high yielders. Similarly, at Kabre, high yielding single cross hybrids were CAH 1715 (9.297 t ha^{-1}), RML-145/RML-98 (8.826 t ha^{-1}) and RML-145/RML-111 (8.712 t ha^{-1}) whereas at Surkhet, hybrid genotypes RML-145/RML-98 (8.509 t ha^{-1}), RML-145/RL-105 (7.168 t ha^{-1}), RML-145/RML-111 (6.941 t ha^{-1}). Likewise, RML-145/RML-98 (13.389 t ha^{-1}), RML-145/RML-111 (12.431 t ha^{-1}), RML-95/RML-105 (11.695t/ha^{-1})

were observed high yielders at Dailekh however, none of the tested hybrids were found high yielder than Rampur hybrid-10 at Lumle. Similarly, a total of eight single cross hybrids were evaluated in coordinated farmer's field trial in terai, inner terai. Among those genotypes, CAH 1715 and CAH 196 at Rampur; VH 1886 and CAH 119 at Tarahara; VH 3729, VH 1846, CAH 196 at Belachapi; VH 1846 and VH 13729 at Parwanipur; RL-36/RL-105 and RML-76/RL105 at Dolakha; and VH 1846 and CAH 196 found high yielders under farmers field condition at Nepalgunj.

The combined analysis of IYT full season hill set across Pakhribas, Kabre, and Lumle showed that Manakamana-7 produced the highest yield (4.874t/ha) followed by RAMPUR S10F18 (4.774t/ha) and P501SRCO/P502SRCO (4.435t/ha) respectively. Combined analysis of CVT full season hill set showed that BGBYPOP produced the highest yield (6.057t/ha) followed by Manakamana-7 (5.763t/ha) and RAMPUR S13F01 (5.687t/ha) respectively. Combined analysis of CFFT full season hill set showed that KSYNF10 produced the highest yield (4.295t/ha) followed by farmers' variety (4.069t/ha) and TLBRS07F16 (4.050t/ha) respectively.

The combined analysis of IYT full season terai set across Doti, Dasrathpur, Nepalgunj and Rampur showed that PHRA PHUTTABAT-S0031 produced the highest yield (4.355t/ha) followed by POZARICA-S 9627 (RE) (3.688t/ha) and R POP-3 (3.682t/ha) respectively. Combined analysis of CVT full season terai set showed that RAMPUR S03F08 produced the highest yield (5.103t/ha) followed by RAMPUR S13F24 (4.686t/ha) and CEL-OHGYA×CEL-OHGYB (4.414t/ha) respectively.

In initial yield trial (IYT) early set genotype SO3TEY/LN (5.959t/ha) produced relatively more yield over standard check Arun-2(5.33t/ha) at Rampur condition and genotypes 02SADVI (2.582t/ha) and Earlymid katamani (2.320t/ha) produced more yield than Arun-2 (1.817t/ha) at Lumle condition whereas combined analysis showed SO3TEY/LN (4.062t/ha) and 02SADVI (3.93t/ha) produced more yield over locations. Likewise, in CVT-E genotypes EEYC1 (5.526t/ha) and SO3TEY-LN/PP (5.463t/ha) at Rampur; genotypes TDO3TEY/SEBAFAUT (3.819t/ha) and SO3TEY/LN (3.579t/ha) at Pakhribas; genotypes Khumal yellow/Pool-17 (5.309t/ha) and S97TEYGHAYB (3) (5.199t/ha) at Kabre; EEYC1 (4.269t/ha) and S97TEYGHAYB (3) (4.244t/ha) at Nepalgunj, Earlymid katamani (2.965t/ha) and ZM-621/Pool-15 at Lumle and genotype S97TEYGHAYB (3) (7.285t/ha) produced relatively more yield over standard check Arun-2. Combined analysis over locations indicated that genotype SO3TEY-LN/PP (4.400t/ha) produced relatively more yield as compared to Arun-2 (4.327t/ha). In CFFT, genotypes EEYC1 (5.225t/ha) at Rampur; S03TEY-LN (6.980t/ha) and Across-99402 (6.850t/ha) at Dolakha; Across-99402 (4.507t/ha) and S03TEY-LN (4.443t/ha) at Dailekh. Based on overall performances, genotypes Pool-16 (5.466t/ha) occupied the first position

followed by Across-99402 (5.306t/ha) in FFT. Popping maize genotypes Australia thulo dana Y (6.794t/ha), Pop45/pool 17 (4.089t/ha) and Popcorn-2 (3.519t/ha) and sweet corn genotypes ID-8007 R (13.62t/ha), ID-8002 W (13.35t/ha) and ID-8004 Y (W) (12.84t/ha) produced higher grain yield at Rampur.

Quality protein maize (QPM) genotypes RampurS13FQ-06 (6.232t/ha) and RampurS13FQ-08 (5.464t/ha) produced highest grain yield in comparison to standard check Poshilo Makai-2 (3.723t/ha) and Poshilo Makai-1 (3.614t/ha) in IYT at Rampur. In CVT at NMRP Rampur genotypes RampurS13FQ-08 (7.853t/ha) followed by RampurS13FQ-06 (7.269t/ha) produced highest grain yield in comparison to std check Poshilo Makai-2 (5.727t/ha) and Poshilo Makai-1 (6.190t/ha). At DoAR Lumle, S00TYLQ_AB (3.58t/ha), Rpop-YQ-10 (3.53t/ha) and Rampur-S13FQ-02 (3.26t/ha) produced more yield over standard checks Posilo Makai-1 (2.28t/ha), Poshilo Makai-2 (2.31t/ha) and farmer's variety (2.68t/ha). At HCRP Dolakha genotypes RAMPUR-S13FQ-08 (8.15t/ha), RAMPUR-S13FQ-06 (7.38t/ha) and RAMPURS03FQ-02 (7.015t/ha) produced more yield over standard checks Posilo Makai-1 (5.534t/ha), Posilo Makai-2 (3.766t/ha) and farmer's variety (4.405t/ha). At DoAR Doti, genotypes Rampur S13FQ-02 with 7.67t/ha followed by RampurS13FQ-06 with 6.92 were the promising genotypes. Similarly, in CFFT-Q genotypes S99TLYQ-AB (6.914t/ha) produced highest grain yield in comparison to std check Poshilo Makai-1 (6.071t/ha) and local check (6.688t/ha) at Rampur. At DoAR Lumle Poshilo Makai-1 (4.33t/ha) produced highest grain yield. At Dolakha S99TLYQ-AB (7.26t/ha) and S01SIYQ (7.13t/ha).

Agronomy

In the experiment conducted for determining the optimum density and fertilizer level for hybrid maize, among the tested genotypes recorded higher grain yield in RML-86/RM-96 (6.693t/ha). In the same way among the different level of nitrogen recorded higher grain yield (6.437t/ha) in 260t/ha Nitrogen level. Further higher grain yield (6.698t/ha) was record in 100000 plant population.

In the experiment of identification of best sowing dates of pipeline genotypes ZM-401 and RML-86/RML-96. Tasseling and silking ranged from 46 to 129 and 48 to 131 days after sowing in ZM-401 and RML-86/RML-96 respectively. Minimum days were required for tasseling/silking for ZM-401 and RML-86/RML-96 when crop was planted 25th Jestha, 3rd Ashad and 4th Shrawan in ZM-401 and in case of RML-86/RML-96, minimum days were required for tasseling (55 days) and silking (57 days) at 25th Jestha, 3rd Ashad, 15th Ashad, 4th Shrawan, 15th Shrawan planting. In case of grain production, the higher grain yield (6.121t/ha) of ZM-401 was recorded when sown on 30th Ashwin and maximum yield (8.971t/ha) of RML-86/RML-96 was observed when sown on 10th Kartik.

Under the MASS project an experiment was conducted for determining the maize inbreeds optimum density and appropriate planting date, significantly difference was observed in grain yield of inbreeds. Recorded highest grain yield in inbreed RML-95(2.713t/ha). Plant density significantly affects the grain yield. The result showed that the higher grain yield (2.559t/ha) was achieved when plant density maintained at 50cm x 20cm. Similarly, significantly highest thousand grain weight (293 gm) recorded in RML-96. Different date of sowing affect thousand grain weight.

Soil Science

Effect of combinations of organic and inorganic sources i.e., FYM, poultry manure, mustard oil cake and bone meal along with different doses of major chemical fertilizer was studied on Manakamana-9 during 2020/21 winter at NMRP, Rampur. Differences were observed in days to silking, ear height, no. of kernels per row, grain yield and thousand grain weight. Maximum grain yield (7.734 t ha^{-1}) was obtained from 120:60:40 kg NPK with 5 t ha^{-1} poultry manure.

In another experiment two promising maize hybrids RML-86/RML-96 and CAH 1715 were evaluated under twelve treatment combinations of different fertilizers level. Variations were observed on different parameters due to treatments. Maximum grain yield of RML-86/RML-96 was 9.283 t ha^{-1} (210:80:40 kg ha^{-1}) followed by 9.120 t ha^{-1} (210:80:60 kg ha^{-1}) and maximum grain yield 9.930 t ha^{-1} (150:80:60 kg ha^{-1}) was recorded in CAH 1715 followed by 9.643 t ha^{-1} (180:80:40 kg ha^{-1}). In similar experiments on promising early maize variety EECY-1 during spring 2021 significant difference was observed in plant and ear height, no. of kernels per row and thousand grain weight. Maximum grain yield (5.994 t ha^{-1}) was obtained from the application of 150:80:60 kg NPK ha^{-1} followed by 5.974 t ha^{-1} with the application of 90:80:40 kg NPK ha^{-1}. Such experiment was also conducted at the NMRP's agronomy farm during spring of 2021 in maize inbred i.e. RML-18 and RML-150. Significant differences were observed for majority of observed paraments due to variety. Maximum grain yield of RML-18 was 2.762 t ha^{-1} (90:60:60 kg ha^{-1}) followed by 2.716 t ha^{-1} (150:60:40 kg ha^{-1}). Similarly, maximum grain yield 1.203 t ha^{-1} (90:60:40 kg ha^{-1}) was recorded in RML-150 followed by 1.101 t ha^{-1} (150:60:60 kg ha^{-1}).

A field experiment was conducted at agronomy farm of NMRP Rampur, during spring season of 2021 to study the response of fertilizers and growth hormones in yield and flowering of maize inbreds. Three different maize inbreds RML-86, RML-96 and RML-95 were selected for field experimentation. Maximum grain yield (1.950 t ha^{-1}) was observed in RML-86 with the application of 120:60:60 kg NPK ha^{-1} and the highest grain yield (2.930 t ha^{-1}) in RML-96 was found with the application of 120:60:60 NPK ha^{-1}. Similarly, the difference was observed

in RML-95 for days to anthesis and grain yield. Maximum grain yield (3.325 t ha^{-1}) was recorded in RML-95 with the application of 120:90:40 kg ha^{-1}.

Entomology

An experiment comprised sixty hybrid maize genotypes was conducted at NMRP, Rampur during 2077/78 spring season to find out the resistance source of maize stem borer (*Chilopartellus* Swinhoe). Out of 60 maize hybrids, the top five maize hybrids having lower percentage of stem borer infestation were RML-57/RL-174 (4.79 %), RML-88/RML-18 (5.33 %), RL-153/RL-105 (5.76 %), RL-208/RL-174 (5.94 %) and RML-57/RML-17 (6.69 %).The higher grain yield were recorded on RML-4/RL-111 (9.583t/ha), RL-242/RL-105 (9.276t/ha), RH-10 (8.476t/ha), TX369 (8.307t/ha), RML-83/RML-146 (8.285t/ha), RL-107/RML-84 (8.038t/ha) and RML-98/RML-17 (8.023t/ha).

For the management of stem borer, field experiment with 6 treatments including control was conducted at NMRP Rampur during spring season of 2077/78 BS. The lower number of percent dead heart (2.08%) and lesser percent of borer damage (3.70%) at pre tasseling stage was observed at the plot sprayed with Delegate Spinetoram 11.7% SC@ 0.4ml/l of water with higher yieldd of (11.760t/ha). The highest number dead heart (9.51 %) and higher percent of borer infestation was observed in the control plot with lower yield (6.148t/ha).The variety was RH-10.

In yield loss experiment, a total of 10 released and promising maize genotypes were compared in Spinosad (0.3 ml/l of water) sprayed and non-sprayed plots. Maize yield was found 14.3 % higher in spinosad sprayed plots compared to non-sprayed plots. Similarly, the higher percent infested borer plant (>5%) and no. of dead hearts (4.37) was recorded in non-sprayed plots compared to sprayed plots i.e. percent infested borer plant (<1%) and no. of dead hearts (1.13).

Similarly in farmers field of maize outreach research sites (Devchuli area of Nawalpur and Madi area of Chitwan), two maize hybrids RH-10 and CAH1715 were compared in spinosad (0.3 ml/l of water) sprayed and non-sprayed plots. Similarly, the higher percent infested borer plant (12.23 %) and no. of dead hearts (6.5) was recorded in non-sprayed plots compared to sprayed plots i.e. percent infested borer plant (5 %) and no. of dead hearts (3.7).

Fall armyworm (*Spodoptera frugiperda*) is an invasive insect pest of maize in Nepal. The *S. frugiperda* had been reported for the first time in Nepal from Gaindakot of Nawalpur district (N 27°42'16.67", E 084°22'50.61") in May 2019. None of the genotypes were found resistant/tolerant against fall armyworm out of 38 testing genotypes from the study. However, Arun-3, EEYC-1, SPPTLYQ-A, CORRALJOS002SIYQ, Mankamana-3, Rampur-4, Deuti, BGBYPOP, 05SAVDI, R-POP-2, KSYNF10, S0128, Rampur hybrid-10,

CAH 1715 were found less susceptible by the fall armyworm. The lower plant infestation (10.4%) due to fall armyworm was found in Spinosad 45% SC treated plot followed by Chlorantraniliprole 18.5% SC (11.3%) and Spinetoram 11.7% SC (19.1%) and in visual observation as compared to untreated control (76.7%). Similarly, the highest grain yield (5.198t/ha) was found in Spinosad 45% SC treated plot followed by Spinetoram treated plot (4.807t/ha) and Novaluron 10% EC (4.635t/ha) as compared to untreated control (1.007t/ha). The severity of plant infestation was found lower on Napier and Desmodium (13.3%) intercropping followed by Bracheria+ Desmodium (15.9%) with compared to mono-cropped maize (62.8%). The study revealed that FAW incidence was high (61.7% and 55.0%) in the month of September in both hybrid and OP genotypes respectively followed by May (58.8% and 52.3%) in the same genotypes. The rearing of *T. chilonis* in our station is continuous and be able to supply the master card as per the demand of other laboratories.

Lower percentage damage (4.84%) by stem borer complex with highest crop yield (4.80t/ha) was observed in plot sprayed with Spinosad 45%SC @ 0.5 ml/liter followed by released of egg parasitoids; *Trichogramma chilonis* @ 100000 eggs/ha which recorded 11.1% damage in leaf with 4.49t/ha grain yield.The lowest maize grain damage (1.02%) was observed in the treatment of bojho rhizome dust @ 10 g/kg of seed followed by 8 gm/kg seed (2.3%) and @ 6g/kg seeds having (3.40%) respectively after 6 month in storage condition. The germination percentage was not lost by using the Celphos on storage. The lowest grain damage (1.54%) with higher germination percentage (91.0%) was observed after fourth application of celphos in monthly interval.

Plant Pathology

Disease monitoring have been done for nineteen times at Chitwan, Makawanpur, Lamjung, Jhapa, Dang, Rupandehi, Dhangadi and Banke during September 2020 to February 2021. However, disease monitoring in the hilly stations of NARC couldn't be accomplished due to COVID-19 threat. Major disease observed during the season was northern leaf blight. Highest score of northern leaf blight was observed in inbred lines at Rampur whereas inbred lines RML 150 and RML 18 were disease free at stem elongation stage in western terai regions (Dhangadhi, Nepalgunj, Dang,) of Nepal.

One hundred and twenty-five maize genotypes screened for northern leaf blight resistance was done at Rampur. It was scored based on the number of lesions on the leaf which was ranged for 1-13 with average value 2. Twenty-three genotypes were found free for northern leaf blight on the basis of leaf lesion and 10 genotypes were infected on only one leaf. Mean AUDPC value was 866. Highest AUDPC value was of Pop corn budhokande2 (1750) and RL-290 (1750). Fifty-nine

genotypes had AUDPC value above average whereas RML-62 (133), RL-232 (154) and Rampur composite (182) were top most resistant genotypes among all.

Thirty-two maize hybrids were tested to assess stalk rot resistance in field condition at Surkhet during summer of 2077/78. Trial average for disease score was 0.9. Disease incidence was low during the season. Most of the hybrids were found least affected by the disease. Among all, RML-191/CML-444, RML-150/RL-105, RML-117/RL-111, RML-191/RML-18, RML-150/RML-96 and L-294/RML-170 were found immune.

Outreach Research

In coordinated farmer's field trial (CFFT) of hybrid maize conducted at Madi and Makawanpur genotypes CAH1715 (5.034 t ha^{-1}) and CAH196 (4.645 t ha^{-1}) found promising as compared to Rajkumar (4.633 t ha^{-1}) and Rampur Hybrid-10 (4.558 t ha^{-1}). In frontline demonstration conducted at Madi, chitwan pipeline hybrid RML-95/RML-96 and RML-86/RML-96 produced comparatively higher yield 5.535t/ha and 5.640t/ha. In CFFT-Hill set, manakamana-7 showed better performance produced 6.035t/ha which is followed by RAMPUR S13F28 and KSYNF10 which produced 5.875t/ha and 5.080t/ha respectively. In CFFT terai set, genotype HGA produced the highest yield (5.354t/ha) followed by S0128 (4.939t/ha) and Farmer's variety (4.610t/ha).In CFFT-Q, genotypes S99TLYQ-AB (6.914t/ha) produced highest grain yield in comparison to Poshilo Makai-1 (6.071t/ha) and local check (6.688t/ha).In CFFT-E, genotypes EEYC1 (4.995t/ha) produced highest yield. The result of Farmers Acceptance Test (FAT) concluded that Rampur Hybrid-10, CAH1715, Manakamana-9, Manakamana-7 produced 10 to 35% more yield as compared to adopted maize varieties at Madi and Suping.

In CFFT on rice conducted at Madi, higher yielding rainfed normal rice were TP-30617 (4.55t/ha) and TP-26777 (4.05t/ha), fine and aromatic rice NR-2191-1-6-2-1-2-1 (3.79t/ha) and early rice was HHZ26-DT1-L11-L11 (4.24t/ha). Likewise, in CFFT wheat, higher grain yield was obtained from BANDGANGA (3.46t/ha).

Collaborative Experiments

Rice

In CVT normal, genotypes NR-2189-11-4-1-2-1 (5.420t/ha) followed by NR-2187-25-2-4-3-1(4.900t/ha),SVIN323(4.430t/ha)andNR-2184-20-2-1-7-1 (4.42t/ha) produced highest grain yield. Likewise high yielding fine rice was SVIN-054 (4.770t/ha) followed by NR-2195-22-1-1-2-1 (3.780t/ha) which gave relatively higher yield over check varieties Samba masuli sub-1 (3.660t/ha) and Sugandhit dhan-1 (3.620t/ha). High yielding early rice genotype was TP-30535 (5.170t/ha), IR 15L1717 (4.960t/ha) and TP 30529 (4.490t/ha produced higher yield over check varieties Radha-4 (4.420t/ha) and Hardinath-3 (4.260t/ha).

Wheat

In wheat, genotypes BL-5066 (4.310t/ha) produced highest grain yield followed by NL-1499 (4.180t/ha) over to standard check Bhrikuti (3.710t/ha) and Gautam (3.570t/ha) in initial yield trial. Similarly genotypes namely, NL-1452 (3.860t/ha), NL-1423 (3.780) and NL-1437 (3.750t/ha) produced better yield in comparison with standard check Gautam (3.220t/ha) and Bhirkuti (2.780t/ha) in in coordinated varietal trial. Based on AUDPC value, top 10 resistant varieties were Triticale-23, BL-4818, Khajura Durum-1, NL-971, Khajura Durum-2, Chyakhura (NL-1164), NL-1094 (danphe), NL-1278, Gaura and NL-1179 with AUDPC value less than 380. Maximum AUDPC value was observed on Pitic 62 (748) followed by Vinayak (553) and Kalyansona (553). Trial average value of AUDPC was 344. Likewise based on leaf rust incidence, 10 wheat varieties Aditya, NL-971, Bandganga (BL-3623), Chyakhura (NL-1164), NL-1307, NL-1327, NL-1202, Khajura Durum -1, Khajura Durum-2 and Triticale-23 were found immune whereas Annapuran 4, Gautam, Sowgadwari, NL-1369 and BL-1135 were moderately resistant in field condition. Highly susceptible varieties were Dhaulagiri, Gaura, Kanti, Rohini, Annapuran-1, Vinayak, RR21 and Pitic 62 having 100 S reactions. Altogether 20 wheat genotypes were evaluated at RTN. Check variety Morocco was found severely infected with the leaf rust score of 80 S. HP-163, Faisalabad 83, INQUILAB 85, Faisalabad 83, PBW-660 and H-2687 were only trace infected but others had shown moderately resistant to susceptible response.

Seed Production

National Maize Research Program produced 21,368 kg of maize breeder and foundation seed, 17,079 kg of rice foundation seed, 200 kg of sun hemp foundation seed and 350 kg of sesbania foundation seed in the fiscal year of 2077/78.Under MASS project twelve thousand nine hundred kilogram of maize foundation seed was produced in the CBSP of Gorkha, Gulmi, Arghakhachi, Pyuthan and Rolpa.

Maintenance

Grid selection was completed in Rampur Composite and Deuti. Half sib family selection was completed in Arun-2, Manakamana-3 and Poshilo Makai-1 and 2.5 kg, 3.0 kg and 2.0 kg nucleus seed was produced in those varieties respectively.

Special Project

Multinational Company Hybrid (MNCH)

A total of 88 multinational company hybrids and two checks Rampur hybrid 10 and RML86/RML96 were evaluated during winter season of 2077 at NMRP, Rampur. The highest grain yield was recorded for MRM4065 (9.422t/ha) followed by 4118 (9.018t/ha), ADV757 (8.908t/ha), RMH-567 (8.655t/ha), MRM4062 (8.576t/ha), MM2122 (8.276t/ha) and NK6702 (8.208t/ha) produced relatively higher grain yield over to standard check Rampur hybrid 10 (4.570t/ha)

and RML86/RML96 (5.615t/ha). These hybrids are likely to be accepted by Nepalese farmers as human consumption and poultry/livestock feed.

Nepal Seed And Fertilizer Project (NSAF)

Early multiple stress tolerant pro vitamin A enriched maize hybrids trial conducted at Rampur genotypes PVAQEH-1 (7.410 t ha^{-1}) produced higher yield than RH-10 (7.050 t ha^{-1}) and Rajkumar. In addition, from pro vitamin A enriched bio-fortified maize hybrids (Yellow and Orange) trial genotype A1804-14 (8.050 t ha^{-1}) produced high yield than Rampur Hybrid-10.

Heat Tolerant maize for Asia (HTMA)

The result obtained from drought tolerant hybrid maize conducted at Rampur showed genotypes VH18687, VH1846, VH171143 and CAH196 produced high yield as compared to Rampur hybrid 10 and Rajkumar under natural condition. Twenty seven ton F1 seed of different varieties were produced through seed production company and cooperatives in collaboration with NMRP.

Prime Minister Agriculture Modernization Project (PMAMP)

Four-ton F1 seed of Rampur Hybrid-10 was jointly produced by PMAMP-Dang and Gorkha Seed Company Dang in collaboration with NMRP. In addition, seed production of Rampur composite was conducted at Shinta-9, Surkhet in 5 ha land by Pabitra Cooperatives Surkhet to produced five tons foundation seed. Seed grader (multicrop) having 1.5 t hr^{-1} was purchased and installed at seed processing complex of NMRP, Rampur. Two cold stores having capacity of 12 ton and 2 ton have installed at Rampur.

Feed The Future Nepal Integrated Pest Management (FTFNIPM)

Three parasitoids namely *Telenomus* and *Chelonis* in the egg and larvae of fall armyworm and *Cotesia* was found in stem borer larvae at NMRP and hopefully searching these parasitoids in the larvae of fall armyworm. Rearing of host egg (*Corcyra cephalonica) and* egg parasitoid *(Trichogramma chilonis)* and fall armyworm (*Spodoptera frugiperda*) in laboratory condition at Rampur is smoothly running and now able to supply seed of parasitoids as a Tricho-card throughout the year to the government and private laboratory if the demand is received.

1. Working Context

Introduction

The National Maize Research Program (NMRP) was evolved as a part of the Rapti Valley Development Project (RVDP) in the year 2013 B.S. (1956 AD) with a view to rehabilitate the flood victims of 2011 B.S. (1954 AD) and to test, develop and recommend a package of farming system technologies to newly settled farmers. However, the systematic research activities were initiated from the year 2020 B.S. (1963). With the inception of commodity research program in 2029 B.S. (1972 AD), this office was mandated for the research and development of maize and maize based cropping system. After the establishment of Nepal Agricultural Research Council (NARC) in 2048 B.S. (1991 AD), this station was renamed as the National Maize Research Program (NMRP) and mandated to develop appropriate maize and maize based technologies for various agro-ecological zones of the country. NMRP, Rampur is located about 10 km west of Bharatpur, the district headquarter of Chitwan, in inner terai (Siwalik Dun Valley) region of Nepal. The geographical location is 27° 40'N latitude, 84° 19' E longitude at an altitude of 228 meter above sea level.

Goal

Increase production and productivity of maize and maize based cropping system in sustainable manner for improving national food, feed and nutritional security.

Objectives

- To collect, characterize, utilize and conserve different local and exotic maize germplasms
- To develop high yielding, disease and insect resistant early, extra early and full season OPVs of maize suitable for different agro-environments
- To develop high yielding disease and insect tolerant single cross, double cross and top cross hybrids for terai and foot hill valleys
- To undertake basic, applied and adaptive research work on maize and maize based cropping system
- To conduct different outreach research activities on maize based cropping system in three districts Chitwan, Makawanpur and Nawalparasi with active participation of related stakeholders
- To develop/test different agriculture implements/machineries in order to increase maize production with reduced cost and drudgery
- To generate maize based conservation agriculture technologies for improving soil health/fertility and increasing maize productivity in a sustainable manner
- To work as national institute for research, training and education in

maize and maize based cropping system
- To work as repository of information on maize and maize based technologies
- To disseminate maize and maize based technologies to the different stakeholders through electronic media, booklets, folders, leaflets and posters
- To establish and strengthen national and international linkages for e×change of knowledge, research materials and collaborative research works
- To produce source seeds of maize (BS, FS) and rice for distribution to different clients according to their demands (balance sheet of NSB)
- To publish research findings, recommend verified technologies and collaborate with disseminating partners for its wider dissemination

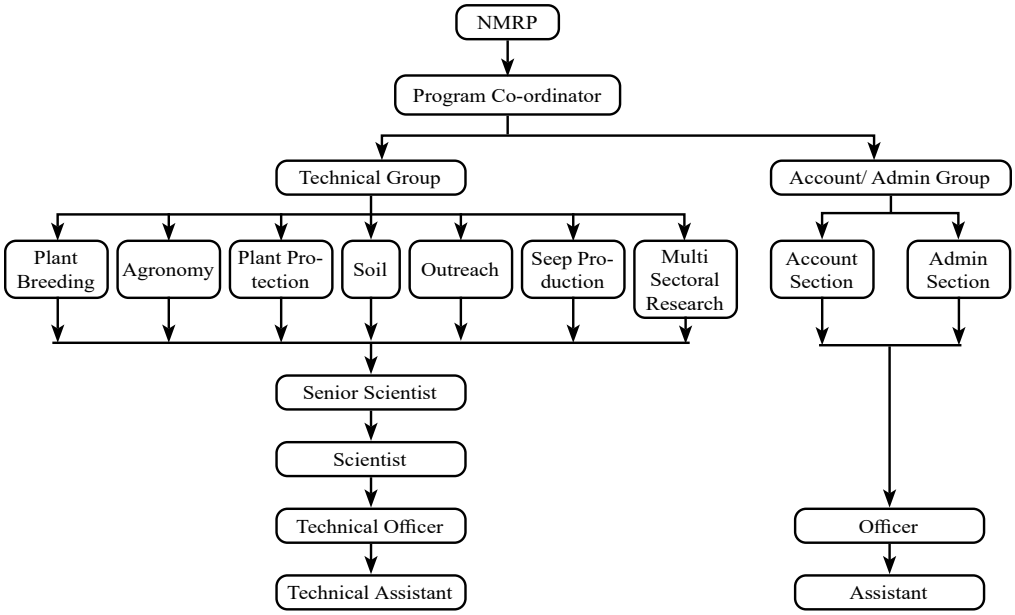
Geography and climate

The geographical location of National Maize Research Program (NMRP), Rampur, Chitwan is 27˚40' N latitude, 84˚19' E longitude at an altitude of 228 meter above sea level. It has humid and subtropical climate with cool winter and hot summer. The soil is generally acidic (pH 4.6-5.7), light textured and sandy loam. The average total annual rainfall of 16 years (2000-2016 AD) was 2215.30 mm with a distinct monsoon period (>75% of annual rainfall) from mid-June to mid-September. The command area covers Chitwan and Siwalik valley of Nawalpur and Makawanpur districts. The main objective of outreach research is to reduce the yield gap between on-station and on-farm in maize.

Infrastructure and facilities

The farm has total area of 101 ha., of which 25 ha. was utilized by Natioanl Cattel Reasearch Porgram Rampur. Out of 76 ha. approximately 2 ha is occupied by office buildings, residences, thressing floor, polyhouses, guardhouse, seed buildings, garage and roads. Around 40 ha. lands of farm have partial irrigation facilities with 5 deep boring and government irrigation canal. Farm has also the facilities of laboratories for pathology, entomology, soil science and equipped seed processing unit for seed section.

Organizational Structure of NMRP



2. Research Highlight

2.1 Plant Breeding

2.1.1 Hybrid Maize Research and Development

2.1.1.1 Evaluation of Single Cross Hybrids in Observation Nursery (OBN-H)

During the winter season of 2020-21, 110 single cross hybrids were evaluated at NMRP. The main objective of this trial was to identify high yielding and best performing single cross hybrids suitable for Rampur and similar locations. Among the major research traits of maize; grain yield, days to anthesis, days to silking, plant height, ear height, number of plants per hectare, number of ears per hectare and ear aspect were evaluated. All evaluated traits were found statistically different among those 110 genotypes. The mean grain yield for those 110 single cross hybrids was 7.9 t ha^{-1} ranging from 1.194-14.778 t ha^{-1}. Similarly, mean value of anthesis days, silking days, plant height, ear height, number of plants per hectare, number of ears per hectare and ear aspect was 90 days, 91 days, 194 cm, 98 cm, 41674, 71781 and 2.5 respectively. Slightly higher deviation on sample data was found for grain yield, number of plants per hectare and number of ears per hectare having CV of 25%, 25.2% and 23.8% respectively (Table 1). Among those evaluated single cross hybrids, high yielding genotypes were RL-232/RL-111 (14.77 t ha^{-1}), RML-85/RML-146 (12.79 t ha^{-1}), RML-145/RML-98 (12.74 t ha^{-1}), RML-11-1/RML-298 (12.50 t ha^{-1}), RML-86/RML-146 (12.44 t ha^{-1}), RL-296/RML-170 (12.01 t ha^{-1}), RML-117/RL-111 (11.95 t ha^{-1}), RML-76/RL-105 (11.17 t ha^{-1}), RML-94/RL-298 (11.03 t ha^{-1}), RL-294/RML-170 (10.87 t ha^{-1}) and so on. Genotypes which had the grain yield higher than nine t ha^{-1} per hectare had the double cob bearing character (E:P ratio >1.6) except for RML-117/RML-111, RL-242/RML-105, RL-236/RML-96, RML-11-1/RML-18 and RL-35-1/RML-18. Details on evaluated single cross hybrids is presented in the table 1.

Table 1: Evaluation of single cross hybrids in winter season of 2020/21 at NMRP, Rampur

Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	EA
RL-232/RL-111	14.778	97	95	238	130	51667	106667	2.3
RML-85/RML-146	12.798	96	96	230	103	51667	106667	2.5
RML-145/RML-98	12.749	90	93	215	100	53333	105000	2.0
RML-11-1/RML-298	12.508	92	90	220	110	55000	101667	2.8
RML-86/RML-146	12.446	94	95	225	113	51667	115000	2.8
RL-296/RML-170	12.010	93	97	200	90	50000	83334	2.0
RML-117/RL-111	11.952	88	88	220	110	60000	81667	2.5
RML-76/RL-105	11.175	94	96	203	110	55000	98333	2.3
RML-94/RL-298	11.031	97	98	185	90	50000	98333	2.5

Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	EA
RL-294/RML-170	10.878	92	94	185	90	41667	85000	1.5
RML-76/RML-17	10.498	91	85	198	100	56667	85000	2.3
RML-4/RL-111	10.453	89	92	193	95	46667	78334	2.3
RL-107/RML-96	10.399	89	91	228	120	53333	93334	2.5
RL-36/RL-105	10.389	92	98	205	108	45000	90000	2.3
RL-102/RML-17	10.326	90	89	200	110	56667	93333	2.3
RML-144/RL-111	10.219	92	94	193	98	45000	80000	2.0
RL-242/RML-105	10.142	91	91	188	90	55000	80000	2.0
RL-229/RML-2	10.114	94	95	220	115	45000	78334	2.5
RML-139/RML-17	9.996	93	92	180	100	41667	86667	2.0
RML-76/RML-146	9.775	95	95	238	103	55000	98334	3.3
RML-98/RL-105	9.678	95	96	198	95	38334	83334	2.5
RML-244/RL-105	9.616	89	89	185	103	43333	71667	2.0
RL-94/RML-17	9.607	84	83	170	100	46667	85000	2.8
RL-94/RML-2	9.495	86	87	190	108	46667	86667	2.0
RML-84/RL-101	9.418	88	87	205	105	56667	96667	2.5
CAH1715	9.403	91	89	238	110	45000	90000	2.5
RML-89/RL-105	9.384	93	89	190	120	50000	96667	2.8
RL-251/RML-17	9.341	87	87	208	120	50000	91667	2.5
RL-236/RML-96	9.319	85	86	240	110	48334	70000	2.3
RML-108/RML-2	9.263	84	86	190	93	45000	88334	2.3
RL-241/RL-105	9.184	93	94	215	105	50000	80000	2.3
RML-11-1/RML-18	9.139	93	95	163	80	51667	70000	2.5
RML-145/RL-105	9.117	94	90	195	93	50000	96667	2.5
RML-88/RML-18	9.085	92	95	185	80	43333	76667	2.5
RL-35-1/RML-18	9.066	92	94	165	85	48334	71667	2.0
RML-93/RML-18	8.946	91	94	165	80	48334	86667	2.3
RL-153/RL-105	8.920	88	91	205	100	48334	80000	2.5
RML-191/RL-105	8.819	88	87	193	93	53334	98333	2.3
RL-78/RL-111	8.793	92	94	183	98	45000	71667	2.3
RL-248/RML-140	8.709	81	83	193	95	50000	90000	2.5
RML-150/RL-101	8.673	86	86	213	105	48334	81667	2.3
RL-239/RML-17	8.639	91	89	180	95	41667	81667	2.5
RML-85/RML-17	8.611	98	94	200	93	35000	70000	3.0
RML-95/RL-105	8.591	94	93	205	115	38334	81667	2.5
RML-88/RL-298	8.533	94	94	205	90	38333	73334	2.3
RL-272/RML-96	8.488	84	84	193	90	43334	68334	1.8
RML-115/RL-105	8.454	95	92	183	98	40000	70000	3.0

Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	EA
RML-5/RL-101	8.394	92	97	183	93	43334	73334	2.3
RML-4/RL-105	8.353	97	97	183	88	41667	80000	2.8
RML-108/RL-101	8.295	89	94	185	110	46667	78334	2.5
RL-107/RL-101	8.201	93	94	208	95	48333	88334	2.3
RML-58/RML-105	8.181	94	92	218	118	36667	73334	2.3
RML-145/RL-101	8.147	87	88	223	113	56667	85000	2.8
RML-150/RL-105	8.145	91	93	193	100	46667	86667	2.5
RL-208/RL-174	8.140	76	81	170	93	56667	90000	3.3
RL-21-1/RML-2	8.132	92	93	190	118	41667	73334	2.5
RML-65/RML-18	8.128	96	99	185	93	45000	81667	2.8
RL-107/RML-84	8.106	92	93	193	83	40000	66667	2.5
RML-37/RL-105	8.055	88	91	190	104	49167	88333	2.6
RL-12/RML-17	8.009	91	95	180	90	40000	65000	2.3
RML-191/CML444	8.007	90	91	210	120	46667	70000	3.3
RML-150/RML-98	7.917	85	84	183	73	35000	70000	2.5
RL-107/RML-105	7.915	91	90	215	110	38334	66667	2.3
RL-122/RML-2	7.767	86	89	205	110	36667	65000	2.3
RML-150/RML-96	7.741	83	89	218	115	48334	85000	2.8
RL-94/RL-101	7.687	94	93	185	110	53333	100000	2.8
RL-243/RML-140	7.631	84	86	195	103	48333	48333	1.8
RL-215/RML-2	7.496	90	90	188	100	36667	65000	2.5
RML-150/RML-84	7.419	88	88	210	100	45000	78333	2.5
RL-180/RL-105	7.275	92	92	203	148	40000	65000	2.5
RML-9/RML-105	7.050	88	89	220	105	45000	75000	2.8
RL-29/RL-105	7.041	93	98	190	113	35000	65000	2.8
RL-173/RML-18	7.022	87	90	148	70	38334	58334	1.8
RML-114/RML-140	7.018	86	88	185	90	41667	50000	2.8
RML-108/RL-111	6.974	86	91	180	100	35000	65000	2.5
RL-269/RL-174	6.766	86	82	180	85	41667	71667	2.8
RL-280/RML-17	6.609	94	94	188	90	35000	66667	2.3
RML-191/RML-18	6.560	85	88	180	95	43333	61667	2.0
RL-279/RL-170	6.556	99	100	210	100	36667	66667	3.0
RML-58/RL-111	6.466	88	88	200	83	33334	51667	2.8
RL-215/RML-17	6.322	87	87	145	95	41667	58333	3.0
RML-98/RML-96	6.247	96	92	200	90	26667	58334	2.5
RL-280/RML-96	6.236	90	93	185	70	31667	61667	2.3
RL-204/RML-17	6.171	83	82	185	90	51667	68333	2.5
Rampur Hybrid-10	6.154	86	88	193	85	43334	55000	2.0

Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	EA
RL-29/RML-140	5.914	81	85	190	95	36667	50000	2.5
RL-249/RML-17	5.830	88	87	190	103	33333	46667	2.5
RL-265/RML-18	5.765	90	94	183	85	36667	40000	2.5
RML-84/RL-105	5.759	91	90	188	103	33333	61667	3.0
RML-251/RML-17	5.750	90	89	185	115	35000	66667	3.3
RML-9/RML-96	5.519	86	87	193	90	31667	53334	3.0
RL-150/RL-111	5.411	93	96	200	95	48334	81667	3.5
RML-97-2/RL-105	5.403	93	96	208	105	33334	58334	3.0
RL-288/RML-18	5.087	96	98	190	90	26667	43334	2.5
RL-249/RML-96	5.042	83	84	210	105	35000	36667	2.0
RL-213/RL-105	4.941	88	90	178	98	30000	60000	3.3
RML-84/RML-96	4.688	90	92	175	95	20000	50000	3.0
RML-95/RML-96	4.660	89	93	175	88	23334	41667	2.8
RML-145/RML-140	4.552	86	87	190	105	31667	43333	2.8
RL-238/RL-111	4.434	88	92	190	95	25000	28334	2.5
RML-9/RML-98	4.258	88	88	185	85	20000	40000	2.8
RL-100-1/RML-140	4.106	85	90	138	85	20000	40000	2.8
RML-89/RML-140	3.827	101	103	193	80	25000	46667	3.5
RML-9/RML-140	3.820	91	92	185	90	26667	40000	3.5
Rampur Hybrid-6	3.719	95	94	183	88	20000	28334	2.8
RML-138/RML-140	2.826	97	103	170	73	16667	35000	3.5
RML-57/RL-174	2.373	83	86	185	95	16667	25000	2.8
RL-21-1/RML-140	1.804	94	99	155	80	16667	16667	2.8
RML-95/RML-140	1.194			150	70	16667	16667	3.5
Mean	7.903	90	91	194	98	41674	71781	2.5
F test	**	**	**	**	*	**	**	**
LSD, 0.05	3.90	5.08	5.47	33.09	27.3	20795	33757	0.77
CV, %	25.0	2.9	3.0	8.6	14.0	25.2	23.8	15.3

Performance of Single cross hybrids in observation nursery at Rampur, Tarahara, Parwanipur and Nepalgunj on winter season of 2020-21

During the winter season of 2020-21, 145 single cross hybrids were evaluated in observation nursery at Rampur, Tarahara, Parwanipur and Nepalgunj. The trial was conducted with one row of 4 meter long without replication per location. Data related with the major traits like grain yield, anthesis days, silking days, plant height, ear height, number of plants per hectare and number of ears per hectare were recorded. The genotypes were different for all evaluated traits. The mean grain yield for those evaluated genotypes across all locations was 3.86 t ha^{-1}. Likewise, mean value of DTT, DTS, PHT, EHT, NOP ha^{-1} and NOE

ha^{-1} was 113 days, 117 days, 152 cm, 73 cm, 38017 and 37799 respectively (Table 2). Among those evaluated genotypes, high yielding genotypes in all four locations were VH1846 (6.39 t ha^{-1}), RL-21-1/RML-140 (6.28 t ha^{-1}), RML-89/RML-140 (5.82 t ha^{-1}), RML-150/RML-98 (5.59 t ha^{-1}), RML-4/RL-111 (5.53 t ha^{-1}), RL-232/RML-18 (5.49 t ha^{-1}), RML-76/RL-105 (5.48 t ha^{-1}), RML-58/RL-111 (5.47 t ha^{-1}), RML-107/RL-111 (5.43 t ha^{-1}), RL-236/RML-96 (5.32 t ha^{-1}) and so on. Details on evaluated hybrids is presented in the table 2.

Table 2: Single cross hybrids in observation nursery at Rampur, Tarahara, Parwanipur and Nepalgunj on winter season of 2020/21

Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE
VH1846	6.395	112	115	150	71	49167	48333
RL-21-1/RML-140	6.285	113	117	149	71	50834	53333
RML-89/RML-140	5.825	118	116	153	78	52500	53333
RML-150/RML-98	5.595	113	115	158	75	36667	42500
RML-4/RL-111	5.535	115	118	166	77	45000	37500
RL-232/RML-18	5.494	117	120	158	73	46667	51667
RML-76/RL-105	5.483	117	121	160	73	45000	47500
RML-58/RL-111	5.475	113	117	195	93	49167	43334
RML-107/RL-111	5.434	113	116	175	84	44167	44167
RL-236/RML-96	5.322	110	112	139	76	47500	46667
RML-86/RML-146	5.274	117	120	181	87	46667	46667
RL-290/CML226	5.185	114	116	176	87	47500	40833
RL-242/RL-105	5.168	111	109	149	69	34167	37500
RML-145/RL-298	5.142	114	116	166	81	43333	47500
RL-243/RML-140	5.098	110	113	143	74	43334	40833
RL-21-1/RML-98	5.080	115	118	158	77	44167	45000
RL-217/CML226	5.073	116	115	169	88	44167	36667
RML-145/RML-98	5.070	113	116	148	70	45000	48333
RL-21-1/RL-101	4.990	114	119	178	93	36667	39167
RL-251/RML-17	4.966	112	115	165	83	37500	42500
CAH1715	4.959	115	117	174	81	40834	45000
RL-248/RML-140	4.938	109	111	151	72	43333	50000
RML-98/RML-17	4.935	115	119	152	82	40000	44167
RL-270/RL-111	4.933	111	116	172	82	38334	40000
RML-83/RML-146	4.830	118	120	185	85	40000	41667
RL-274/CML226	4.809	113	115	180	84	37500	38333
RML-117/RL-111	4.794	114	117	164	76	35000	36667
RML-150/RL-105	4.780	114	116	154	71	39167	35834
VH13729	4.780	111	115	147	72	46667	42500
RML-145/RML-2	4.751	113	116	145	65	43333	45000
RL-294/RML-170	4.732	115	118	155	74	55000	43334

Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE
RL-78/RL-111	4.668	122	121	172	83	50000	50000
RL-249/RML-17	4.636	112	121	154	79	45000	42500
RML-76/RML-146	4.631	117	117	179	85	43334	40833
RL-102/RML-17	4.540	112	114	164	92	38333	42500
RML-144/RL-111	4.523	115	118	170	77	35000	36667
RML-88/RL-298	4.479	115	117	158	81	46667	47500
RL-232/RL-111	4.431	115	119	196	95	40833	41667
RML-191/RML-18	4.381	114	116	154	70	40834	39167
RML-84/RML-2	4.340	114	117	152	79	35000	36667
RML-114/RML-84	4.306	112	115	154	67	44167	41667
RML-84/RL-101	4.303	114	117	167	78	40833	37500
RL-244/RML-140	4.293	111	113	140	63	39167	35000
RL-235/RL-111	4.285	112	116	167	76	45000	49167
RL-35-1/RML-18	4.281	114	118	125	57	42500	43333
RL-286/RML-18	4.234	116	119	143	57	32500	33333
RL-241/RL-105	4.201	112	114	139	67	33334	31667
RML-145/RL-101	4.197	111	116	161	77	39167	39167
RML-145/RML-140	4.189	109	113	157	69	38333	40000
RL-279/CML226	4.144	115	119	174	84	30834	35834
RL-30-3/RL-111	4.119	112	115	166	86	30000	36667
RL-248/RML-96	4.111	109	111	163	79	47500	47500
RL-272/RML-96	4.107	111	116	159	66	45000	45833
RML-9/RML-140	4.007	110	119	140	69	41667	44167
RML-84/RML-96	3.969	115	118	168	78	45833	50833
RL-94/RML-96	3.957	111	114	156	80	45833	42500
RL-243/RML-17	3.943	113	115	156	79	34167	35834
RML-98/RL-105	3.942	120	123	144	68	30000	36667
RL-265/RML-18	3.913	116	117	129	53	34167	34167
RL-21-1/RML-2	3.907	117	119	149	78	37500	45833
RML-98/RL-111	3.903	115	119	142	69	38334	40833
RML-11-1/RML-18	3.899	116	121	139	63	41667	38333
RML-150/RML-84	3.897	112	114	158	66	44167	40000
RL-33-1/RL-105	3.889	113	116	142	67	47500	38333
Rampur Hybrid-10	3.875	113	115	158	71	30000	25833
RL-94/RL-105	3.874	114	116	147	79	36667	36667
RL-269/RL-174	3.822	109	112	132	51	39167	38333
RL-288/RML-18	3.822	116	119	134	61	33334	32500
RL-100-1/RML-140	3.798	112	115	131	57	45000	41667
RML-150/RL-101	3.744	114	117	158	72	33333	33333

Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE
RML-89/RL-105	3.730	116	120	147	73	35834	40000
RML-87/RL-105	3.724	117	121	138	71	41667	43333
RML-11-1/RL-298	3.724	115	117	160	84	41667	31667
RML-5/RL-101	3.721	114	118	153	67	31667	31667
RML-58/RL-105	3.708	113	115	184	85	30000	30000
RML-84/RML-17	3.693	114	117	150	76	34167	38333
RML-138/RML-140	3.668	115	119	149	63	37500	40000
RML-88/RML-18	3.658	115	117	138	62	37500	34167
RML-9/RML-96	3.657	114	115	145	66	36667	34167
RL-107/RML-96	3.657	112	113	165	83	33333	36667
RML-150/RML-140	3.644	112	115	133	59	38333	35834
RL-94/RML-140	3.641	111	114	131	68	38333	37500
RL-107/RML-84	3.639	113	117	153	69	48333	42500
RL-244/RL-105	3.624	118	122	144	68	35000	35000
RL-229/RML-2	3.606	114	118	172	87	45000	40000
RL-249/RML-96	3.580	110	113	150	69	45833	36667
RL-94/RML-17	3.577	112	113	143	76	33333	40000
RML-9/RML-98	3.563	112	118	135	67	38334	41667
RL-296/RML-170	3.538	116	120	153	76	39167	38333
RL-291/RML-18	3.514	115	119	132	56	28333	36667
RL-215/RML-17	3.504	110	111	149	79	32500	38334
Rampur Hybrid-6	3.483	115	117	149	72	45000	42500
CAH196	3.479	114	117	155	71	50000	45000
RL-94/RL-101	3.465	111	114	152	72	37500	42500
RML-93/RML-18	3.452	114	115	151	62	40834	44167
RL-133/RML-18	3.426	114	117	141	63	31667	32500
RL-107/RL-101	3.419	112	116	166	82	38334	36667
RML-114/RML-140	3.388	113	117	141	64	43333	33333
RL-280/RML-96	3.384	112	115	162	80	44167	27500
RML-95/RML-140	3.378	113	116	140	73	33334	40000
RML-84/RML-140	3.376	114	118	141	70	35000	40000
RML-95/RL-105	3.375	116	119	148	68	29167	34167
RL-94/RML-2	3.362	111	115	150	70	37500	37500
RML-68-1/RL-101	3.360	114	117	148	72	35834	30834
RML-9/RML-105	3.348	111	115	135	57	39167	41667
RL-173/RML-18	3.341	116	118	136	58	30833	30000
RL-208/RL-174	3.308	108	112	138	62	34167	38333
RL-239/RML-17	3.304	115	118	140	72	35833	35834
RL-222/RML-96	3.300	110	112	172	87	45834	43333

Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE
RML-85/RML-17	3.263	117	122	156	86	31667	32500
RML-150/RML-96	3.260	112	116	170	78	35834	30000
RL-222/RML-2	3.242	113	117	161	87	40000	37500
RML-108/RL-111	3.233	113	118	147	77	36667	30834
RL-219/RL-151	3.225	114	118	135	63	33333	39167
RML-98/RML-96	3.217	118	120	146	78	37500	40000
RML-108/RL-101	3.201	111	113	152	79	33333	38333
RL-213/RL-105	3.180	111	113	132	59	25833	27500
RL-215/RML-2	3.142	112	114	139	73	37500	37500
RL-217/RML-18	3.133	115	116	146	66	26667	28334
RML-85/RML-146	3.132	118	121	167	76	32500	30000
RML-115/RL-105	3.119	114	116	121	59	24167	22500
RL-12/RML-17	3.098	115	118	150	76	33333	35000
RL-215/RML-96	3.081	111	113	154	73	34167	30000
RL-21-1/RL-111	3.054	117	118	154	80	32500	32500
RML-57/RML-17	3.026	116	118	153	73	25833	25833
RML-87/RML-96	3.015	115	118	148	71	45833	41667
RML-94/RL-298	2.972	116	118	155	76	40000	39167
RL-29/RL-105	2.970	113	116	122	60	22500	22500
RL-213/RML-17	2.965	112	115	147	73	31667	31667
RL-204/RML-17	2.873	110	113	150	72	31667	30000
Rajkumar	2.831	111	115	150	73	31667	26667
RML-139/RML-17	2.786	115	118	145	78	30000	34167
RL-107/RL-105	2.716	114	118	147	67	32500	30833
RML-65/RML-18	2.711	115	120	146	64	35833	35000
RL-29/RML-140	2.684	108	112	125	59	34167	29167
RL-153/RL-105	2.664	113	116	163	78	30834	33333
RL-180/RL-105	2.638	113	117	150	68	30000	30000
RML-108/RML-2	2.615	112	116	141	60	39167	33334
RL-281-1/RML-17	2.615	117	119	140	80	30000	35000
RL-280/RML-17	2.610	117	120	140	66	24167	28334
RML-138/RML-96	2.507	115	118	143	77	32500	34167
RML-57/RL-174	2.060	110	111	117	51	25000	25833
RL-215/RL-151	1.642	112	116	151	80	34167	19167
RL-150/RL-111	1.014	116	117	132	56	25000	24167
RML-83/RL-197	0.386	108	117	116	42	25000	15000
Mean	3.861	113	117	152	73	38017	37799
F test	*	*	**	**	**	*	*
LSD, 0.05	4.734	9.11	10.60	25.1	14.6	15404	15697

Performance of single cross hybrids observation nursery in spring season of 2021 at NMRP, Rampur

NMRP developed 195 genotypes of single cross hybrids of maize were evaluated in spring season of 2021 at NMRP, Rampur. To develop the high yielding and better performing hybrids of maize, evaluation of single cross hybrids was conducted both in winter and spring season. Among those evaluated genotypes, traits like grain yield, anthesis days, silking days, number of plants per hectare and ear aspect were found statistically significantly different while plant height, ear height and number of ears per hectare were found statistically non-significantly different. The mean grain yield for those evaluated genotypes was 3.6 t ha^{-1}, which is slightly low and may be due to poor crop managemnet. Among those 195 genotypes, grain yield was ranges from 0.74 to 8.08 t ha^{-1} and only 36 genotypes had grain yield higher than 5.0 t ha^{-1}. High yielding genotypes were RL-272/RML-96 (8.080 t ha^{-1}), RML-242/RL-105 (7.700 t ha^{-1}), RL-244/RML-140 (7.670 t ha^{-1}), RL-242/RML-84 (7.020 t ha^{-1}), RL-21-1/RL-101 (6.620 t ha^{-1}), RML-95/RML-140 (6.410 t ha^{-1}), RL-249/RML-96 (5.990 t ha^{-1}), RL-249/RML-17 (5.980 t ha^{-1}), RML-150/RML-140 (5.960 t ha^{-1}), RL-269/RL-174 (5.840 t ha^{-1}) and so on, which is clearly predicted in table 3.

Table 3: Evaluation of single cross hybrids in spring season of 2021 at NMRP, Rampur

Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	EA
RL-272/RML-96	8.082	55	58	240	148	71667	61667	2.5
RML-242/RL-105	7.700	57	60	245	155	68334	70000	3.5
RL-244/RML-140	7.677	55	57	215	135	70000	73334	3.5
RL-242/RML-84	7.028	54	55	235	158	70000	60000	3.3
RL-21-1/RL-101	6.621	57	60	250	160	61667	53333	3.0
RML-95/RML-140	6.415	57	59	225	125	60000	68334	3.3
RL-249/RML-96	5.994	54	56	245	150	65000	63334	3.8
RL-249/RML-17	5.984	55	57	220	145	70000	63333	3.8
RML-150/RML-140	5.965	56	59	215	160	61667	65000	4.0
RL-269/RL-174	5.843	53	54	250	145	71667	55000	4.0
RML-191/RM-L18	5.757	56	57	228	140	70000	53334	3.5
RL-291/RML-18	5.718	58	60	215	130	56667	65000	3.0
RL-208/RL-174	5.650	53	54	245	135	66667	51667	4.3
RL-217/RML-18	5.594	55	57	223	135	61667	53333	3.8
RML-9/RML-140	5.529	55	57	280	130	65000	56667	3.8
RML-84/RML-140	5.488	55	56	243	145	63334	66667	3.8
RL-204/RML-17	5.334	60	64	260	160	66667	50000	4.0
HGAS2-13-1-1BB/RL-105	5.293	56	58	235	125	61667	61667	3.3
RML-87/RL-105	5.259	58	59	235	160	63334	45000	3.5

Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	EA
RL-235/RL-111	5.250	58	60	223	135	70000	56667	4.0
RML-98/RML-17	5.247	61	62	220	110	61667	45000	4.5
RML-94/RL-298	5.240	58	60	250	160	66667	48333	3.8
RML-57/RML-174	5.174	58	59	255	155	61667	46667	3.0
RL-29/RML-140	5.154	57	59	225	145	58334	46667	4.3
TX369	5.120	57	60	215	135	61667	48333	3.8
RL-294/RML-170	5.074	56	58	235	135	60000	55000	3.8
RML-145/RL-101	5.070	57	59	220	145	75000	46667	3.5
HGAS2-13-3-2-BB/RL-105	5.043	58	60	240	150	68334	58334	3.5
RL-248/RML-140	5.032	53	54	245	143	70000	66667	4.5
RML-150/RML-96	5.030	57	59	240	155	66667	60000	3.5
RML-83/RML-146	5.028	58	60	250	135	63333	51667	3.8
RML-84/RML-2	5.025	59	60	220	115	66667	56667	3.8
RL-238/RL-111	5.012	55	59	225	145	66667	50000	4.0
RL-271/RL-111	5.010	57	60	255	155	68333	40000	4.0
HGAS2-3-1-1BB/RL-105	5.002	61	64	230	145	66667	53334	3.3
RML-191/CML-444	5.000	58	60	250	150	58334	51667	3.8
RL-107/RML-96	4.991	58	61	255	160	65000	55000	4.3
RL-248/RML-96	4.910	57	59	240	143	63334	63334	3.3
RML-191/RL-105	4.906	57	59	248	155	65000	61667	3.0
RL-236/RML-96	4.892	70	72	245	155	61667	56667	3.3
RML-88/RML-18	4.885	57	59	225	143	63333	38334	3.3
RML-114/RML-84	4.868	56	57	230	133	65000	45000	3.5
RL-274/RML-170	4.711	58	62	235	135	65000	45000	4.0
DEUTIS2-27-3-2BB/RML-62	4.709	58	62	230	125	66667	53334	4.0
RML-115/RL-111	4.682	59	63	220	145	70000	46667	3.8
07SADVI-11-1-2BB/RL-111	4.659	59	62	260	150	68333	50000	4.5
RML-84/RL-101	4.644	56	59	255	135	73333	45000	4.0
RL-35-1/RML-18	4.642	57	61	230	145	71667	53333	3.3
RL-279/RML-170	4.626	57	59	250	163	68334	46667	3.5
RL-94/RL-101	4.621	58	60	240	143	51667	60000	3.5
RML-87/RML-96	4.605	58	59	235	145	71667	48334	3.3
RL-273/RL-111	4.554	60	62	230	130	61667	46667	3.3
RL-21-1/RML-140	4.551	54	60	240	165	56667	46667	4.3
Rampur Hybrid-10	4.485	56	59	250	170	68334	45000	3.8
RML-191/RML-17	4.451	57	58	265	140	70000	55000	3.8
RML-84/RML-96	4.424	57	58	235	150	63334	50000	3.3
RML-117/RL-111	4.389	56	59	240	150	65000	43334	4.5

Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	EA
RML-89/RML-140	4.348	57	60	230	140	70000	50000	4.3
RML-150/RML-84	4.345	55	56	235	125	66667	53334	3.5
RML-9/RML-98	4.328	56	60	225	145	61667	40000	3.5
RL-107/RML-84	4.313	59	61	255	148	71667	65000	3.8
RL-222/RML-96	4.310	57	61	230	140	65000	40000	3.3
RL-281-2/RML-17	4.278	58	60	228	130	61667	53334	3.8
RML-84/RL-105	4.242	57	60	245	150	55000	46667	4.0
RL-270/RL-111	4.219	57	59	230	160	65000	41667	4.0
RL-244/RL-105	4.217	57	60	250	155	71667	40000	4.0
RL-94/RML-96	4.179	56	58	210	145	63334	45000	3.5
RML-8/RML-62	4.175	57	58	230	145	65000	43333	3.3
H08KH-845-40BB/RML-18	4.170	57	59	255	170	61667	45000	3.5
RL-242/RML-98	4.157	58	60	235	145	73333	40000	3.8
RML-150/RL-101	4.111	58	60	255	145	60000	45000	4.0
RML-76/RL-105	4.111	58	59	215	130	70000	58334	3.5
RL-215/RML-2	4.071	57	60	235	170	66667	53334	3.5
RML-5/RL-101	4.062	59	60	230	133	55000	56667	3.3
RL-94/RML-17	4.056	56	59	215	135	66667	45000	4.0
RL-30-3/RL-111	4.054	57	59	243	170	70000	38334	3.3
HGAS2-28-1-2BB/RML-18	4.048	57	59	220	140	68333	50000	3.3
RML-144/RL-111	4.039	58	62	235	135	66667	56667	4.0
RL-251/RML-17	4.018	55	56	235	150	70000	51667	3.5
RML-58/RL-111	4.004	58	62	230	165	63334	35000	4.0
RML-86/RML-146	3.953	57	60	230	155	63334	43334	3.8
RL-213/RL-105	3.902	57	60	218	125	70000	53333	3.3
RML-95/RML-96	3.884	59	62	230	145	55000	41667	4.3
HGBS2-31-2-2-BB/RL-111	3.868	57	60	255	155	63333	51667	3.8
RML-76/RML-17	3.823	59	62	230	155	66667	41667	3.5
RL-33-1/RL-105	3.759	60	64	225	160	66667	45000	4.3
RML-114/RL-111	3.738	58	61	235	155	68334	36667	3.8
RML-150/RML-98	3.697	55	58	250	155	70000	40000	3.5
HGABS2-10-2-3BB/RML-62	3.660	56	59	240	145	71667	35000	4.0
RML-108/RML-2	3.648	57	59	250	153	66667	35000	3.5
RML-93/RML-18	3.621	58	61	240	130	61667	48333	3.5
HGAS2-39-2-2BB/RML-18	3.618	57	62	250	130	68333	48334	4.0
RML-68-1/RL-101	3.603	58	62	250	170	68334	38333	4.3
RL-215/RML-96	3.598	57	59	235	135	55000	38334	3.5
RL-232/RL-111	3.594	58	61	245	140	68334	43333	4.0

Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	EA
RML-145/RML-140	3.589	55	59	240	145	66667	38334	4.0
RL-232/RML-18	3.576	61	64	225	165	71667	38334	3.8
RML-85/RML-17	3.570	57	59	210	165	61667	45000	4.3
RL-239/RML-17	3.569	58	62	255	165	63334	46667	3.5
RL-234/RML-96	3.563	59	62	265	135	61667	51667	3.8
RML-115/RML-98	3.546	59	61	225	135	65000	33334	3.8
RML-9/RL-105	3.534	58	60	228	150	43334	40000	3.5
RL-296/RML-170	3.485	58	60	240	140	41667	35000	4.3
RL-243/RML-17	3.484	58	60	240	150	71667	40000	3.5
RL-21-1/RL-111	3.477	58	61	250	160	65000	46667	3.8
RL-215/RML-17	3.466	56	58	220	145	63334	40000	3.5
RML-114/RML-140	3.405	55	58	240	155	61667	56667	3.8
RL-107/RL-101	3.374	60	64	235	165	63334	56667	4.3
RML-9/RML-96	3.343	55	58	230	140	65000	40000	4.0
RML-97-2/RL-105	3.340	60	64	195	113	66667	45000	3.8
RML-85/RML-146	3.313	61	63	250	145	66667	40000	4.3
RML-88/RL-298	3.305	56	58	190	135	73333	40000	4.5
RML-37/RL-105	3.256	56	59	245	150	73334	40000	4.5
RML-98/RL-111	3.253	59	61	250	145	61667	45000	4.0
RML-76/RML-146	3.216	60	62	240	125	68333	36667	4.0
RL-288/RML-18	3.215	57	61	250	115	63334	53334	3.8
RL-107/RL-105	3.209	59	62	255	150	66667	51667	4.3
HGAS2-1-1BB/RL-105	3.199	61	64	230	140	65000	35000	3.5
RML-145/RML-2	3.182	57	59	265	135	60000	36667	3.3
RL-286/RML-18	3.102	59	62	228	140	36667	38334	4.0
RL-215/RL-151	3.099	59	64	248	150	60000	38333	4.3
RL-102/RML-17	3.091	58	60	220	125	63334	36667	3.8
RML-107/RL-111	3.067	60	60	263	145	60000	36667	4.0
HGAS2-7-3-2BB/RL-105	3.050	58	60	235	155	68334	51667	4.0
RL-94/RML-2	2.957	58	61	220	145	65000	41667	4.3
RML-139/RML-17	2.955	57	60	220	135	66667	45000	4.8
RL-29/RL-105	2.899	59	61	240	138	63334	41667	4.0
RL-94/RML-140	2.891	57	59	210	115	73333	38334	4.3
RL-280/RML-18	2.874	58	61	245	140	60000	31667	3.8
RL-265/RML-18	2.873	59	62	225	130	65000	43334	4.0
RML-37/RML-17	2.842	56	58	253	148	66667	41667	4.0
RML-145/RML-98	2.828	59	62	238	135	60833	30000	3.9
RML-98/RL-105	2.784	62	64	200	108	53334	31667	3.8

Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	EA
RL-173/RML-18	2.744	58	61	240	153	60000	28334	3.5
RML-86/RML-96	2.730	59	62	250	140	55000	35000	3.5
RL-100/RML-140	2.728	55	60	245	170	66667	43334	4.0
HGABS2-15-2-1BB/RL-174	2.723	55	56	225	120	61667	36667	3.0
RML-145/RML-146	2.689	58	60	215	155	63334	36667	4.3
RML-11-1/RL-298	2.682	57	59	203	133	61667	28333	4.3
RML-84/RML-17	2.630	57	59	230	155	66667	36667	4.3
RML-138/RML-140	2.623	60	62	210	150	53333	35000	4.3
DEUTI-10-2-3-BB/RML-62	2.618	54	59	243	125	63334	33333	4.0
HGBS2-34-1-3BB/RL-111	2.609	58	61	230	155	61667	38334	4.8
RL-281-1/RML-17	2.588	58	60	250	148	46667	43334	4.3
HGAS2-23-1-1BB/RL-105	2.576	57	59	225	150	56667	38334	3.5
RL-153/RL-105	2.490	59	59	220	125	66667	35000	4.3
RML-97-1/RL-105	2.489	59	61	245	135	53334	38334	3.8
RML-108/RL-111	2.463	57	62	233	140	53334	26667	3.5
Rampur Hybrid-6	2.456	57	60	230	145	63333	36667	4.0
RML-89/RL-105	2.445	59	62	220	150	63334	38334	4.3
RL-36/RL-105	2.391	59	62	240	145	63334	31667	3.8
RL-241/RL-105	2.372	60	62	235	160	55000	30000	4.3
RML-150/RL-105	2.366	58	61	255	155	70000	36667	4.0
HBGS2-37-1-2BB/RML-62	2.314	56	61	235	165	71667	31667	4.0
Rampur Hybrid-4	2.275	56	60	233	140	60000	25000	3.8
RML-11-1/RML-18	2.265	59	62	288	160	48334	30000	4.0
RL-213/RML-17	2.264	56	57	225	125	63333	26667	3.5
HGBS2-7-3-BB/RL-111	2.245	57	61	220	135	58333	30000	4.0
RL-21-1/RML-98	2.240	59	61	235	150	58334	26667	4.3
RL-133/RML-18	2.235	59	62	230	140	60000	30000	3.8
RML-98/RML-96	2.230	62	66	250	135	63333	25000	4.5
RL-243/RML-140	2.224	57	60	230	135	65000	40000	4.3
RML-4/RL-111	2.222	60	64	220	150	58333	35000	4.0
RML-108/RL-101	2.190	58	61	235	135	66667	28333	4.0
RML-95/RML-105	2.181	60	63	245	178	71667	31667	3.8
CAH1715	2.087	59	62	230	145	58334	21667	4.3
HGAS2-8-3-2BB/RL-105	2.086	60	64	185	120	60000	28334	4.0
RL-280/RML-96	2.076	57	60	205	145	60000	23333	4.0
RL-222/RML-2	2.036	58	63	230	125	68334	25000	4.3
RL-217/RML-170	1.997	58	60	225	125	58333	30000	4.5
RML-1/RML-17	1.984	56	59	200	150	60000	26667	4.5

Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	EA
RML-57/RML-17	1.887	56	57	255	150	61667	36667	4.5
HGAS2-39-1-1BB/RL-105	1.883	61	63	245	125	46667	33334	4.3
HGABS2-10-2-3BB/RL-111	1.809	57	61	245	158	70000	28333	4.0
RML-138/RML-96	1.757	57	61	245	160	55000	23334	4.0
RL-290/RML-170	1.756	60	63	208	145	58334	25000	3.8
RL-78/RL-111	1.681	60	65	248	160	60000	21667	4.0
RL-280/RML-17	1.650	57	59	210	130	60000	28334	4.8
RL-12/RML-17	1.607	58	61	220	165	63334	28334	4.3
RL-180/RL-105	1.595	60	63	200	130	66667	31667	3.5
HGBS2-2-3-2BB/RL-105	1.567	58	64	220	138	58334	20000	4.3
RL-150/RL-111	1.555	60	62	240	128	65000	16667	4.3
HGBS2-17-3-1/RML-18	1.551	58	62	230	130	53334	18334	3.5
RL-219/RL-151	1.532	58	60	220	160	60000	33333	4.0
RML-145/RL-298	1.518	57	59	240	135	46667	21667	4.0
RML-4/RL-105	1.399	61	62	230	155	65000	30000	4.5
RML-58/RL-105	1.379	60	64	235	140	70000	20000	3.8
RL-94/RL-105	1.333	58	60	200	155	66667	23334	4.3
RML-105/RML-140	1.229	58	62	210	145	68333	21667	4.5
RML-65/RML-18	1.182	59	63	215	138	65000	16667	4.0
RML-83/RL-197	1.038	63	66	220	145	38333	16667	4.3
RL-21-1/RML-2	0.990	60	64	235	140	53334	15000	4.0
SADVI07-2-2-1-1BB/RL-111	0.945	58	64	240	155	61667	23334	4.0
RL-229/RML-2	0.741	62	65	235	155	65000	18333	4.0
Mean	3.606	58	60	234	144	63427	41991	3.8
F test	*	*	**	ns	ns	*	ns	*
LSD, 0.05	3.42	4.65	5.05	-	-	15203	-	0.99
CV, %	48.2	4.1	4.3	9.2	14.3	12.2	36.7	13.1

2.1.1.2 Performance of single cross maize hybrids in Coordinated Varietal Trial hill set (CVT-H)

A set of experiment was conducted in coordinated varietal trial during summer season in 2020 at Kabre, Lumle, Dailekh, Pakhribas and Surkhet as well as during winter season at Rampur, Tarahara, Parwanipur, Nepalgunj, Belachapi and Nawalpur in 2020/21 for the identification of high yielding hybrids adaptive to specific or wider range of environment. The results on grain yield, anthesis days, silking days, plant height, ear height, number of plants per hectare and number of cobs per hectare was different but insignificant on scoring of ear aspect during winter season of 2020/21 at NMRP, Rampur, Chitwan. The grain yield of 7.095 t ha^{-1} recorded from RL-294/RML-170 followed by RL-36/

RML-105 (5.760 t ha^{-1}), RML-76/RML-146 (5.733 t ha^{-1}), RML-11-1/RL-298 (5.617 t ha^{-1}), RML-191/RML-444 (5.478 t ha^{-1}), RML-85/RML-146 (5.117 t ha^{-1}) and RL-272/RML-96 (5.079 t ha^{-1}) which were similar with each other (Table 4). The grain yield of hybrid maize RML-294/RML-170 was higher due to significantly higher number of plants per hectare (50000) and number of cobs per hectare (48333) (Table 4).

Table 4: Evaluation of hybrids maize in coordinated varietal trial on winter season of 2020/21 at NMRP, Rampur

Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	EA
RL-294/RML-170	7.095	99	99	165	85	50000	48333	2.7
RL-36/RL-105	5.760	100	101	210	112	36667	41389	2.3
RML-76/RML-146	5.733	101	103	192	103	40000	31667	2.3
RML-11-1/RL-298	5.617	100	101	168	98	44167	39722	3.0
RML-191/RML-444	5.478	99	99	188	85	37778	34722	2.5
RML-85/RML-146	5.308	101	101	238	128	34167	40556	3.0
RML-87/RML-146	5.117	100	101	190	93	40278	42222	3.0
RL-272/RML-96	5.073	95	98	177	68	47500	40000	3.0
Rajkumar	4.815	94	95	185	100	45000	40000	3.0
RML-145/RL-105	4.501	96	98	158	73	35833	24166	3.0
RL-236/RML-96	4.375	95	100	183	88	43611	39444	3.3
RML-4/RL-111	4.289	100	103	178	98	31667	29167	3.0
RML-84/RL-105	4.047	96	99	178	88	35556	36945	3.3
RML-97-2/RML-105	3.918	97	99	172	87	36389	40833	3.3
RML-95/RML-140	3.751	97	100	153	60	30278	31389	2.5
CAH196	3.543	100	102	172	88	29722	26944	3.3
DMK 2	3.311	95	100	172	67	36389	28611	3.3
RML-76/RML-17	3.287	100	101	167	90	24444	24167	3.2
RML-4/RL-105	2.847	101	103	160	88	24167	28889	2.5
Rampur Hybrid-10	2.697	96	100	153	65	31944	23055	3.3
Mean	4.528	98	100	178	88	36778	34611	2.9
F test	*	**	*	**	**	**	*	ns
LSD 0.05	2.2	2.8	3.0	27.9	24.0	10934	16537	
CV, %	28.9	1.7	1.8	9.5	16.5	18.0	28.9	16.6

There was significant different was obtained on grain yield and all yield attributed traits among the tested single cross hybrids maize at DoAR, Tarahara during the winter season at 2020/21. Beside the tested single cross hybrid maize genotypes DMK 2 (6.106 t ha^{-1}), RL-236/RML-96 (5.679 t ha^{-1}), RML-4/RML-111 (5.584 t ha^{-1}), RL-272/RML-96 (5.121 t ha^{-1}), RL-294/RML-170 (5.147 t ha^{-1}) and RML-11-1/Rl-298 (5.071 t ha^{-1}) significantly higher grain yield obtained that

were more than 5.0 t ha^{-1} which might due to the significantly higher number of plant ha^{-1}, number of cobs per ha^{-1} and thousands grain weight (Table 5) of those genotypes which gave positive impact on grain yield.

Table 5: Evaluation of hybrids maize in coordinated varietal trial at DoAR, Tarahara in winter season of 2020/21

Genotypes	GY (t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	CL	NGPR	NRPE	TKW
DMK 2	6.106	102	107	160	66	51667	51667	13.3	27.4	14.1	342
RL-236/RML-96	5.679	101	104	179	89	48333	47222	12.7	26.6	14.4	322
RML-4/RL-111	5.584	107	111	177	80	42222	42222	13.7	30.9	14.5	331
RL-272/RML-96	5.212	101	104	175	79	48333	48333	15.2	27.5	15.6	320
RL-294/RML-170	5.147	106	110	171	80	42778	42222	16.2	34.3	15.4	315
RML-11-1/RL-298	5.071	104	108	178	94	43889	43889	14.4	30.3	13.4	357
RML-76/RML-146	4.965	108	113	187	91	48889	47778	13.7	32.0	13.5	291
CAH196	4.887	105	111	169	82	42222	41667	14.0	30.3	14.5	324
RML-76/RML-17	4.811	108	111	180	96	39444	40000	14.7	31.3	12.4	323
RL-36/RL-105	4.810	110	115	205	106	46667	45556	13.2	30.5	13.4	309
RML-84/RL-105	4.787	107	113	184	89	46667	46111	14.4	33.0	12.9	286
RML-145/RL-105	4.700	105	111	154	78	39444	38333	13.9	28.9	12.1	338
RML-191/RML-444	4.588	106	110	193	86	37222	37222	14.4	29.3	13.5	383
RML-85/RML-146	4.442	112	116	191	98	42778	41667	13.5	31.7	13.8	289
RML-95/RML-140	4.391	105	109	168	86	37222	36111	14.0	30.1	13.5	304
Rajkumar	4.313	102	107	175	82	38333	37778	16.2	32.1	15.6	319
RML-87/RML-146	4.283	112	116	214	106	41111	40556	14.9	33.8	14.2	313
RML-4/RL-105	4.196	111	115	184	91	44444	43889	12.8	30.2	13.4	311
Rampur Hybrid-10	3.342	105	108	166	67	36667	35000	12.9	32.0	13.1	397
RML-97-2/RML-105	2.743	108	114	171	87	40556	40000	13.0	29.9	11.8	286
Mean	4.703	106	111	179	87	42944	42361	14.0	30.6	13.8	323
F test	*	**	**	*	*	*	*	**	*	**	*
LSD 0.05	1.73	3.46	3.31	32.61	26.94	14268	14085	1.68	5.87	0.80	60.30
CV, %	22.3	2.0	1.8	11.0	18.8	20.1	20.1	7.2	11.6	3.5	11.3

In the same experiment planted at DoAR, Parwanipur during winter 2020/21 showed significant result on all the measured components (Table 6). The grain yield data showed that single cross hybrids namely RML-236/ RML-96 (5.816 t ha^{-1}), RML-85/RML-146 (5.700 t ha^{-1}), RML-4/RML-111 (5.401 t ha^{-1}), RL-272/RML-96 (5.389 t ha^{-1}) was higher grain yielding genotypes than check (Rampur hybrid -10) (5.148 t ha^{-1}).

Table 6: Evaluation of hybrids maize in coordinated varietal trial on winter season of 2020/21 at DoAR, Parwanipur

Genotypes	GY (t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	RL	SL	RE
RL-236/RML-96	5.818	108	110	182	100	47778	50000	5.7	16.2	6.5
RML-85/RML-146	5.700	119	122	221	119	54444	64444	12.3	14.5	19.9
RML-4/RL-111	5.401	111	114	179	94	49444	47778	24.8	12.5	1.4
RL-272/RML-96	5.389	108	110	176	78	41111	43333	23.9	24.4	5.6
Rampur Hybrid-10	5.148	110	112	174	88	35000	34444	14.1	19.1	5.6
RL-294/RML-170	5.097	113	116	176	95	46111	47222	10.1	25.7	15.6
CAH196	5.084	111	114	180	109	48889	50556	9.3	22.4	13.0
RML-191/RML-444	4.884	110	114	187	99	36111	35556	9.1	15.0	5.4
RML-145/RL-105	4.820	107	110	178	81	42778	44444	13.6	33.8	4.6
RML-87/RML-146	4.709	119	122	218	119	40556	51111	15.6	28.0	15.4
TK-1	4.689	114	120	203	103	49444	42222	7.6	14.0	34.2
RML-11-1/RL-298	4.627	108	111	187	94	36111	39444	44.1	44.9	3.9
RL-36/RL-105	4.539	114	119	188	102	46667	48889	7.3	55.1	14.8
RML-76/RML-17	4.410	111	114	184	96	43333	50000	12.9	31.3	14.6
RML-95/RML-140	4.237	109	111	168	91	40000	46111	6.9	48.8	20.4
RML-84/RL-105	4.236	111	114	167	86	37778	41111	1.4	46.4	9.6
Rajkumar	4.181	106	109	188	93	41667	46667	14.0	45.5	25.5
RML-4/RL-105	4.110	114	118	173	96	43889	42778	22.9	46.6	7.6
RML-76/RML-146	3.888	113	117	189	93	39444	41667	5.7	23.9	14.6
RML-97-2/RML-105	3.366	113	117	184	97	36667	38889	8.8	17.6	8.1
Mean	4.717	111	115	185	97	42861	45333	13.5	29.3	12.3
F test	*	**	**	**	*	*	**	*	**	**
LSD0.05	1.2	2.9	3.2	16.1	20.2	11985	10439	19.9	22.8	12.0
CV, %	15.3	1.6	1.7	5.3	12.7	16.9	13.9	89.0	47.2	58.8

The ANOVA revealed that highly significant differences on all the taken parameters of among the single cross hybrids at DoAR, Nepalgunj. The grain yield ranged from 2.648 to 6.152 t ha^{-1} with mean grain yield 4.350 t ha^{-1} (Table 7). The significantly highest grain yield recorded hybrid genotypes DKM-2 (6.152 t ha^{-1}) followed by RML-4/RL-111 (5.734 t ha^{-1}), CAH196 (5.669 t ha^{-1}), RL-294/RML-170 (5.509 t ha^{-1}) and RML-85/RML-146 (5.307 t ha^{-1}) (Table 7).

Table 7: Evaluation of hybrids maize in coordinated varietal trial on winter season of 2020/21 at DoAR, Nepalgunj

Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	CL	NRPE	NGPR	TKW
DMK 2	6.152	119	121	167	70	40000	40833	17.9	14.4	32.3	408
RML-4/RL-111	5.734	123	125	168	80	30556	31111	18.2	15.6	34.1	407
CAH196	5.669	121	123	160	69	42500	37222	19.3	15.1	36.7	388
RL-294/RML-170	5.509	120	121	155	73	33333	37778	19.0	15.6	34.0	383
RML-85/RML-146	5.307	124	127	187	89	38889	42222	17.8	13.3	35.7	332
RL-236/RML-96	4.953	119	121	172	77	33333	30833	19.1	15.9	28.6	462
RML-76/RML-17	4.893	122	124	158	70	37778	36944	18.3	13.7	32.6	328
RL-272/RML-96	4.890	119	120	156	62	33333	38611	18.4	14.8	30.3	405
RL-36/RL-105	4.758	123	125	175	91	38611	36944	17.5	13.7	37.9	375
RML-76/RML-146	4.439	123	125	176	74	38056	35556	17.9	14.5	33.4	314
RML-191/RML-444	4.343	123	124	178	76	28889	25278	18.3	13.9	33.5	447
RML-87/RML-146	4.256	123	126	172	81	31667	37500	17.8	14.8	30.7	322
RML-95/RML-140	3.767	122	125	131	58	26389	33333	17.7	14.7	28.5	364
Rajkumar	3.765	118	120	166	78	36944	30000	20.1	14.1	31.3	399
RML-11-1/RL-298	3.611	124	126	153	76	27500	28056	19.3	14.1	30.6	434
RML-4/RL-105	3.258	123	125	150	72	25833	26111	16.9	13.5	29.9	347
RML-145/RL-105	3.134	122	126	148	59	24722	22778	17.8	13.1	27.1	452
Rampur Hybrid-10	3.051	123	125	165	58	25000	19444	20.2	13.9	32.4	398
RML-97-2/RML-105	2.857	123	125	138	61	35556	32500	16.5	12.8	30.7	342
RML-84/RL-105	2.648	122	125	145	59	24444	25000	18.3	13.2	31.5	311
Mean	4.350	122	124	161	72	32667	32403	18.3	14.2	32.1	381
F test	**	**	**	**	**	*	**	*	**	*	**
LSD0.05	1.6	1.6	2.2	13.4	11.1	15085	11263	2.0	1.5	6.9	63.3
CV, %	21.6	0.8	1.1	5.0	9.3	27.9	21.0	6.5	6.5	13.1	10.0

Among twelve genotypes evaluated in CVT at Belachapi, high yielding genotypes were RML-191/RML-17 (7.953 t ha^{-1}) followed by RML-294/RML-170 (6.484 t ha^{-1}), Rampur Hybrid-10 (6.165 t ha^{-1}), RML-76/RML-146 (6.078 t ha^{-1}) (Table 8). Mean anthesis days for all genotypes were 113 days while genotypes RML-153/RL-105 and RML-145/RML-RL-105 early anthesis than other genotypes having anthesis days of 107. The mean days to silking for all genotypes was 115.

Table 8: Evaluation of hybrids maize in coordinated varietal trial on winter season of 2020/21 at ARS, Belachapi

Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	CL	CD	NRPE	NGPR	TKW
RML-191/RML-17	7.953	105	107	223	111	50000	55000	16.6	15.6	11.0	29.8	395
RL-294/RML-170	6.484	114	113	197	102	50556	75278	17.1	16.1	15.2	34.8	380
Rampur Hybrid-10	6.165	111	111	235	125	43889	50000	16.6	16.5	13.2	30.4	395
RML-76/RML-146	6.078	120	121	193	135	59167	60000	16.6	15.6	12.2	33.8	320
RL-236/RML-96	5.954	109	113	182	127	57778	59167	17.6	17.7	13.2	27.7	423
RL-153/RL-105	5.366	107	111	186	99	50000	52222	13.5	14.3	12.7	26.9	410
RML-11-1/RL-298	5.356	110	114	235	161	48056	41667	18.2	16.4	12.4	34.9	408
RML-191/RL-105	5.345	111	113	191	91	28333	43611	16.2	15.5	12.3	33.2	435
RML-85/RML-146	5.014	115	118	261	162	42222	67222	16.6	16.1	14.3	32.7	385
TK-1	4.985	114	116	227	124	33333	33333	16.7	18.3	15.2	32.3	345
RML-145/RML-98	4.863	111	115	202	101	56111	60000	16.3	16.2	12.6	33.7	485
RML-145/RML-140	4.505	111	114	191	104	60000	48611	17.3	14.2	11.0	32.0	440
RML-84/RL-105	4.372	112	115	194	99	51389	66944	15.2	14.3	12.3	28.8	338
RML-95/RML-140	4.120	120	121	145	80	53333	68333	16.6	15.1	14.5	31.8	333
RML-4/RL-111	4.035	115	117	254	144	42500	41389	15.6	15.5	12.5	31.1	385
RL-272/RML-96	4.020	112	115	189	94	50278	52222	13.5	14.6	14.2	22.5	315
RML-145/RL-105	3.948	107	112	187	97	58333	51944	16.1	13.5	12.0	24.7	375
Rajkumar	3.772	114	115	205	112	53333	56389	19.0	17.6	15.1	35.8	410
RML-11-1/RML-18	3.772	121	122	150	94	62222	51667	14.5	15.2	12.6	25.8	345
CAH196	3.484	114	117	208	113	59444	55556	17.4	15.8	13.4	34.5	400
Mean	4.980	113	115	203	114	50514	54528	16.4	15.7	13.1	30.9	386
F test	**	**	**	**	**	**	**	**	**	**	**	**
LSD0.05	14.2	1.7	1.8	21.1	2.1	2460	2624	0.9	0.5	0.4	0.8	26.9
CV, %	0.2	0.9	1.0	6.3	1.1	2.9	2.9	3.3	2.0	1.7	1.6	4.2

Table 9: Evaluation of hybrids maize in coordinated varietal trial on winter season of 2020/21 at OSRP, Nawalpur, Sarlahi

Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOE	CL	CD	NGPR	TKW
CAH196	8.896	74	83	179	66	54167	17.6	15.7	32	293
Rajkumar	5.195	72	81	158	71	59167	17.9	15.9	31	320
Rampur Hybrid-10	3.911	78	86	170	73	64722	15.8	13.5	29	353
RL-153/RL-105	2.921	83	92	172	65	68611	16.0	14.9	26	313
RL-236/RML-96	4.602	77	88	164	70	60556	16.5	15.3	26	313
RL-272/RML-96	5.349	79	87	176	72	70000	16.4	14.7	30	307
RL-294/RML-170	6.986	75	83	163	72	68611	18.0	15.8	32	293

Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOE	CL	CD	NGPR	TKW
RML-11-1/RL-298	6.515	82	91	168	73	67222	16.3	14.1	27	323
RML-11-1/RML-18	6.343	87	96	181	69	71667	16.5	13.9	27	333
RML-145/RL-105	5.268	92	101	167	69	69167	16.8	14.5	30	302
RML-145/RML-140	5.616	82	92	187	72	60556	15.8	14.8	30	333
RML-145/RML-98	8.069	79	89	160	68	73056	16.6	15.2	31	320
RML-191/RL-105	6.217	77	86	172	72	69722	17.2	14.1	30	320
RML-191/RML-17	5.172	87	95	168	68	64444	15.9	15.2	31	340
RML-4/RL-111	6.321	86	96	175	70	69444	16.0	14.7	32	313
RML-76/RML-146	5.459	84	94	160	72	64722	16.6	14.7	30	260
RML-84/RL-105	3.733	90	100	173	71	68889	16.0	15.1	29	253
RML-85/RML-146	5.893	86	96	162	70	66944	16.9	15.9	29	262
RML-95/RML-140	5.051	82	91	174	66	75278	15.8	14.7	29	313
TK-1	3.786	90	100	176	71	74444	16.9	14.1	27	293
Mean	5.565	82	91	170	70	67069	16.6	14.8	29	308
F test	**	*	*	*	*	*	ns	*	ns	**
LSD0.05	2.5	13.8	14.2	27.5	7.4	15664		1.7		40.6
CV, %	27.4	10.2	9.4	9.8	6.4	14.1	8.2	6.9	14.6	8.0

The recorded data of single cross hybrids revealed that significant differences were obtained on grain yield, days to anthesis and silking, plant height, ear height, number of cobs ha, cob diameter and thousand grain weight whereas non-significant on cob length and number of grains per row among the tested hybrids at OSRP, Nawalpur. The grain yield 8.896 t ha^{-1} and 8.069 t ha^{-1} recorded by CAH196 and RML-145/RML-198, respectively were similar to each other but significantly higher than all other tested single cross hybrid genotypes that were RL-294/RML-170 (6.986 t ha^{-1}), RML-11-1/RL-298 (6.515 t ha^{-1}), RML-11-1/RML-18 (6.343 t ha^{-1}), RL-4/RL-111 (6.321 t ha^{-1}), RML-191/RL-105 (6.217 t ha^{-1}) and others (Table 9).

Table 10: Evaluation of hybrids maize in coordinated varietal trial on summer season of 2020 at HCRP, Kabre

Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	TKW	EA	HUSK	PA
CAH1715	9.297	79	79	284	142	52593	56296	357	3.0	2.5	2.8
RML-145/RML-98	8.826	78	79	264	141	38519	51111	414	3.0	2.8	3.0
RML-145/RL-111	8.712	78	78	209	101	53333	59259	370	3.2	2.8	2.8
RML-145/RM-L2	8.367	79	79	235	121	58519	60000	362	3.5	3.3	3.2
RL-232/RML-18	7.749	82	84	250	145	54074	54074	314	3.0	2.3	2.7
RML-145/RML-140	7.747	77	78	235	117	52593	55556	372	3.0	3.2	3.2
Rajkumar	7.725	74	75	237	130	54074	51852	354	3.5	2.3	3.5

Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	TKW	EA	HUSK	PA
RML-145/RL-105	7.471	78	78	245	133	48889	57037	357	3.3	3.0	3.2
RML-97-1/RL-105	7.181	78	79	221	113	44444	51111	291	3.2	3.2	2.8
RML-76/RML-146	7.164	80	81	195	114	57037	63704	307	3.3	2.0	3.3
RML-95/RML-140	7.085	80	81	286	141	50370	65185	267	3.7	2.7	3.7
RML-11-1/RL-298	6.880	79	80	242	149	53333	51852	380	3.5	3.5	3.3
Rampur Hybrid-10	6.673	78	78	245	137	43704	40741	406	3.0	3.0	3.3
RML-195/RL-105	6.475	80	81	251	142	57037	66667	253	3.8	3.5	3.2
RL-180/RL-105	5.759	79	80	253	140	53333	57037	306	4.0	3.5	3.8
Mean	7.541	79	79	244	131	51457	56099	341	3.3	2.9	3.2
F test	*	**	**	**	**	**	*	**	**	**	**
LSD0.05	2.4	1.0	1.2	1.4	1.5	13609	11941	71.4	0.7	0.7	0.8
CV, %	19.2	0.7	0.9	0.4	0.7	15.8	12.7	12.5	13.1	13.5	15.1

The analysis of variance revealed significantly high yielding genotypes were CAH1715 (9.297 t ha^{-1}), RML-145/RML-98 (8.826 t ha^{-1}), RML-145/RML-111 (8.712 t ha^{-1}) and RML-145/RML-2 (8.367 t ha^{-1}) which remain at par of the HCRP, Kabre. On the other hand, lower yielding hybrids were RL-180/RL-105 (5.759 t ha^{-1}), RML-195/RL-105 (6.475 t ha^{-1}), Rampur Hybrid-10 (6.673 t ha^{-1}) and RML-11-1/RL-98 (6.880 t ha^{-1}) having mean grain yield of 7.541 t ha^{-1}.

The grain yield and yield attributes characters were significant for hybrids including commercial check (Rajkumar) and standard check (Rampur Hybrid-10) with randomized complete block design with two replications during summer season of 2020 at DoAR, Surkhet. The single cross hybrids RML-145/RML-98 recorded grain yield (8.509 t ha^{-1}) was significantly superior over all other tested hybrid genotypes this might be significantly higher number of plants (48889 plants ha^{-1}) and number of cob (53056 cobs ha^{-1}) (Table 11). The grain yield of hybrids RML-145/RML-98 (8.509 t ha^{-1}), RML-145/RL-105 (7.168 t ha^{-1}), RML-145/RML-111 (6.941 t ha^{-1}), RL-232/RML-18 (6.838 t ha^{-1}), RML-145/RML-140 (6.729 t ha^{-1}), CAH1715 (6.714 t ha^{-1}), RML-111-1/RL-298 (6.63 t ha^{-1}) and RML-145/RML-2 (6.381 t ha^{-1}) were higher than mean grain yield (6.042 t ha^{-1}) (Table 11).

Table 11: Evaluation of hybrids maize in coordinated varietal trial on summer season of 2020 at DoAR, Surkhet

Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	RL%	SL%	PA	EA
RML-145/RML-98	8.509	50	52	269	130	48889	53056	0.58	3.95	1.67	1.33
RML-145/RL-105	7.168	50	53	277	139	48611	51111	0.00	0.00	1.00	2.67
RML-145/RL-111	6.941	50	52	296	154	43611	43611	5.96	0.00	2.00	2.00
RL-232/RML-18	6.838	53	55	276	137	44444	49167	0.00	0.00	1.00	1.33

Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	RL%	SL%	PA	EA
RML-145/RML-140	6.729	49	51	255	132	45000	46389	4.36	0.00	2.00	3.33
CAH1715	6.714	51	54	304	152	45000	44722	2.00	2.44	3.00	1.67
RML-11-1/RL-298	6.639	51	53	265	159	38056	42500	4.35	3.77	2.67	2.33
RML-145/RML-2	6.381	49	51	264	137	45278	47778	0.00	0.60	1.00	2.67
Rajkumar	5.903	44	49	266	133	45556	40833	2.35	1.78	2.33	3.00
RML-76/RML-146	5.569	52	57	300	139	44722	46944	0.61	1.82	3.00	3.33
RML-95/RL-105	5.470	53	56	251	131	41389	48333	0.00	0.00	2.00	4.00
RML-95/RML-140	5.234	50	53	241	127	41667	44722	0.00	0.00	2.33	3.33
RL-180/RL-105	4.862	53	56	281	147	42222	42500	0.00	0.00	1.67	3.33
Rampur Hybrid-10	4.072	51	53	285	133	28611	28056	0.00	0.00	2.33	4.00
RML-97-1/RL-105	3.603	51	54	244	124	40556	36111	0.00	0.00	2.67	4.33
Mean	6.042	50	53	272	138	42907	44389	1.35	0.96	2.04	2.84
F test	**	**	**	**	*	**	**	*	*	*	**
LSD0.05	1.08	2.32	1.45	27.20	18.86	5460	5768	5.51	2.99	1.74	1.23
CV, %	10.7	2.7	1.6	6.0	8.2	7.6	7.8	244.5	187.0	50.9	25.8

The result of CVT of hybrids maize showed that hybrid maize Rampur Hybrid-10 gave significantly higher grain yield (6.156 t ha^{-1}) as compared to other tested hybrids maize but remained similar with RML-145/RL-111 (5.812 t ha^{-1}), RML-145/RL-105 (5.796 t ha^{-1}), Rajkumar (5.180 t ha^{-1}), CAH1715 (4.399 t ha^{-1}), RML-145/RML-2 (4.387 t ha^{-1}), RL-180/ RL-105 (4.125 t ha^{-1}), RML-11-1/RL-298 (4.083 t ha^{-1}), RML-76/RML-146 (4.067 t ha^{-1}) and RML-145/ RML-140 (3.574 t ha^{-1}) which were also similar to each other's (Table 12).

Table 12: Evaluation of hybrids maize in co-ordinated varietal trial on summer season of 2020 at DoAR, Lumle

Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	TKW
Rampur Hybrid-10	6.156	78	79	199	88	68750	56250	373
RML-145/RL-111	5.812	81	83	214	100	64583	68750	359
RML-145/RL-105	5.796	80	84	183	84	66667	70833	331
Rajkumar	5.180	77	79	189	93	68750	64583	297
CAH1715	4.399	84	87	196	96	77083	68750	282
RML-145/RML-2	4.387	79	81	169	77	64583	60417	304
RL-180/RL-105	4.125	85	87	197	98	66667	66667	242
RML-11-1/RL-298	4.083	79	81	190	98	68750	58333	281
RML-76/RML-146	4.067	86	88	204	92	56250	54167	259
RML-145/RML-140	3.574	82	84	157	78	58333	58333	298
RML-145/RML-98	3.404	79	81	185	83	64583	58333	261

Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	TKW
RML-97-1/RL-105	3.356	85	87	181	86	50000	50000	265
RL-232/RML-18	2.700	86	88	206	93	56250	45833	196
RML-95/RML-140	1.594	85	87	169	84	66667	60417	128
RML-95/RL-105	0.916	85	87	144	77	50000	27083	125
Mean	3.970	82	84	186	88	63194	57917	267
F test	*	**	**	**	*	*	*	**
LSD0.05	2.653	2.95	3.60	25.38	20.03	22431	18786	48
CV, %	31.2	1.7	2.0	6.4	10.6	16.5	15.1	8.4

The experiment of CVT of different hybrids maize result showed that significant effect on grain yield, anthesis days, silking days, plant height, ear height, number of plants per hectare, number of ears per hectare cob length, cob diameters and number of grains per row at Dailekh during summer season of 2020. The grain yield (13.389 t ha^{-1}) recorded by RML-145/RML-98 was significantly superior over all other hybrid but insignificantly with RML-145/RL-111 (12.431 t ha^{-1}), RML-95/RML-105 (11.695 t ha^{-1}), RML-145/RML-140 (11.637 t ha^{-1}) and RML-11-1/RL-298 (11.458 t ha^{-1}) (Table 13) which were also statistically similar with each other during summer season of 2020 at HRS, Dailekh. The Hybrids maize RML-145/RML-98, RML-145/RML-111, RML-95/RML-105, RML-145/RML-140 and RML11-1/RL-298 were significantly higher grain yield this might be due to higher number of plants per hectare, number of cobs per hectare and number of grains per row which were similar to each other (Table 13).

Table 13: Evaluation of hybrids maize in coordinated varietal trial on summer season of 2020 at HRS, Dailekh

Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	CL	CD	NGPR
RML-145/RML-98	13.389	61	63	271	141	41667	62222	18.8	16.2	31
RML-145/RL-111	12.431	64	67	305	165	42222	65000	18.7	16.1	38
RML-95/RL-105	11.695	71	73	262	155	47222	67778	15.8	15.2	37
RML-145/RML-140	11.637	61	63	262	143	42222	63889	19.4	15.3	37
RML-11-1/RL-298	11.458	66	68	280	163	47778	54444	18.4	16.1	38
RML-95/RML-140	11.014	63	65	257	138	45556	68889	16.5	15.1	36
RML-145/RL-105	10.960	68	70	276	157	48333	65000	17.4	14.9	36
RML-145/RML-2	10.712	61	64	269	148	47222	53333	17.5	15.9	36
RML-97/RL-105	10.633	63	65	265	149	47778	62778	16.8	14.6	40
Rampur Hybrid-10	10.456	62	64	275	141	37778	48333	18.8	15.5	29
RML-76/RML-146	9.988	69	71	298	150	41667	54444	17.6	15.6	39
CAH1715	9.976	67	70	323	173	43333	55000	18.8	16.5	40
RL-232/RML-18	9.843	65	69	267	145	47778	52778	17.4	15.7	37

Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	CL	CD	NGPR
Rajkumar	9.467	65	67	269	153	47222	46111	17.3	15.9	35
RL-180/RL-105	9.029	70	72	285	171	47778	57778	16.2	15.6	41
Mean	10.846	65	67	277	153	45037	58519	17.7	15.6	37
F test	*	**	*	**	*	*	*	*	*	*
LSD0.05	2.043	6.7	7.1	29.1	17.7	9926	15284	1.7	1.2	7.4
CV, %	8.8	4.8	5.0	4.9	5.4	10.3	12.2	4.6	3.7	9.5

The result of CVT of hybrids maize in ARS, Pakhribas showed significant effect was found grain yield, anthesis days, silking days, plant height, and ear height but in number of plants per hectare and ear per hectare was insignificant during summer season of 2020. The hybrid maize RML-145/RML-140 was significantly higher grain yield (3.441 t ha^{-1}) than all other hybrids maize but at par with RML-11-1/RL298 (2.767 t ha^{-1}), Rajkumar (2.560 t ha^{-1}), Rampur Hybrid-10 (2.348 t ha^{-1}), RML-145/RL-105 (2.348 t ha^{-1}), RML-145/RML-2 (2.149 t ha^{-1}) and RML-95/RML-140 (1.966 t ha^{-1}) which were also at par with each other (Table 14).

Table 14: Evaluation of hybrids maize in coordinated varietal trial on summer season of 2020 at ARS, Pakhribas

Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE
RML-145/RML-140	3.441	79	81	203	91	48148	47222
RML-11-1/RL-298	2.767	78	80	173	78	48148	47222
Rajkumar	2.560	77	79	187	77	52778	45370
Rampur Hybrid-10	2.348	82	86	193	83	56481	50000
RML-145/RL-105	2.292	78	81	193	81	48148	47222
RML-145/RML-2	2.149	81	86	186	82	53704	50000
RML-95/RML-140	1.966	80	82	160	64	50926	48148
RL-180/RL-105	1.965	77	79	211	85	56481	51852
RML-95/RL-105	1.963	82	86	188	84	54630	45370
RL-232/RML-18	1.619	76	80	176	73	44444	41667
RML-76/RML-146	1.574	81	83	190	82	49074	45370
CAH1715	1.570	80	84	176	70	46296	40741
RML-145/RL-111	1.541	81	87	185	84	50926	44444
RML-97-1/RL-105	1.445	81	86	186	78	40741	40741
RML-145/RML-198	1.308	81	84	181	79	46296	39815
Mean	2.034	80	83	186	79	49815	45679
F test	*	**	**	*	**	ns	ns
LSD0.05	1.442	1.96	2.65	24.58	13.93	19013	15757
CV, %	42.4	1.5	1.9	7.9	10.5	22.8	20.6

2.1.1.3 Performance of single cross maize hybrids in Coordinated Farmers Field Trial (CFFT-H) Hills and Terai

A total of eight single cross hybrids were evaluated in Coordinated Farmer's Field Trial (CFFT) in the year 2020/21 during winter season across Terai and inner Terai area at DoAR, Taharaha, DoAR, Parawanipur; ARS,Belachapi; NMRP, Rampur and DoAR, Nepalgunj and six single cross hybrids were evaluated in similar trial during summer season of 2020 across hill environment at HRS, Dailekh, DoAR, Doti, DoAR, Lumle and HCRP, Kabre with two replications for the identification of superior hybrids.

Among eight tested hybrid genotypes of maize at Rampur, grain yield ranges from 2.275 t ha^{-1} of genotype VH1829 to 5.034 t ha^{-1} of genotype CAH1715 with mean grain yield was 3.971 t ha^{-1}. The CAH1715 gave significantly superior to produced grain yield as compared to all other genotypes followed by CAH196 (4.645 t ha^{-1}), Rajkumar (4.633 t ha^{-1}), Rampur Hybrid-10 (4.558 t ha^{-1}) and so on (Table 15).

Table 15: Evaluation of hybrids maize in coordinated farmers field trial at NMRP, Rampur on spring season of 2020/21

Genotypes	GY	DTT	DTS	PHT	EHT	NOP	NOE	EA
CAH1715	5.034	97	101	162	75	41296	38889	2.8
CAH196	4.645	99	101	188	85	34445	34815	2.5
RAJKUMAR	4.633	99	103	183	103	42593	42037	2.8
Rampur Hybrid-10	4.558	93	98	158	73	40185	37592	3.0
RML-86/RML-96	3.912	98	100	167	83	37593	40000	2.8
RML-95/RML-96	3.543	93	94	198	107	36667	33519	3.2
VH13729	3.165	95	98	163	77	33333	27222	2.7
VH1846	2.275	98	101	173	78	25370	24259	3.2
Mean	3.971	96	100	174	85	36435	34792	2.9
F test	**	**	**	*	*	*	*	ns
LSD0.05	1.05	2.45	3.60	24.96	12.03	9056	9743	
CV, %	15.1	1.5	2.1	8.2	8.1	14.2	16.0	14.9

The results of CFFT trial at Tarahara showed that the grain yield (5.190 t ha^{-1}) obtained by VH1846 was higher than other tested single cross hybrid maize genotypes followed by CAH196 (4.897 t ha^{-1}), Rajkumar (3.507 t ha^{-1}) and up to lowest grain yield 1.410 t ha^{-1} of Rampur Hybrid-10 (Table 16).

Table 16: Evaluation of hybrids maize in coordinated farmers field trial at DoAR, Tarahara on spring season of 2020/21

Entry name	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	CL	CD	NRPE	NGPR	TKW
VH1846	5.190	103	110	153	88	15.0	52.0	15.0	27.0	402
CAH196	4.897	103	112	178	92	15.0	47.0	14.0	32.0	376
RAJKUMAR	3.507	101	103	189	98	16.0	46.0	15.0	33.0	352
RML-86/RML-96	3.185	111	114	191	84	15.0	45.0	14.0	30.0	336
VH13729	2.650	113	117	143	44	15.0	42.0	15.0	31.0	350
CAH1715	2.394	104	111	217	97	15.0	46.0	14.0	31.0	390
RML-95/RML-96	2.277	111	114	165	72	14.0	44.0	14.0	31.0	346
Rampur Hybrid-10	1.410	109	112	167	63	14.0	43.0	12.0	28.0	342
Mean	3.189	107	112	175	80	14.9	45.6	14.1	30.4	362
Max	5.190	113	117	217	98	16.0	52.0	15.0	33.0	402
Min	1.410	101	103	143	44	14.0	42.0	12.0	27.0	336

Table 17: Evaluation of hybrids maize in coordinated farmers field trial at ARS, Belachapi on spring season of 2020/21

Entry name	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	CL	CD	NRPE	NGPR	TKW
VH13729	13.735	114	116	207	134	17.0	15.8	14.0	31.2	360
VH1846	12.644	118	119	219	138	16.2	16.6	14.0	27.6	450
CAH196	11.569	120	121	200	126	15.6	15.6	11.6	29.4	490
RAJKUMAR	9.744	119	120	188	105	18.2	16.2	14.6	34.2	330
RML-86/RML-96	9.617	120	121	173	89	16.4	15.8	14.0	30	260
Rampur Hybrid-10	8.873	120	121	171	87	17.8	14.8	11.2	28.6	370
CAH1715	7.556	121	123	189	126	19.0	15.4	12.8	34.6	350
RML-95/RML-96	7.312	120	121	181	108	21.0	14.8	13.6	27.6	350
Mean	10.131	119	120	191	114	17.7	15.6	13.2	30.4	370
Max	13.735	121	123	219	138	21.0	16.6	14.6	34.6	490
Min	7.312	114	116	171	87	15.6	14.8	11.2	27.6	260

Among the evaluated eight hybrids maize genotypes the VH3729 (13.75 t ha^{-1}) followed by VH1846 (12.644 t ha^{-1}), CAH196 (11.569 t ha^{-1}), Rajkumar (9.744 t ha^{-1}), RML-86/RML-96 (9.617 t ha^{-1}) were the top five grain yielding hybrid maize in spring season at ARS, Belachapi (Table 17).

The grain yield ranges from 5.916 t ha^{-1} to 2.230 t ha^{-1} were obtained from the different eight evaluated single cross hybrid maize genotypes with mean grain yield 4.148 t ha^{-1} and VH1846 (5.916 t ha^{-1}) was the higher grain yielding hybrid and RML-95/RML-96 (2.230 t ha^{-1}) gave lowest grain yield (Table 18) at Parwanipur during spring season of 2020/21.

Table 18: Evaluation of hybrids maize in co-ordinated farmers field trial at DoAR, Parwanipur on spring season of 2020/21

Entry name	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)
VH1846	5.916	111	114	179	95
VH13729	5.407	111	116	168	68
CAH196	4.672	111	117	195	120
CAH1715	4.200	108	109	219	95
Rampur Hybrid-10	3.935	106	109	160	68
RML-86/RML-96	3.764	114	118	169	91
RAJKUMAR	3.063	105	107	158	70
RML-95/RML-96	2.230	110	114	157	90
Mean	4.148	110	113	176	87
Max	5.916	114	118	219	120
Min	2.230	105	107	157	68

The grain yield obtained by VH1846 (8.739 t ha^{-1}), CAH196 (7.735 t ha^{-1}), VH13729 (6.682 t ha^{-1}) and Rampur Hybrid-10 (5.736 t ha^{-1}) were higher grain yield than average grain yield 5.759 t ha^{-1} (Table 19) out of eight evaluated single cross hybrid maize at Nepalgunj during spring season.

Table 19: Evaluation of hybrids maize in coordinated farmers field trial at DoAR, Nepalgunj on spring season of 2020/21

Entry name	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	CL	CD	NRPE	NGPR	TKW
VH1846	8.739	120	124	167	86	20.2	18.6	16.4	32.8	504
CAH196	7.735	119	120	167	86	18.2	16.2	14.0	33.6	372
VH13729	6.682	119	121	142	73	19.2	16.8	16.0	32.2	455
Rampur Hybrid-10	5.736	121	124	174	64	19.0	16.0	13.2	26.8	479
RAJKUMAR	5.316	119	121	160	73	18.4	16.2	15.2	28.2	326
RML-86/RML-96	4.855	121	124	137	48	17.8	15.4	14.4	30.4	332
RML-95/RML-96	3.787	124	125	131	56	19.2	15.8	13.2	29.8	336
CAH1715	3.226	121	124	184	79	18.8	16.2	13.2	32.6	399
Mean	5.759	121	123	158	71	18.9	16.4	14.5	30.8	400
Max	8.739	124	125	184	86	20.2	18.6	16.4	33.6	504
Min	3.226	119	120	131	48	17.8	15.4	13.2	26.8	326

The standard check Rampur Hybrid-10 obtained higher grain yield (6.171 t ha^{-1}) and commercial check Rajkumar (3.212 t ha^{-1}) grain yield recorded lowest with mean yield 4.573 t ha^{-1} out of tested six hybrid genotypes of maize during summer season at DoAR, Doti (Table 20).

Table 20: Evaluation of hybrids maize in coordinated farmers field trial at DoAR, Doti on summer season of 2020

Entry name	GY (t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP
Rampur Hybrid-10	6.171	59	62	266	139	49167
RML-86/RML-96	5.778	56	61	262	140	49167
CAH1715	4.525	59	62	282	139	55833
RML-76/RL-105	4.160	63	66	277	131	45833
RML-95/RML-96	3.592	54	59	286	148	12500
Rajkumar	3.212	45	49	264	141	50833
Mean	4.573	56	60	273	140	43889
Max	6.171	63	66	286	148	55833
Min	3.212	45	49	262	131	12500

Six tested hybrids maize along with two checks were evaluated at HCRP, Kabre where all four genotypes produced higher yield than check varieties. RL-36/RL-105 produced highest grain yield (9.183t/ha) followed by RML-76/RL-105 produced grain yield of 7.9183t/ha (Table 21) during summer 2020.

Table 21: Evaluation of hybrids maize in coordinated farmers field trial at HCRP, Kabre on summer season of 2020

Entry name	GY (t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	TKW	PA	EA
RL-36/RL-105	9.183	80	80	268	147	56667	63333	350	3.0	3.0
RML-76/RL-105	7.992	80	81	242	124	59444	63889	366	2.0	2.5
RML-95/RML-96	6.554	80	80	244	121	47222	55000	554	3.0	3.0
RML-86/RML-96	6.515	78	79	200	109	50000	65000	342	3.0	3.0
Rajkumar	6.282	72	74	206	98	52778	48333	372	3.5	4.0
Rampur Hybrid-10	6.181	74	75	224	110	40000	40000	494	2.5	2.5
Mean	7.118	77	78	231	118	51019	55926	413	2.8	3.0
Max	9.183	80	81	268	147	59444	65000	554	3.5	4.0
Min	6.181	72	74	200	98	40000	40000	342	2.0	2.5

Among the evaluated six hybrid genotypes revealed that commercial check i.e., Rajkumar (3.488 t ha^{-1}) was higher grain producing hybrid followed by standard check i.e., Rampur Hybrid-10 (2.637 t ha^{-1}), RML-95/RML-96 (2.632 t ha^{-1}), RML-86/RML-96 (1.757 t ha^{-1}) and other (Table 22) during summer season at DoAR, Lumle.

Table 22: Evaluation of hybrids maize in coordinated farmers field trial at DoAR, Lumle on summer season of 2020

Genotype	GY (t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	TKW
Rajkumar	3.488	73	76	194	89	55556	41667	288
Rampur Hybrid-10	2.637	73	76	202	89	54167	38889	275
RML-95/RML-96	2.632	84	87	179	71	48611	48611	209
RML-86/RML-96	1.757	84	87	164	64	47222	43056	218
RL-36/RL-105	0.978	83	86	194	78	15278	16667	255
RML-76/RL-105	0.872	84	87	168	64	26389	19444	256
Mean	2.060	80	83	184	76	41204	34722	250
Max	3.488	84	87	202	89	55556	48611	288
Min	0.872	73	76	164	64	15278	16667	209

The mean grain yield 4.382 t ha^{-1} obtained from out of six tested hybrid genotypes at Dailekh during summer season of 2020 where commercial check hybrid variety Rajkumar produced higher grain yield of (4.265 t ha^{-1}) followed by Rampur Hybrid-10 (4.806 t ha^{-1}), RL-36/ RL-105 (4.641 t ha^{-1}), RML-76/RL-105 (4.346 t ha^{-1}), RML-95/RML-96 (4.632 t ha^{-1}) and RML-86/RML-96 (3.603 t ha^{-1}) (Table 23).

Table 23: Evaluation of hybrids maize in coordinated farmers field trial on summer season of 2020 at HRS, Dailekh

Genotypes	GY (t/ha)	PHT(cm)	EHT(cm)	NOP	NOE
Rajkumar	4.265	275	143	28148	27778
Rampur Hybrid-10	4.806	254	124	29630	39630
RL-36/RL-105	4.641	266	149	37407	36667
RML-76/RL-105	4.346	270	143	31852	29259
RML-95/RML-96	4.632	242	151	26667	36667
RML-86/RML-96	3.603	240	138	26667	22963
Mean	4.382	258	141	30062	32160
Max	4.806	275	151	37407	39630
Min	3.603	240	124	26667	22963

2.1.2 Development of Open Pollinated Full Season Maize Varieties for Nepal

A series of trials such as IYT, CVT and CFFT were carried out at Pakhribas, Kabre, Khumaltar, Lumle, Salyan and Dailekh for hill set and Rampur, Surkhet, Nepalgunj and Doti for the terai set during summer season of 2077/78 A.D. to find the performance of open pollinated maize varieties. Randomized Complete

Block Design with 3 replications was used for each trial. In IYT, there were two rows per plot. In CVT, there were four rows per plot. In CFFT, there were six rows per plot. Length of rows was three meter for hilly research stations and 5 meters for terai research station. The row to row and plant to plant distances were 75 cm and 25 cm respectively. Other agronomic practices were conducted according to the recommended packages of practices.

2.1.2.1 Initial Yield Trial (IYT) full season hill set

The genotypes RAMPUR S10F18 produced the highest grain yield (4.212t/ha) followed by BLSBRS07F12 (3.808t/ha) and P501SRCO/P502SRCO (3.195t/ha) at Pakhribas (Table 24). Likewise, at Kabre ACROSS0011 produced the highest yield (7.103t/ha), followed by RAMPUR S03F04 (6.986t/ha) and RAMPUR S10F18 (6.777t/ha) respectively (Table 25) whereas Manakamana-7 (5.122t/ha) was top yielder at Lumle followed by P501SRCO/P502SRCO (3.556t/ha) and RAMPUR S10F18 (3.518t/ha) respectively (Table 26). The combined analysis of IYT full season hill set showed that genotypes were highly significant for grain yield, days to tasseling, days to silking, plant height and ear height but non-significant for plant number per hectare and ear number per hectare. Locations were highly significant for grain yield, days to tasseling, days to silking, plant height, ear height, plant number per hectare and ear number per hectare. Interactions were highly significant for days to silking and days to tasseling but non-significant for grain yield, plant height, ear height, plant number per hectare and ear number per hectare. The standard check variety Manakamana-7 produced the highest yield (4.874t/ha) across Pakhribas, Kabre, and Lumle followed by RAMPUR S10F18 (4.774t/ha) and P501SRCO/P502SRCO (4.435t/ha) respectively (Table 27).

2.1.2.2 Coordinated Varietal Trial (CVT) Full Season Hill Set

At Parkhribas, BGBYPOP showed highest yield 3.900t/ha followed by Farmer's Variety (3.419t/ha) and Manakamana-3 (3.375t/ha) respectively (Table 28) while at Kabre RAMPUR S13F01 produced the highest yield (8.038t/ha) followed by 07SADVI (8.011t/ha) and Manakamana-3 (7.859t/ha) (Table 29). Likewise, at Lumle 05SADVI produced the highest grain yield (4.061t/ha) followed by BGBYPOP (3.868t/ha) and KSYN10 (3.385t/ha) (Table 30). Manakamana-7 was highest yielder (6.122t/ha) at Salyan followed by BGBYPOP (6.016t/ha) and RAMPUR S13F01 (6.013t/ha) respectively (Table 31). BGBYPOP produced the highest yield (6567t/ha) followed by 05SADVI (6.405t/ha) and 07SADVI (6.152t/ha) at Dailekh (Table 32). Combined analysis of CVT full season hill set showed that BGBYPOP produced the highest yield (6.057t/ha) followed by Manakamama-7 (5.763t/ha) and RAMPUR S13F01 (5.687t/ha) respectively (Table 33). Genotypes were highly significant for days to tasseling, days to silking, plant height and ear height. Genotypes were significant for grain yield.

Genotypes were non- significant for plant number per hectare and ear number per hectare. Location was highly significant for grain yield, days to tasseling, days to silking, plant height, ear height, plant number per hectare and ear number per hectare. Interaction was highly significant for plant height and ear height. Interaction was significant for days to silking. Interaction was non-significant for plant number per hectare, ear number per hectare, days to tasseling and grain yield.

2.1.2.3 Coordinated Farmers' Field Trial (CFFT) Full Season Hill Set

Farmers variety was highest yielder (5.980t/ha) at Parkhribas followed by ZM401 (5.954t/ha) and KSYNF10 (5.599t/ha) respectively (Table 34). KSYNF10 produced the highest yield (8.837t/ha) followed by ZM401 (8.319t/ha) and Manakamana-7 (7.514t/ha) at Kabre (Table 35) while standard check variety Manakamana-7 produced the highest grain yield (4.642t/ha) followed by TLBRS07F16 (3.774t/ha) and RAMPUR S13F28 (3.724t/ha) at Lumle (Table 36). Again Manakamana-7 was top yielder at Salyan gave 5.566t/ha followed by Farmers variety (5.481t/ha) and KSYNF10 (5.037t/ha) respectively (Table 37). KSYNF10 produced the highest yield (3.302t/ha) followed by RAMPUR S13F28 and ZM401 produced 2.759t/ha and 2.591t/ha respectively at Dailekh (Table 38).

Combined analysis of CFFT full season hill set showed that KSYNF10 produced the highest yield (4.295t/ha) followed by Farmers variety and TLBRS07F16 produced 4.069t/ha and 4.050t/ha respectively (Table 39). Genotypes were significant for days to silking. Genotypes were non-significant for grain yield, plant height, ear height, plant number per hectare, ear number per hectare, and days to tasseling. Location was highly significant for days to tasseling, days to silking, plant height, ear height, plant number per hectare and grain yield. Location was significant for ear number per hectare. Interaction was non-significant for grain yield, plant height, ear height, plant number per hectare and ear number per hectare. Interaction was significant for days to tasseling and days to silking.

2.1.2.4 Initial Yield Trial (IYT) full season Terai set

Statistical analysis of 14 genotypes evaluated at NMRP, Rampur showed that the genotype PHRA PHUTTABAT- S0031 produced the highest yield (3.659t/ha), followed by R POP-3 and Terai Pool Yellow produced 3.045t/ha and 2.823t/ha respectively (Table 40). POZARICA-S 9627 (RE) produced the highest yield (5.148t/ha) followed by ACROSS 0031 (4.619t/ha) and HG.AB (4.514t/ha) at Surkhet (Table 41). At Nepalgunj PHRA PHUTTABAT- S0031 produced the highest yield (4.236t/ha) followed by R POP-3 and RAMPUR S03F02 produced 3.904t/ha and 3.514t/ha respectively (Table 42). Again PHRA

PHUTTABAT- S0031 was observed top yielder at Doti produced 5.716t/ha followed by RAMPUR S03F02 and HG.AB gave 4.703t/ha and 4.636t/ha respectively (Table 43).

The combined analysis of IYT full season terai set across Doti, Dasrathpur, Nepalgunj and Rampur showed that PHRA PHUTTABAT- S0031 produced the highest yield (4.355t/ha) followed by POZARICA-S 9627 (RE) (3.688t/ha) and R POP-3 (3.682t/ha) respectively (Table 44). Genotypes were highly significant for grain yield, plant height, ear height, and ear number per hectare. Genotypes were significant for plant number per hectare. Locations were highly significant for grain yield, plant height, ear height, plant number per hectare and ear number per hectare. Interactions were highly significant for ear number per hectare. Interactions were significant for plant height, plant number per hectare and grain yield. Interactions were non-significant for ear height.

2.1.2.5 Coordinated Varietal Trial (CVT) Full Season Terai Set

Among 10 genotypes at Rampur, genotype RAMPUR S03 F08 produced the highest yield (6.028t/ha) followed by RAMPUR S13F24 (5.911t/ha) and CEL-OHGYA×CEL-OHGYB (4.168t/ha) respectively (Table 45). Upahar produced the highest yield (4.549t/ha) followed by RAMPUR COMPOSITE (4.468t/ha) and POZARICA 9531 (4.380t/ha) respectively at Surkhet (Table 46) while at Nepalgunj AGUA FRIA S0031 produced the highest yield (3.800t/ha) followed by CEL-OHGYA×CEL-OHGYB (3.487t/ha) and POZARICA 9531 (3.462t/ha) (Table 47). RAMPUR S03 F08 (6.559t/ha) was highest yielder followed by CEL-OHGYA×CEL-OHGYB (6.489t/ha) and Rampur Composite (6.484t/ha) respectively at Doti (Table 48). Combined analysis of CVT full season terai set showed that RAMPUR S03F08 produced the highest yield (5.103t/ha) followed by RAMPUR S13F24 (4.686t/ha) and CEL-OHGYA×CEL-OHGYB (4.414t/ha) respectively (Table 49). Genotypes were highly significant for plant height. Genotypes were significant for ear height and grain yield. Genotypes were non-significant for plant number per hectare and ear number per hectare. Locations were highly significant for grain yield, plant height and ear height. Locations were non-significant for plant number per hectare and ear number per hectare. Interactions were highly significant for plant height, ear height, ear number per hectare and grain yield. Interactions were non-significant for plant number per hectare.

2.1.2.6 Coordinated Farmers' Field Trial (CFFT) Full Season Hill Set

RPOP-2 produced the highest yield (4.564t/ha) followed by HGA (4.285t/ha) and RAMPUR 4 (3.347t/ha) at Rampur (Table 50) while Farmers variety produced the highest yield (8.803t/ha) followed by RAMPUR S13F26 (8.308t/ha) and RAMPUR 4 (7.197t/ha) at Surkhet (Table 51). RAMPUR S13F26 produced the

highest yield (7.404t/ha) followed by HGA (6.081t/ha) and S 0128 (5.886t/ha) at Doti (Table 52).

Table 24: Performance of maize genotypes in IYT full season at Pakhribas during summer, 2020/21

Genotypes	DTT	DTS	PHT(cm)	EHT(cm)	GY(t/ha)	NOP	NOE
RAMPUR S10F22	63	71	186	103	2.015	50370	29630
RAMPUR S10F20	61	65	174	90	2.867	49630	38519
RAMPUR S10F18	59	67	172	93	4.212	51111	49630
RAMPUR S03F06	66	72	190	101	2.181	53333	33333
RAMPUR S03F04	65	70	172	92	2.577	53333	42222
P501SRCO/P502SRCO	64	68	161	89	3.195	52593	42963
MANAKAMANA-7	64	70	182	95	2.868	51111	44444
KLYPOP	61	69	213	114	2.787	52593	42222
HGA/HG-AB	57	66	161	74	2.552	51852	42222
FARMERS VARIETY	65	69	203	98	2.667	40000	30370
BLSBRS07F12	62	67	198	99	3.808	51852	45185
BLBSRS07F10	61	66	187	101	2.898	51852	38519
ACROSS 0031	61	66	172	83	1.789	51852	26667
ACROSS 0011	65	68	197	106	2.828	45926	41481
Grand Mean	62	68	183	96	2.803	50529	39101
F-test	**	**	ns	ns	ns	**	*
LSD (0.05)	3	3.2	-	-	-	5816.6	12136
CV (%)	2.9	2.8	11.1	15	27.7	6.85	18.49

Table 25: Performance of maize genotypes in IYT full season at Kabre during summer, 2020/21

Genotypes	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	GY(t/ha)
RAMPUR S10F22	74	76	234	125	43333	42222	6.392
RAMPUR S10F20	75	77	217	121	44444	42667	4.996
RAMPUR S10F18	76	78	231	137	41111	44444	6.777
RAMPUR S03F06	81	82	197	137	45926	45926	5.603
RAMPUR S03F04	74	75	237	132	45926	51111	6.986
P501SRCO/P502SRCO	81	83	254	128	40741	45185	6.553
MANAKAMANA-7	81	82	221	134	42963	40000	6.634
KLYPOP	77	79	242	143	42222	40741	5.170
HGA/HG-AB	75	76	183	104	37778	34074	3.106

Genotypes	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	GY(t/ha)
FARMERS VARIETY	76	78	230	133	42963	40000	5.072
BLSBRS07F12	74	74	233	125	41481	45185	6.470
BLBSRS07F10	74	75	239	138	41481	42963	5.247
ACROSS 0031	73	73	230	129	40741	37037	4.557
ACROSS 0011	79	80	240	145	46667	46667	7.103
Grand Mean	76	78	227	130	42804	42698	5.686
F-test	**	**	ns	ns	ns	ns	*
LSD (0.05)	0.8	0.7	-	-	-	-	2.256
CV (%)	0.7	0.5	10.9	11.4	12.3	19.7	23.61

Table 26: Performance of maize genotypes in IYT full season at Lumle during summer, 2020/21

Genotypes	DTT	DTS	DTM	NOP	NOE	PHT(cm)	EHT(cm)	GY(t/ha)	TKW
RAMPUR S10F22	75	78	140	34074	25185	156	76	2.495	300
RAMPUR S10F20	75	78	137	28148	26667	140	69	2.989	300
RAMPUR S10F18	74	77	139	37778	34074	140	68	3.518	243
RAMPUR S03F06	76	79	139	38519	25185	149	72	1.797	250
RAMPUR S03F05	76	79	137	32593	25185	154	78	2.514	233
P501SRCO/P502SRCO	75	79	137	31111	28148	158	74	3.556	253
MANAKAMANA-7	77	80	141	34815	36296	152	71	5.122	293
KLYPOP	74	77	136	41481	31111	172	82	2.930	273
HGA/HG-AB	73	75	139	35556	33333	131	64	2.331	237
FARMER'S VARIETY	67	70	141	38519	25926	173	86	3.180	277
BLBSRS07F12	74	77	136	32593	25926	144	70	2.512	303
BLBSRS07F10	72	75	139	37778	29630	146	76	2.931	280
ACROSS 0031	71	74	138	37778	34074	155	73	3.080	253
ACROSS 0011	76	79	135	37778	33333	172	92	3.365	202
Grand Mean	74	77	138	35608	29577	153	75	3.023	264
F-test	**	**	**	ns	ns	**	**	**	ns
LSD (0.05)	2.5	2.3	1.17	-	-	15.8	11	1.220	-
CV (%)	2	1.8	0.5	16.67	20.69	6.13	8.3	24.04	18.7

Table 27: Combined analysis of IYT full season at Pakhribas, Kabre and Lumle in 2020/21

Genotypes	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	GY(t/ha)
RAMPUR S10F22	70	75	187	97	42716	30123	3.050
RAMPUR S10F20	71	74	179	96	41235	38272	3.910
RAMPUR S10F18	70	74	180	99	43210	42469	4.774
RAMPUR S03F06	74	78	179	103	45926	34815	3.194
RAMPUR S03F04	71	74	188	100	43951	39506	4.026
P501SRCO/P502SRCO	73	76	191	97	41481	38765	4.435
MANAKAMANA-7	74	77	185	100	42963	40247	4.874
KLYPOP	71	75	209	113	45432	38025	3.629
HGA/HG-AB	68	72	159	80	41728	36543	2.663
FARMERS VARIETY	69	72	202	106	40494	32099	3.640
BLSBRS07F12	70	73	191	98	41975	38765	4.263
BLBSRS07F10	69	72	190	105	43704	37037	3.692
ACROSS 0031	68	71	186	95	43457	32593	3.142
ACROSS 0011	73	76	203	114	43457	40494	4.432
Grand Mean	71	74	188	100	42981	37125	3.837
F-test (Genotype)	**	**	**	**	ns	ns	**
F-test (Location)	**	**	**	**	**	**	**
F-test (Genotype × Location)	**	**	ns	ns	ns	ns	ns
LSD (0.05)	6.5	4.7	35.6	25.5	7840.7	9565	1.824
CV (%)	9.8	6.8	20.3	27.3	19.53	27.58	30.91

Table 28: Performance of maize genotypes in CVT full season, Pakhribas in 2020/21

Genotypes	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	DTM	GY(t/ha)
05SADVI	66	71	199	100	53333	40988	112	2.620
07SADVI	63	68	185	91	51358	41481	112	2.819
BGBYPOP	64	68	176	98	45926	40494	111	3.900
FARMERS VARIETY	66	71	217	116	52840	43457	112	3.419
KSYN10	64	69	154	78	49383	29630	112	1.391
MANAKAMANA-3	65	71	204	105	50370	40000	111	3.375
MANAKAMANA-7	62	67	183	101	52346	45432	112	3.025
RAMPUR S03F08	64	71	173	92	51852	33580	112	2.298
RAMPUR S13F01	61	66	183	93	50370	41975	113	2.933
ZM627	65	68	169	90	48889	35556	111	2.138
Grand Mean	64	69	184	97	50667	39259	112	2.792
F-test	ns	*	**	*	ns	ns	ns	**
LSD (0.05)	-	2.9	22.8	18.4	-	-	-	1.115
CV (%)	3.6	2.5	7.2	11.1	8.88	15.42	1.26	23.29

Table 29: Performance of maize genotypes in CVT full season, Kabre in 2020/21

Genotypes	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	HC	PA	EA	TKW	GY(t/ha)
05SADVI	79	81	273	163	47037	49259	3	3	2	410	7.640
07SADVI	81	82	240	121	46667	51111	3	3	3	411	8.011
BGBYPOP	80	81	235	112	43333	47407	4	2	3	381	7.745
FARMERS VARIETY	76	77	248	147	41852	38519	3	3	3	403	5.853
KSYN10	80	81	215	117	45556	47407	3	3	3	369	5.757
MANAKAMANA-3	81	83	241	133	42593	44444	3	3	3	405	6.739
MANAKAMANA-7	77	78	257	146	45185	49259	4	3	3	431	7.859
RAMPUR S03F08	79	80	249	144	44815	52222	3	3	3	390	6.890
RAMPUR S13F01	73	74	243	124	47037	47778	3	2	2	453	8.038
ZM627	78	79	237	131	44815	45926	3	3	3	441	7.590
Grand Mean	78	80	244	134	44889	47333	3	3	3	409	7.212
F-test	**	**	**	**	**	ns	**	Ns	ns	ns	*
LSD (0.05)	0.5	0.7	2	2.4	2800.7	-	0.68	-	-	-	1.518
CV (%)	0.4	0.5	0.5	1	3.63	10.05	13.3	21.1	21.9	11	12.27

Table 30: Performance of maize genotypes in CVT full season, Lumle in 2020/21

Genotypes	DTT	DTS	DTM	NOP	NOE	PHT(cm)	EHT(cm)	GY(t/ha)	TKW
05SADVI	79	82	137	53333	46667	137	50	4.061	200
07SADVI	71	74	135	34286	30476	136	51	2.941	280
BGBYPOP	75	78	136	36190	31429	123	46	3.868	270
FARMERS VARIETY	68	71	137	40952	31429	120	44	1.579	300
KSYN10	71	74	136	51429	45714	120	59	3.385	370
MANAKAMANA-3	71	74	137	14286	10476	159	57	1.401	180
MANAKAMANA-7	71	74	132	46667	41905	122	37	1.855	272
RAMPUR S03F08	71	74	137	8571	8571	99	30	0.328	280
RAMPUR S13F01	74	77	133	36190	29524	135	53	2.411	360
ZM627	72	71	136	17143	15238	107	35	0.393	270
Grand Mean	72	75	136	33905	29143	126	46	2.222	278

Table 31: Performance of maize genotypes in CVT full season, Salyan in 2020/21

Genotypes	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	GY(t/ha)	TKW	DTM
05SADVI	76	83	203	112	51481	48889	4.424	444	130
07SADVI	73	81	190	91	47778	45185	4.250	374	128
BGBYPOP	75	82	188	96	50741	46296	6.016	408	130

Genotypes	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	GY(t/ha)	TKW	DTM
FARMERS VARIETY	68	73	207	117	48148	47037	4.608	465	120
KSYN10	72	79	183	94	51111	46296	4.492	386	127
MANAKAMANA-3	74	83	236	124	47778	44444	5.125	408	127
MANAKAMANA-7	74	81	194	103	52593	51111	6.122	450	127
RAMPUR S03F08	75	82	180	97	51481	49259	4.691	397	130
RAMPUR S13F01	73	80	184	92	51481	51852	6.013	337	128
ZM627	73	81	190	87	51852	50370	5.271	401	129
Grand Mean	73	81	195	101	50444	48074	5.101	407	128
F-test	**	**	**	**	ns	ns	ns	**	**
LSD (0.05)	2.3	2.6	16	15.3	-	-	-	19.7	1.7
CV (%)	1.8	1.9	4.76	8.78	6.51	10.26	18.8	2.81	0.77

Table 32: Performance of maize genotypes in CVT full season,Dailekh in 2020/21

Genotypes	DTT	DTS	PHT(cm)	EHT(cm)	NOE	GY(t/ha)	NOP
05SADVI	64	66	254	133	48889	6.405	52840
07SADVI	65	67	238	136	51852	6.152	51852
BGBYPOP	64	66	241	144	52346	6.567	53333
FARMERS VARIETY	63	66	292	175	53827	6.130	52840
KSYN10	62	64	225	120	56790	5.663	52840
MANAKAMANA-3	65	67	273	156	44938	5.451	52346
MANAKAMANA-7	65	67	251	137	52346	6.047	53333
RAMPUR S03F08	68	70	252	141	51852	5.860	53333
RAMPUR S13F01	63	65	229	118	50370	5.764	53333
ZM627	63	65	230	120	51358	6.102	53827
Grand Mean	64	66	249	138	51457	6.014	52988
F-test	ns	ns	**	**	ns	ns	ns
LSD (0.05)	-	-	25.5	18.1	-	-	-
CV (%)	6.8	6.9	5.97	7.66	11.65	17.9	2

Table 33: Combined analysis of CVT full season maize genotypes at Pakhribas, Kabre, Salyan and Dailekh in 2020/21

Genotype	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	GY(t/ha)
05SADVI	71	75	232	127	51173	47006	5.272
07SADVI	70	75	213	110	49414	47407	5.308
BGBYPOP	71	75	210	113	48333	46636	6.057
FARMERS VARIETY	68	72	241	139	48920	45710	5.002
KSYN10	69	73	194	102	49722	45031	4.326

Genotype	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	GY(t/ha)
MANAKAMANA-3	71	76	239	130	48272	43457	5.172
MANAKAMANA-7	69	73	221	122	50864	49537	5.763
RAMPUR S03F08	72	76	214	118	50370	46728	4.935
RAMPUR S13F01	67	72	210	107	50556	47994	5.687
ZM627	70	73	207	107	49846	45802	5.275
Grand Mean	70	74	218	117	49747	46531	5.280
F-test (Genotype)	**	**	**	**	ns	ns	*
F-test (Location)	**	**	**	**	**	**	**
F-test (Genotype × Location)	ns	*	**	**	ns	ns	ns
LSD (0.05)	5.7	5.7	26.5	18.2	34.67.98	6216	1.633
CV (%)	10	9.6	15	19.2	8.61	16.51	8.23

Table 34: Performance of maize genotypes in CFFT full season, Pakhribas in 2020/21

Genotypes	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	GY(t/ha)
ZM401	79	84	148	60	38889	36667	5.954
TLBRS07F16	81	85	154	57	35926	31481	5.573
RAMPUR S13F28	80	85	143	37	34444	30741	3.830
MANAKAMANA-7	79	83	154	58	36296	33333	2.134
KSYNF10	79	83	160	55	28889	27778	5.599
FARMERS VARIETY	81	84	175	65	35926	33704	5.980
Grand Mean	80	84	156	55	35062	32284	4.845
F-test	Ns	ns	ns	ns	ns	ns	ns
LSD (0.05)	-	-	-	-	-	-	-
CV (%)	2.4	2.8	17	29.8	20.01	22.72	18.8

Table 35: Performance of maize genotypes in CFFT full season, Kabre in 2020/21

Genotypes	PHT(cm)	EHT(cm)	NOP	NOE	TKW	GY(t/ha)
ZM401	241	122	44000	50400	410	8.319
TLBRS07F16	199	99	48000	48000	400	5.935
RAMPUR S13F28	253	138	53600	54400	370	6.347
MANAKAMANA-7	218	117	56000	55200	394	7.514
KSYNF10	246	132	49600	55200	404	8.837
FARMERS VARIETY	225	119	49600	50400	446	6.634
Grand Mean	231	121	50133	52267	404	7.264

Table 36: Performance of maize genotypes in CFFT full season, Lumle in 2020/21

Genotypes	DTT	DTS	DTM	NOP	NOE	PHT(cm)	EHT(cm)	GY(t/ha)	TKW
ZM401	69	75	133	25926	20370	149	68	1.970	280
TLBRS07F16	74	78	138	40370	31852	140	73	3.774	317
RAMPUR S13F28	75	78	134	45556	40741	151	77	3.724	313
MANAKAMANA-7	74	77	139	35185	30000	139	61	4.642	317
KSYNF10	71	75	138	47037	40741	145	71	3.244	350
FARMERS VARIETY	66	69	140	41481	37778	134	70	2.468	310
Grand Mean	71	75	137	39259	33580	143	70	3.304	314
F-test	*	**	**	ns	ns	ns	ns	ns	ns
LSD (0.05)	5.61	3.69	0.91	-	-	-	-	-	-
CV (%)	4.32	2.69	0.36	20.31	23.11	9.58	17.24	14.15	13.1

Table 37: Performance of maize genotypes in CFFT full season, Salyan in 2020/21

Genotypes	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	TKW	GY(t/ha)
ZM401	76	80	202	99	49136	47407	464	4.941
TLBRS07F16	73	76	206	109	47901	45432	471	5.034
RAMPUR S13F28	76	78	197	102	47654	46667	473	4.812
MANAKAMANA-7	77	79	215	114	48642	48889	486	5.566
KSYNF10	68	73	210	109	50864	38765	478	5.037
FARMERS VARIETY	73	76	219	124	47160	41728	481	5.481
Grand Mean	74	77	208	109	48560	44815	475	5.145
F-test	*	*	ns	*	ns	ns	**	ns
LSD (0.05)	4.66	3.62	-	14.26	-	-	7.41	-
CV (%)	3.48	2.58	4.27	7.17	7.19	20.29	0.85	13.82

Table 38: Performance of maize genotypes in CFFT full season,Dailekh in 2020/21

Genotype	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	GY(t/ha)
FARMERS VARIETY	67	70	254	133	19630	22963	2.347
KSYNF10	63	65	199	111	28148	30370	3.302
MANAKAMANA-7	67	69	217	126	35556	28519	2.697
RAMPUR S13F28	65	67	207	110	29630	33333	2.759
TLBRS07F16	60	62	201	116	22593	17407	1.818
ZM401	66	68	210	120	29630	25556	2.591
Grand Mean	65	67	215	119	27531	26358	2.586
F-test	ns	ns	**	ns	ns	ns	ns
LSD (0.05)	-	-	24.25	-	-	-	-
CV (%)	6.74	6.43	6.21	8.3	19.9	13.17	14.82

Table 39: Combined analysis of CFFT full season Pakhribas, Lumle, Salyan and Dailekh in 2020/21

Genotypes	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	GY(t/ha)
ZM401	73	77	177	87	35895	32500	3.864
TLBRS07F16	72	75	175	88	36698	31543	4.050
RAMPUR S13F28	74	77	175	82	39321	37870	3.781
MANAKAMANA-7	74	77	181	90	38920	35185	3.759
KSYNF10	70	74	178	86	38735	34414	4.295
FARMERS VARIETY	71	75	196	98	36049	34043	4.069
F-test (Genotype)	ns	*	ns	ns	ns	ns	ns
F-test (Location)	**	**	**	**	**	*	**
F-test (Genotype × Location)	*	*	ns	ns	ns	ns	ns
LSD (0.05)	5.44	5.77	32.13	25.32	9162.4	9373.08	2.048
CV (%)	9.23	9.33	21.86	35.12	29.89	33.56	6.33

Table 40: Performance of maize genotypes in IYT full season terai set , Rampur in 2020/21

Genotypes	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	GY(t/ha)
TERAI POOL YELLOW	50	52	197	103	45128	24103	2.823
SIN-IBP-UTYF	55	57	151	94	20513	11282	1.448
RAMPUR S03 F02	52	54	179	111	38974	16410	1.972
RAMPUR S03 F06	54	56	212	119	35385	11795	1.368
RAMPUR COMPOSITE	52	54	211	122	42564	14872	1.671
R POP-4	54	56	213	116	34872	10769	0.988
R POP-3	52	54	198	121	44103	23077	3.045
POZARICA-S 9627 (RE)	53	55	212	118	46154	21026	2.356
PHRA PHUTTABAT- S0031	53	55	194	115	48205	27179	3.659
NARAYANI	53	55	199	119	41538	21026	2.484
HG-B	55	57	191	108	38974	15897	1.776
HG.AB	53	55	180	103	20000	11795	1.362
FARMERS' VARIETY	51	53	198	115	34359	14359	2.386
ACROSS 0031	51	53	211	122	48205	22051	2.424
Grand Mean	53	55	196	113	38498	17546	2.126
F-test	**	**	**	ns	**	*	*
LSD (0.05)	1.94	1.7	26.49	-	11530.35	10414.15	1.376
CV (%)	2.2	1.85	8.05	11.09	17.84	35.36	38.56

Table 41: Performance of maize genotypes in IYT full season terai set, Surkhet in 2020/21

Genotypes	PHT(cm)	EHT(cm)	RL	SL	NOP	NOE	GY(t/ha)	HC	PA	EA
TERAI POOL YELLOW	172	87	5	5	61481	60741	3.886	2	2	2
SIN-IBP-UTYF	184	99	2	6	58519	58519	3.916	2	3	2
RAMPUR S03F02	196	96	3	3	58519	59259	3.210	3	2	2
RAMPUR S03 F06	191	102	3	6	57778	59259	4.498	2	2	2
RAMPUR COMPOSITE	207	98	5	6	56296	57778	3.994	2	2	2
R POP-4	199	103	5	3	50370	57778	3.593	2	2	3
R POP-3	190	107	5	5	60000	61481	3.885	3	3	2
POZARICA-S 9627 (RE)	188	92	5	6	54815	57778	5.148	2	3	2
PHRA PHUTTABAT- S0031	184	92	6	4	58519	57037	3.806	2	2	3
NARAYANI	180	96	4	5	55556	52593	4.055	2	3	3
HG-B	202	93	6	4	55556	59259	4.387	2	2	3
HG.AB	184	86	5	4	51111	59259	4.514	3	2	3
FARMERS' VARIETY	213	95	4	4	65185	59259	3.695	2	3	3
ACROSS 0031	197	110	5	5	48148	55556	4.619	2	1	3
Grand Mean	192	97	5	5	56561	58254	4.086	2	2	3
F-test	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
LSD (0.05)	-	-	-	-	-	-	-	-	-	-
CV (%)	7.08	9.11	4.73	4.2	13.96	8.24	2.71	4.74	3.43	3.19

Table 42: Performance of maize genotypes in IYT full season terai set ,Nepalgunj in 2020/21

Genotypes	DTT	DTS	DTM	PHT(cm)	EHT(cm)	NOP	NOE	GY(t/ha)
TERAI POOL YELLOW	49	52	95	164	74	48000	43111	2.112
SIN-IBP-UTYF	56	59	97	152	71	49333	48889	3.289
RAMPUR S03F02	54	57	95	154	80	46667	44889	3.514
RAMPUR S03 F06	55	61	95	205	91	43556	33333	1.814
RAMPUR COMPOSITE	54	59	96	189	84	48000	39556	2.570
R POP-4	56	61	96	177	84	47556	35556	2.245
R POP-3	54	57	96	161	87	48000	48444	3.904
POZARICA-S 9627 (RE)	58	63	97	164	68	43556	35111	2.825
PHRA PHUTTABAT- S0031	54	58	96	160	72	50222	49778	4.236
NARAYANI	54	59	96	161	80	44000	39111	2.908
HG-B	54	58	96	185	94	39556	34667	2.347
HG.AB	53	57	95	173	87	49778	45778	3.242
FARMERS' VARIETY	49	53	95	182	89	47556	45333	2.375
ACROSS 0031	54	59	96	155	77	51111	49778	2.858
Grand Mean	54	58	96	170	81	46921	42381	2.874
F-test	**	ns	*	**	*	ns	**	ns
LSD (0.05)	3.51	-	1.28	21.68	14.61	-	8595.63	-
CV (%)	3.89	5.94	0.80	7.59	10.70	15.50	12.08	28.96

Table 43: Performance of maize genotypes in IYT full season terai set, Doti in 2020/21

Genotypes	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	GY(t/ha)
TERAI POOL YELLOW	53	57	229	117	48889	49630	3.890
SIN-IBP-UTYF	60	64	222	127	43704	43704	3.746
RAMPUR S03F02	56	60	217	122	45926	45185	4.703
RAMPUR S03 F06	54	59	251	140	42222	44444	4.340
RAMPUR COMPOSITE	54	60	255	136	49630	48148	4.506
R POP-4	56	60	242	146	48148	47407	4.101
R POP-3	56	60	248	150	46667	48889	3.895
POZARICA-S 9627 (RE)	57	63	223	110	46667	50370	4.421
PHRA PHUTTABAT- S0031	56	59	261	141	51111	52593	5.716
NARAYANI	56	60	239	139	50370	48889	4.321
HG-B	56	59	244	146	47407	52593	3.243
HG.AB	55	60	234	127	43704	43704	4.636
FARMERS' VARIETY	47	51	225	138	50370	61481	1.180
ACROSS 0031	56	60	241	126	45185	48148	4.493
Grand Mean	55	59	238	133	47143	48942	4.085
F-test	**	**	ns	ns	ns	*	**
LSD (0.05)	2.33	3.31	-	-	-	8777.29	1.260
CV (%)	2.52	3.32	6.74	10.6	10.36	10.68	18.38

Table 44: Combined analysis IYT full season terai set Rampur, Surkhet, Nepalgunj and Doti in 2020/21

Genotypes	PHT(cm)	EHT(cm)	NOP	NOE	GY(t/ha)
ACROSS 0031	201	109	48162	43883	3.599
FARMERS' VARIETY	204	109	49368	45108	2.409
HG.AB	193	101	41148	40134	3.438
HG-B	205	110	45373	40604	2.938
NARAYANI	195	109	47866	40405	3.442
PHRA PHUTTABAT- S0031	200	105	52014	46647	4.355
POZARICA-S 9627 (RE)	197	97	47798	41071	3.688
R POP-3	199	116	49692	45473	3.682
R POP-4	208	112	45236	37877	2.732
RAMPUR COMPOSITE	215	110	49122	40088	3.185
RAMPUR S03 F06	215	113	44735	37208	3.005
RAMPUR S03F02	186	102	47521	41436	3.350

Genotypes	PHT(cm)	EHT(cm)	NOP	NOE	GY(t/ha)
SIN-IBP-UTYF	177	98	43017	40598	3.100
TERAI POOL YELLOW	190	95	50875	44396	3.177
Grand Mean	199	106	47281	41781	3.293
F-test (Genotype)	**	**	*	**	**
F-test (Location)	**	**	**	**	**
F-test (Genotype × Location)	*	ns	*	**	*
LSD (0.05)	25.01	18.78	8183.53	13658.77	1.078
CV (%)	15.59	21.93	21.46	4.05	4.06

Table 45: Performance of maize genotypes in CVT full season terai set ,Rampur in 2020/21

Genotypes	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	GY(t/ha)
AGUA FRIA S0031	51	54	200	108	50370	47407	3.822
CEL-OHGYA×CEL-OHGYB	55	56	201	107	50370	40000	4.168
FARMERS' VARIETY	51	54	203	109	33333	45185	3.388
POZARICA 9531	49	52	196	108	36296	23704	2.013
R POP-1	55	57	202	108	28889	31852	2.856
RAMPUR COMPOSITE	54	56	199	106	43704	23704	2.798
RAMPUR S03 F08	54	56	201	108	45185	68148	6.028
RAMPUR S13F24	54	56	202	109	57037	60741	5.911
RAMPUR-4	52	54	198	106	38519	25185	1.862
UPAHAR	53	55	198	107	46667	33333	3.264
Grand Mean	53	55	200	108	43037	39926	3.811
F-test	**	**	ns	ns	ns	*	**
LSD (0.05)	2.71	2.25	-	-	-	27474.94	2.659
CV (%)	2.99	2.38	1.86	1.79	26.64	40.11	4.06

Table 46: Performance of maize genotypes in CVT full season terai set, Surkhet, in 2020/21

Gentopyes	PHT(cm)	EHT(cm)	NOE	NOP	GY(t/ha)	HC	PA	EA
AGUA FRIA S0031	192	106	39048	37460	3.244	2	3	2
CEL-OHGYA×CEL-OHGYB	205	101	41587	40635	4.387	3	2	1
FARMERS' VARIETY	212	102	40000	43175	3.759	3	3	2
POZARICA 9531	211	100	43175	45714	4.380	4	3	2
R POP-1	199	99	47937	46349	4.245	2	3	2
RAMPUR COMPOSITE	225	92	43492	43175	4.468	2	3	1

Gentopyes	PHT(cm)	EHT(cm)	NOE	NOP	GY(t/ha)	HC	PA	EA
RAMPUR S03 F08	182	97	39683	40317	3.836	3	4	3
RAMPUR S13F24	204	90	46984	48254	4.176	3	3	2
RAMPUR-4	182	103	42222	44127	3.327	2	4	3
UPAHAR	222	101	50476	48254	4.549	2	3	3
Grand Mean	204	99	43460	43746	4.037	3	3	2
F-test	ns	ns	ns	ns	ns	ns	ns	ns
LSD (0.05)	-	-	-	-	-	-	-	-
CV (%)	11.38	10.87	16.59	21.03	25.06	40.09	29.71	40.16

Table 47: Performance of maize genotypes in CVT full season terai set , Nepalgunj, in 2020/21

Genotypes	DTT	DTS	DTM	PHT(cm)	EHT(cm)	NOP	NOE	GY(t/ha)
AGUA FRIA S0031	51	54	95	179	84	51778	48222	3.800
RAMPUR COMPOSITE	47	49	93	189	87	51778	49556	3.447
RAMPUR S13F24	57	61	96	154	64	48667	39111	2.612
RAMPUR-4	51	54	94	173	93	45778	44889	3.315
UPAHAR	53	56	95	182	86	48667	45333	3.289
CEL-OHGYA×CEL-OHGYB	50	54	94	188	91	47111	44000	3.487
R POP-1	65	59	96	166	73	38889	38889	2.988
RAMPUR S03 F08	55	59	96	152	66	46889	44444	2.809
FARMERS' VARIETY	51	54	95	163	82	48444	43333	3.035
POZARICA 9531	52	57	94	172	81	50889	48889	3.462
Grand Mean	53	56	95	172	81	47889	44667	3.224
F-test	ns	**	**	*	ns	ns	ns	ns
LSD (0.05)	-	4.79	1.18	23.07	-	-	-	-
CV (%)	13.37	5.02	0.72	7.82	17.19	12.0	12.2	26.37

Table 48: Performance of maize genotypes in CVT full season terai set, Doti, in 2020/21

Genotypes	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	GY(t/ha)
AGUA FRIA S0031	54	57	239	136	44444	47111	5.498
CEL-OHGYA×CEL-OHGYB	57	61	236	124	46667	44000	6.489
FARMERS' VARIETY	51	55	125	80	54667	48444	4.567
POZARICA 9531	54	57	237	139	45778	44000	5.340
R POP-1	56	59	238	130	40889	41778	5.048
RAMPUR COMPOSITE	54	57	258	147	38667	40000	6.484
RAMPUR S03 F08	57	61	249	128	43111	48444	6.559
RAMPUR S13F24	58	61	217	126	35556	38222	4.847

Genotypes	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	GY(t/ha)
RAMPUR-4	53	57	226	128	42222	42222	4.818
UPAHAR	56	59	220	125	44000	44000	5.501
Grand Mean	55	58	225	126	43600	43822	5.115
F-test	**	**	**	**	**	ns	ns
LSD (0.05)	1.98	2.26	31.66	23.07	6437.63	-	-
CV (%)	2.1	2.26	8.22	10.64	8.6	12.99	15.57

Table 49: Combined analysis of CVT full season terai set (Rampur, Surkhet, Nepalgunj and Doti) in 2020/21

Genotypes	PHT(cm)	EHT(cm)	NOP	NOE	GY(t/ha)
AGUA FRIA S0031	202	108	46013	45447	4.091
CEL-OHGYA×CEL-OHGYB	199	99	46585	41175	4.414
FARMERS' VARIETY	182	95	45738	45796	3.909
POZARICA 9531	204	110	43392	38942	3.762
R POP-1	205	106	41198	41725	3.859
RAMPUR COMPOSITE	217	109	43164	37799	4.309
RAMPUR S03 F08	199	101	41876	48791	5.103
RAMPUR S13F24	194	98	46934	47598	4.686
RAMPUR-4	192	105	43328	38241	3.260
UPAHAR	203	103	47452	44175	4.194
Grand Mean	200	103	44568	42969	4.159
F-test (Genotype)	**	*	ns	ns	*
F-test (Location)	**	**	ns	ns	**
F-test (Genotype × Location)	**	**	ns	**	**
LSD (0.05)	25.45	17.77	-	9187.49	1.331
CV (%)	15.73	21.24	20.28	26.42	3.95

Table 50: Performance of maize genotypes in CFFT full season terai set , Rampur in 2020/21

Genotypes	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	GY(t/ha)
FARMERS VARIETY	50	52	220	113	47778	32222	3.098
HG. A	50	52	237	127	54444	41111	4.285
R POP-2	48	50	227	140	48889	46667	4.564
RAMPUR 4	50	52	198	108	43333	38889	3.347
RAMPUR S13F26	50	52	185	110	61111	27778	2.444
S 0128	50	52	223	118	57778	20000	1.664
Grand Mean	50	52	215	119	52222	34444	3.234

Table 51: Performance of maize genotypes in CFFT full season terai set, Surkhet in 2020/21

Genotypes	NOP	NOE	GY(t/ha)	PA	EA
HG.A	33333	37778	5.543	2	2
R POP-2	32222	26667	6.227	3	3
RAMPUR 4	53333	26667	7.197	1	2
RAMPUR S13F26	44444	41111	8.308	4	4
FARMERS VARIETY	33333	35556	8.803	3	4
S 0128	33333	37778	6.412	3	3
Grand Mean	38333	34260	7.082	3	3

Table 52: Performance of maize genotypes in CFFT full season terai set, Doti in 2020/21

Genotypes	DTT	EHT(cm)	DTS	PHT(cm)	NOP	NOE	GY(t/ha)
FARMERS VARIETY	43	96	47	198	37333	42667	3.037
HG. A	53	101	58	215	50667	57333	6.081
R POP-2	53	129	58	228	42667	44000	5.705
RAMPUR 4	54	131	58	229	33333	33333	4.792
RAMPUR S13F26	53	100	57	215	48000	52000	7.404
S 0128	54	113	58	213	41333	44000	5.886
Grand Mean	52	114	56	216	42222	45556	5.484

2.1.3 Development of Quality Protein Maize (QPM) for Terai and Mid Hills of Nepal

A set of experiment was conducted on quality protein maize for initial yield trial (IYT), coordinated varietal trial (CVT) and coordinated farmer's field trial (CFFT) at NMRP, Rampur during winter season of 2020. The individual plot was two rows of 4m long for IYT, four rows of 4m long for CVT and six rows of 4m length. Row to row (RR) and Plant to plant (PP) spacing was maintained as 0.75m and 0.20m respectively. The experiment was carried out in randomized completed design (RCDB) with three replications. Two seeds per hill were planted and thinned out to a single plant per hill after first weeding. Fertilizers were applied at the rate of 120:60:40 kg/ha N:P_2O_5 ,K_2O respectively in addition to 10t/ha FYM. Half dose of nitrogen and full dose of P and K were applied as basal and remaining half dose of N was applied as side dressing at knee high stage. The plot was kept free of weed manually. The field weight of ear was converted into grain yield (t/ha) at 15% moisture level considering 80% shelling recovery percentage.

2.1.3.1 Initial Yield Trial (IYT-Q)

There was significant difference for number of days to 50 % antheiss and silking, plant height, ear height and number of plant/ ha of quality protein maize (QPM) where as non significant different among the tested genotypes for grain yield at NMRP, Rampur (Table 53) indicating the similar performance of tested genotypes in term of grain yield. The genotypes RampurS13FQ-06 (6.232t/ha) followed by RampurS13FQ-08 (5.464t/ha) produced highest grain yield in comparison to std check Poshilo Makai-2 (3.723t/ha) and Poshilo Makai-1 (3.614t/ha). The trial mean was 4.272t/ha (Table 53).

Table 53: Performance of QPM in IYT at NMRP Rampur, 2020 winter

EN	Genotype	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	GY(t/ha)
1	RPop YQ-10	74	77	189	94	43333	46111	4.751
2	Rampur-S13FQ-02	75	78	177	92	41111	42778	4.768
3	Rampur-S03FQ-02	68	70	187	92	50556	51111	4.867
4	Rpop YQ-4	77	80	182	87	36667	42222	4.738
5	Rpop YQ-14	75	78	191	96	40556	38889	4.266
6	Rpop YQ-12	77	79	182	83	39444	44444	4.703
7	Rampur-S13FQ-010	79	82	187	100	32222	36667	3.348
8	Rpop-YQ-8	77	80	176	85	34444	37222	3.109
9	RampurS13-FQ-04	76	79	179	103	40000	39444	4.367
10	Rpop YQ-2	75	78	186	106	36667	39444	3.866
11	RampurS13FQ-08	71	75	210	107	51111	53889	5.464
12	Rpop YQ-06	76	79	137	82	27778	23333	2.162
13	RampurS13FQ-06	74	77	193	113	44444	55000	6.232
14	Poshilo Makai-1	74	76	190	89	41111	35000	3.614
15	Poshilo Makai-2	74	77	145	91	38889	39444	3.723
	Grand Mean	75	78	181	95	39889	41667	4.272
	P value	0	0.01	0.01	0.02	0.36	0.04	0.05
	CV(%)	3.48	3.44	10.49	10.51	24.55	23.17	26.6
	LSD(0.05)	4.33	4.45	31.89	16.59	16471.84	16410.18	2.157

2.1.3.2 Coordinated Varietal Trial (CVT-Q)

There was significant difference for number of days to 50% antheiss and silking, plant height, ear height and number of plant/ ha of quality protein maize (QPM) where as non significant different among the tested genotypes for grain yield at NMRP, Rampur (Table 54) indicating the similar performance of tested genotypes in term of grain yield. The genotypes RampurS13FQ-08 (7.853t/ha) followed by RampurS13FQ-06 (7.269t/ha) produced highest grain yield in

comparison to std check Poshilo Makai-2 (5.727t/ha) and Poshilo Makai-1 (6.190t/ha). The trial mean was 6.070t/ha. There was non-significant difference among the tested genotypes for any of the traits under observation at ARS Pakribas (Table 55) indicating the similar performance of the tested genotypes.

Table 54: Performance of QPM in CVT at NMRP Rampur, 2020

EN	Genotype	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	GY(t/ha)
1	S01S1WQ-2	76	79	166	77	29167	29444	3.836
2	S03TLYQ-AB-01	75	77	162	98	49167	53889	7.075
3	S00TLYQ-AB	74	77	199	100	37778	40833	5.771
4	S01SIYQ	78	80	197	103	41389	46111	6.607
5	S00TLWQ-B	77	80	171	86	37222	36111	4.692
6	Rpop-YQ-8	77	79	193	95	51111	56389	6.152
7	Rampur-S13FQ-02	73	76	209	113	52222	53056	5.664
8	RampurS13FQ-08	72	75	195	101	48333	57778	7.853
9	RPOPYQ-10	75	78	204	97	49722	53889	6.333
10	Rampur-S13FQ-010	78	81	206	93	47222	38889	6.270
11	Rampur-S03FQ-02	70	73	193	88	51944	55278	5.885
12	RampurS13FQ-06	76	79	190	104	53056	53056	7.269
13	Poshilo Makai-1	76	78	222	100	40278	40833	6.190
14	Poshilo Makai-2	73	76	183	94	44167	45000	5.727
15	Local check	68	70	204	104	43889	46667	5.726
	Grand Mean	75	77	193	97	45111	47148	6.070
	P value	0.00	0.00	0.06	0.04	0.02	0.03	0.52
	CV(%)	2.72	2.84	10.6	10.42	16.73	20.96	25.41
	LSD(0.05)	3.39	3.67	34.22	16.88	12619.98	16525.89	3.594

Table 55: Performance of QPM in CVT at ARS Pakribash, 2020

EN	Genotypes	DTT	DTS	PHT(cm)	EHT(cm)	RL	SL	GY(t/ha)
1	S01S1WQ-2	66	70	174	95	11	1	1.620
2	S03TLYQ-AB-01	67	71	184	98	8	1	1.762
3	S00TLYQ-AB	64	68	190	103	9	0	1.209
4	S01SIYQ	65	71	206	117	12	0	1.647
5	S00TLWQ-B	64	70	217	96	14	0	1.941
6	Rpop-YQ-8	65	72	210	106	8	0	1.381
7	Rampur-S13FQ-02	64	69	199	114	8	0	1.508
8	RampurS13FQ-08	63	67	193	104	10	0	1.697
9	RPOPYQ-10	66	70	238	111	6	0	1.867
10	Rampur-S13FQ-010	46	71	198	117	12	1	1.061
11	Rampur-S03FQ-02	64	68	193	105	11	0	1.151

EN	Genotypes	DTT	DTS	PHT(cm)	EHT(cm)	RL	SL	GY(t/ha)
12	RampurS13FQ-06	68	74	186	107	12	1	1.716
13	Poshilo Makai-1	67	71	196	101	14	0	2.214
14	Poshilo Makai-2	65	70	161	99	9	1	1.465
15	Farmer's variety	67	71	222	123	12	0	1.979
	Grand Mean	64	70	198	106	10	0	1.615
	P value	0.419	0.207	0.128	0.167	0.753	0.678	0.342
	CV,%	13.82	3.23	13.07	10.94	45.13	215.10	32.10
	LSD (0.05)	14.80	3.79	43.26	19.48	7.82	1.36	0.87

The results from Lumle showed the significant difference for days to flowering, days to silking, plant height, number of plant and ear per hectare, thousand kernel weights and grain yield where as non-significant variation observed for ear height (Table 56). Genotypes S00TYLQ-AB (3.58t/ha), Rpop-YQ-10 (3.53t/ha) and Rampur-S13FQ-02 (3.26t/ha) produced relatively more grain yield over to standard checks Posilo Makai-1 (2.28t/ha), Posilo Makai-2 (2.31t/ha) and farmer's variety (2.68t/ha). Similarly, there was significant difference days to anthesis, days to silking, ear height, thousand kernel weight and grain yield where as non-significant variation observed for plant height, number plant and ear per hectare at HCRP, Dolakha. where RAMPUR-S13FQ-08 (8.15t/ha), RAMPUR-S13FQ-06 (7.38t/ha) and RAMPUR-S03FQ-02 (7.015t/ha) produced relatively more GY over to standard checks Posilo Makai-1 (5.534t/ha), Posilo Makai-2 (3.766t/ha) and farmer's variety (4.405t/ha) (Table 57).

Table 56: Performance of QPM in CVT at DoAR Lumle, 2020

SN	Genotypes	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	TKW	GY(t/ha)
1	Farmer's variety	71	75	168	103	51111	48889	310	2.689
2	Posilo Makai-1	87	89	163	102	28889	23333	293	2.285
3	Posilo Makai-2	75	78	147	90	44444	44444	323	2.319
4	Rampur-S03FQ-02	80	82	163	95	53333	43334	293	2.399
5	Rampur-S13FQ-010	80	83	154	96	45556	40000	243	2.047
6	Rampur-S13FQ-02	83	86	159	99	64445	55556	333	3.261
7	Rampur-S13FQ-06	83	86	166	99	54445	48889	263	2.949
8	Rampur-S13FQ-08	81	84	163	96	61111	56667	317	3.106
9	Rpop-YQ-10	85	88	169	95	60000	56667	307	3.537
10	Rpop-YQ-8	83	86	137	88	31111	31111	250	1.737
11	S00TLWQ-B	88	90	149	101	35556	32222	220	1.893
12	S00TYLQ-AB	82	85	154	95	61111	60000	257	3.586
13	S01SIYQ	83	87	136	83	20000	21111	287	1.57
14	S03TYLYQ-AB-01	86	89	154	107	26667	21111	277	1.441
15	SO1S1WQ-2	83	88	126	86	34445	32222	263	1.576

SN	Genotypes	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	TKW	GY(t/ha)
	Mean	82	85	154	96	44815	41037	282	2.426
	P value	0.001	<0.001	<0.001	0.2152	0.0043	0.0019	0.0478	0.04
	CV,%	5	4	7	10	31	30	13	39.2
	LSD0.05	6	6	17	16	23454	20662	66	1.592

Table 57: Performance of QPM in CVT at HCRP,Dolakha,2020

SN	Genotypes	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	TKW	GY(t/ha)
1	S01S1WQ-2	79	81	204	102	48889	43704	320	3.475
2	S03TLYQ-AB-01	81	83	189	80	51111	45926	354	4.716
3	S00TLYQ-AB	81	83	210	102	54074	55556	336	6.972
4	S01SIYQ	82	84	177	119	54815	47407	379	5.383
5	S00TLWQ-B	79	81	206	118	50370	54074	285	5.357
6	RPOP-YQ-8	82	84	191	98	57037	47407	313	4.056
7	RAMPUR-S13FQ-02	80	81	221	111	51852	54815	364	6.563
8	RAMPUR-S13FQ-08	80	82	214	103	55556	61481	343	8.15
9	RPOPYQ-10	81	83	213	101	60000	53333	384	6.21
10	RAMPUR-S13FQ-010	79	81	216	111	51852	42222	337	5.153
11	RAMPUR-S03FQ-02	81	82	145	103	52593	55556	388	7.015
12	RAMPUR-S13FQ-06	80	82	202	103	59259	58519	332	7.389
13	Poshilo makai-1	78	81	234	102	44444	50370	324	5.534
14	Poshilo makai-2	80	81	190	103	48889	40741	347	3.766
15	Farmer's variety	79	80	221	94	48889	43704	331	4.405
	Grand Total	80	82	202	103	52642	50321	343	5.61
	P value	0	0	0.567	0.01	0.45	0.231	0.03	0.04
	CV,%	4.12	6.12	12.21	9.67	13.34	15.56	13.31	15.12
	LSD	1.56	2.32	50	18	12580	12103	38.0	2.14

At DoAR, Doti, there were significant differences for days to flowering, plant height and grain yield of quality protein maize (QPM) genotypes evaluated under coordinated yield trial (CVT). The grain yield was ranged from 2.02t/ha of Farmer's variety to 7.67t/ha of Rampur S13FQ-02 (Table 58). Rampur S13FQ-02 with 7.67t/ha followed by RampurS13FQ-06 with 6.92 were the promising genotypes.

Table 58: Performance of QPM in CVT at Doti,2020

SN	Genotype	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	TKW	GY(t/ha)
1	SO1S1 WQ-2	58	62	222	109	58333	61574	343	5.64
2	SO3TLYQ-AB-01	58	62	225	115	64352	64352	348	6.08
3	SOOTLYQ-AB	57	62	251	136	56019	55556	318	6.59
4	SO1 SIYQ	58	64	228	125	65278	64815	353	6.28
5	SOOTLWQ-B	57	62	226	115	58796	58333	338	5.86
6	RPOP-YQ-8	60	63	225	101	56944	56481	368	4.86
7	Rampur-S13FQ-02	58	62	228	128	62963	60648	347	4.83
8	Rampur S13FQ-02	57	62	257	131	67130	65278	368	7.67
9	RPOPYQ-10	59	63	239	130	62500	65741	348	5.3
10	Rampur-S13FQ-010	59	62	237	129	63889	63426	360	5.45
11	Rampur-SO3FQ-02	57	61	243	123	65741	65278	313	6.18
12	RampurS13FQ-06	58	63	236	129	62963	62963	347	6.92
13	Posilo Makai-1	58	62	262	127	58333	61111	388	5.38
14	Posilo Makai-2	57	62	229	126	60648	61574	327	5.82
15	Farmer's variety	43	47	189	104	58333	63889	358	2.02
	Grand Mean	57	61	233	122	61481	62068	348	5.66
	P value	0.000	0.000	0.003	0.084	0.147	0.165	0.937	0.003
	CV,%	1.87	2.31	6.96	10.99	7.85	7.24	13.14	20.95
	LSD	1.78	2.37	27.14	22.4	8075.59	7512.95	87.51	1.98

2.1.3.3 Coordinated Farmers Field Trial (CFFT-Q)

At Rampur, significant differences was observed among tested genotypes at farmers fields for number of days to 50 % antheiss and silking, plant height, ear height and number of plant/ ha and grain yield (Table 59). The genotypes S99TLYQ-AB (6.914t/ha) produced highest grain yield in comparison to std check Poshilo Makai-1 (6.071t/ha) and local check (6.688t/ha). The trial mean was 5.724t/ha. Likewise at DoAR, Lumle differences among genotypes was observed for number of days to 50 % antheiss and silking, number of plant and ear / ha and grain yield of (Table 60). The genotypes Poshilo Makai-1 (4.330t/ha) produced highest grain yield. The trial mean was 2.702t/ha. In HCRP Kabre, maximum grain yield of 7.570t/ha was obtained from S99TLYQ-AB followed by 7.26t/ha 0f S01SIYQ where as standard check produced grain yield 7.13t/ha of Poshilo makai-1 (Table 61).

Table 59: Performance of QPM in CFFT at NMRP Rampur, 2020

EN	Name of genotypes	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	GY(t/ha)
1	S99TLYQ-HG-AB	68	71	201	104	41667	38889	5.351
2	S01SIYQ	78	82	191	96	42778	55556	5.969
3	S00TLWQ-B	80	84	179	90	28333	30000	3.348
4	S99TLYQ-AB	75	78	205	110	41667	44444	6.914
5	Poshilo Makai-1	76	79	200	92	50000	47778	6.071
6	Farmer's variety	71	74	200	101	50556	55556	6.688
	Grand Mean	75	78	196	99	42500	45370	5.724

Table 60: Performance of QPM in CFFT at DoAR, Lumle, 2020

SN	Genotypes	DTT	DTS	NOP	NOE	PHT(cm)	EHT(cm)	TKW	GY(t/ha)
1	S99TLYQ-AB	78	81	34815	31481	158	70	270	2.257
2	Poshilo Makai-1	84	87	51482	50000	173	77	313	4.335
3	Farmer's variety	82	86	55555	50000	167	67	237	2.213
4	S99TLYQ-HG-AB	82	85	60740	52593	150	58	250	2.125
5	S00TLWQ-B	83	86	63704	54074	149	64	243	2.993
6	S01SIYQ	72	76	82963	68889	171	77	290	2.287
	Grand Mean	80	83	58210	51173	161	69	267	2.702
	P value	0.00	0.00	0.03	0.05	0.53	0.30	0.16	0.03
	CV,%	2.80	2.65	23.72	22.17	12.18	15.60	13.52	27.70
	LSD	4.09	4.02	25116.47	20639.67	35.76	19.53	65.73	1.36

Table 61: Performance of QPM in CFFT at HCRP, Dolakha, 2020

EN	Genotypes	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	TKW	GY(t/ha)
1	S99TLYQ-HG-AB	79	82	230	118	60833	62500	350	6.635
2	S01SIYQ	81	82	195	114	54167	56667	360	7.267
3	S00TLWQ-B	80	82	195	97	60000	66667	310	6.340
4	S99TLYQ-AB	78	80	241	128	61667	70000	338	7.570
5	Poshilo makai-1	80	81	245	130	52500	55000	352	7.133
6	Farmer's variety	74	77	231	136	58333	51667	522	6.568
	Grand Mean	79	81	223	121	57917	60417	372	6.919

2.1.4 Development and evaluation of early maize genotypes

2.1.4.1 Initial Yield Trial (IYT-E)

There was significant difference for flowering, plant and ear height and number of plant and ear per plot and grain yield among the tested genotypes at Rampur (Table 62). Genotype SO3TEY/LN produced the highest grain yield of 5.959 t/ha followed by standard check Arun-2 (5.33 t/ha) where trial mean was 3.89 t/ha. Likewise, significant differences was observed for flowering, plant and ear height whereas non- significant differences for grain yield, number of plant and ear per plot at DoAR, Lumle. Grain yield ranged from 1.807 t/ha to 2.582 t/ha with trial mean 2.133 t/ha (Table 63). Non-significant difference among the tested genotypes for grain yield under observation indicating the similar performance of the tested genotypes. However, combine analysis over locations showed that grain yield was recorded as non-significant for genotypes and significant for genotypes × environment interaction. Genotypes SO3TEY/LN, 02SADVI performed better in IYT across locations (Table 64). Therefore, this can be potential genotypes for promoting to coordinated varietal trial in the next season.

Table 62: Performance of early maize genotypes in IYT-E at NMRP Rampur, 2020/21

EN	Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE
1	Across-2402	3.736	65	70	133	61	32	26
2	S03TEY-SEQ	3.477	63	65	142	71	21	24
3	Earlymid katamani	1.717	61	63	139	69	23	20
4	SO3TEY/LN	5.959	61	63	157	86	36	37
5	TDO3TEY/SEBAFAUT	4.112	62	65	155	75	23	26
6	02SADVI	5.294	65	71	153	81	37	30
7	P15QC7SRC1	3.679	69	72	165	76	25	22
8	Khumal yellow /Pool-17	3.369	64	68	144	66	16	18
9	Farmers' Variety.	3.115	60	62	166	89	19	21
10	POP-445/POP-446	2.494	61	63	142	64	20	19
11	EEY C1	4.769	61	62	141	68	35	31
12	ZM-621/Pool-15	4.332	63	65	148	73	26	23
13	Arun-2 (std ck)	5.332	60	62	188	115	42	32
14	ZM-423	2.468	61	63	131	66	21	20
15	RC/Pool-17	4.588	60	63	155	87	29	29
	Grand Mean	3.896	62	65	151	77	27	25
	P value	0.00	0.00	0.000	0.000	0.000	0.010	0.030
	LSD (0.05)	1.74	2.14	3.20	18.67	15.30	7.67	7.86
	CV,%	26.78	2.05	2.94	7.41	11.95	16.96	18.63

Table 63: Performance of early maize genotypes in IYT-E at DoAR,Lumle, 2020/21

EN	Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE
1	Across-2402	2.282	76	79	123	48	17	18
2	S03TEY-SEQ	1.807	67	71	124	49	15	17
3	Earlymid katamani	2.32	68	72	125	48	14	15
4	SO3TEY/LN	2.165	72	76	142	59	15	16
5	TDO3TEY/SEBAFAUT	2.181	73	76	135	55	13	14
6	02SADVI	2.582	78	82	151	68	16	17
7	P15QC7SRC1	2.05	77	78	142	57	14	15
8	Khumal yellow/Pool-17	2.19	71	74	141	60	14	16
9	Farmers' Variety.	2.28	70	73	156	74	17	18
10	POP-445/POP-446	2.125	65	69	110	37	16	18
11	EEY C1	1.892	69	72	128	58	14	17
12	ZM-621/Pool-15	2.227	72	76	137	59	18	20
13	Arun-2 (std. ck)	1.817	71	74	145	66	16	17
14	ZM-423	1.907	68	72	126	47	15	17
15	RC/Pool-17	2.172	67	69	146	64	16	17
	Grand Mean	2.133	71	74	135	57	15	17
	P value	0.135	0.000	0.00	0.007	0.000	0.366	0.278
	LSD (0.05)	0.479	3.130	3.266	21.232	11.373	3.651	3.792
	CV,%	13.415	2.638	2.634	9.381	12.008	14.216	13.408

Table 64: Combined results of early maize genotypes in IYT at Rampur and Lumle 2020/21

EN	Genotype	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE
1	Across-2402	3.009	71	74	128	54	25	22
2	S03TEY-SEQ	2.642	65	68	133	60	18	20
3	Earlymid katamani	2.019	65	67	132	58	19	18
4	SO3TEY/LN	4.062	67	69	150	73	25	26
5	TDO3TEY/SEBAFAUT	3.146	67	71	145	65	18	20
6	02SADVI	3.938	72	76	152	75	27	24
7	P15QC7SRC1	2.865	73	75	154	67	20	19
8	Khumal yellow/Pool-17	2.779	68	71	142	63	15	17
9	Farmers' Variety.	2.697	65	67	161	81	18	20
10	POP-445/POP-446	2.31	63	66	126	50	18	18
11	EEY C1	3.331	65	67	135	63	25	24
12	ZM-621/Pool-15	3.28	68	71	142	66	22	22
13	Arun-2 (std ch)	3.575	65	68	167	91	29	24
14	ZM-423	2.187	64	68	129	57	18	19

EN	Genotype	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE
15	RC/Pool-17	3.38	64	66	150	75	22	23
	Grand Mean	3.015	67	70	143	67	21	21
	P value (G)	0.458	0.006	0.007	0.000	0.008	0.362	0.577
	P value(G×E)	0.00	0.00	0.02	0.57	0.03	0.002	0.00
	LSD (0.05)	1.822	3.825	3.724	16.635	15.322	11.451	9.060
	CV,%	25.376	2.404	2.776	8.360	12.105	16.939	17.515

2.1.4.2 Coordinated Varietal Trial (CVT-E)

There was significant difference for grain yield, flowering, plant and ear height and number plant and ear per hectare among the genotypes at Rampur.The mean grain yield ranged from 2.044t/ha of Earlymid katamani to 5.526t/ha of EEYC1 with trial mean 3.927t/ha. Here, EEYC1 (5.526t/ha), SO3TEY-LN/PP (5.463t/ha) and Pool-15 (5.340t/ha) were another three higher yielding early maize genotypes (Table 65). Similarly there was non-significant difference among the genotypes for grain yield, plant and ear height, number of plant and ear per hectare at Pakhribas. However, significant variation observed for flowering traits. TDO3TEY/SEBAFAUT produced the highest grain yield of 3.819t/ha followed by SO3TEY/LN (3.579t/ha) where trial mean was 3.11t/ha. Thus non-significant grain yield among genotypes means similar performance under study condition and we have no varietal selection option (Table 66). Result from HCRP, Dolakha showed the significant differences for days to flowering, height whereas non-significant effect on grain yield and number of plant and ear per hectare HCRP, Dolakha (Table 67). Khumal Yellow/Pool-17 producted the highest grain yield of 5.309t/ha followed by S97TEYGHAYB (3) (5.199t/ha) and Arun-2 (5.130t/ha). There was non-significant difference among the tested genotypes for any of the traits under observation at Nepaljung (Table 68) indicating the similar performance of the tested genotype. Likewise, the result showed the significant differences for flowering days, number of plant and ear per hectare whereas non-significant differences for grain yield, height among tested genotypes at DoAR Lumle (Table 69). Earlymid katamani produced highest grain yield of 2.965t/ha followed by ZM-621/Pool-15 (2.886t/ha) where trial mean was 2.289t/ha. There was significant difference for grain yield, flowering days, height, and number of ear per hectare whereas there was non-significant differeance for rest of the traits viz. number of plant per hectare (Table 70). At HRS Dailekha, maximum grain yield of 7.285t/ha was produced from S97TEYGHAYB(3). Combine analysis over locations showed non-significant differences recorded for all traits except height with respect to genotypes and significant differences recorded for all traits viz. grain yield, flowering days, number of plant and ear per hectare with respect to genotypes × environment interactions in combined sites analysis (Table 71). Genotype SO3TEY-LN/PP with 4.400t/ha was highest grain yielder among the tested

early genotypes in CVT across the locations. Therefore, this can be a potential genotype for promoting to coordinated farmer's field trial (CFFT) in the next season.

Table 65: Performance of Early maize genotypes in CVT-E at NMRP,Rampur, 2020/21

EN	Genotype	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE
1	Earlymid katamani	2.044	63	66	137	66	49306	35417
2	Rajahar local	4.667	65	68	164	95	79166	72916
3	S97TEYGHAYB(3)	3.197	61	63	123	57	26389	28472
4	POP-445/ POP-446	3.393	61	63	121	55	49305	43750
5	Pool-15	5.34	61	63	145	86	55556	52778
6	R.C./POOL-17	3.647	62	64	168	92	50000	50695
7	SO3TEY/LN	4.901	63	65	152	83	55555	61111
8	ARUN-2 (Std Chk)	4.416	64	66	171	94	61805	60417
9	FARMERS VARIETY	2.307	63	66	150	84	20139	24306
10	ZM-621/Pool-15	3.599	63	65	134	69	41667	43056
11	EEYC1	5.526	60	62	143	76	70139	79167
12	SO3TEY-LN/PP	5.463	61	63	139	76	70833	75694
13	Khumal yellow/Pool-17	3.509	67	70	137	63	48611	43750
14	TDO3TEY/SEBAFAUT	2.968	65	70	146	73	40278	32639
	Grand Mean	3.927	63	65	145	76	51339	50298
	P value	0.003	0.01	0.00	0.000	0.000	0.000	0.000
	LSD (0.05)	1.767	3.179	3.310	15.665	10.356	16122	17746
	CV,%	26.805	3.023	3.013	6.438	8.096	18.712	21.022

Table 66: Performance of Early maize in CVT-E at Pakhribas

EN	Genotype	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE
1	Earlymid katamani	3.207	56	60	177	92	64583	64583
2	Rajahar local	3.354	62	67	212	99	62500	65972
3	S97TEYGHAYB(3)	3.037	61	64	180	96	65278	66667
4	POP-445/ POP-446	2.378	58	62	179	79	57639	60417
5	Pool-15	2.789	58	62	190	108	60417	62500
6	R.C./POOL-17	3.3	56	61	202	109	56250	57639
7	SO3TEY/LN	3.579	59	62	193	99	62500	65972
8	ARUN-2 (Std Chk)	3.261	59	64	191	94	47222	54167
9	FARMERS VARIETY	2.51	66	69	229	112	54861	56945
10	ZM-621/Pool-15	3.447	60	66	195	99	63889	64583
11	EEYC1	3.346	57	61	198	100	70139	71528
12	SO3TEY-LN/PP	3.253	59	63	181	92	65972	67361

EN	Genotype	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE
13	Khumal yellow/Pool-17	2.231	63	68	170	83	63889	64583
14	TDO3TEY/SEBAFAUT	3.819	60	64	194	103	61111	63194
	Grand Mean	3.11	59.57	63.86	192.13	97.53	61160.74	63293.62
	P value	0.207	0.000	0.000	0.156	0.173	0.284	0.546
	LSD (0.05)	1.127	1.872	2.623	35.387	21.976	14626	14054
	CV,%	21.613	1.872	2.448	10.974	13.425	14.250	13.230

Table 67: Performance of Early maize genotypes in CVT-E at HCRP, 2020/21

EN	Genotype	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE
1	Earlymid katamani	2.526	73	74	147	75	37926	38222
2	Rajahar local	2.661	75	77	210	106	41185	36741
3	S97TEYGHAYB(3)	5.199	79	80	184	97	39704	42074
4	POP-445/ POP-446	3.04	69	71	178	82	43555	41481
5	Pool-15	3.764	71	74	203	107	40889	40593
6	R.C./POOL-17	4.03	72	74	188	102	47407	46815
7	SO3TEY/LN	3.97	75	76	182	96	39111	40296
8	ARUN-2 (Std Chk)	5.13	70	73	216	125	40296	40296
9	FARMERS VARIETY	4.206	80	82	226	127	41778	41778
10	ZM-621/Pool-15	4.88	76	77	186	92	45926	47407
11	EEYC1	4.187	73	76	181	91	42074	41481
12	SO3TEY-LN/PP	4.242	74	75	189	103	46815	46519
13	Khumal yellow/Pool-17	5.309	74	75	211	103	46519	48000
14	TDO3TEY/SEBAFAUT	4.313	71	72	171	121	42074	42963
	Grand Mean	4.104	74	75	191	102	42519	42476
	P value	0.085	0.000	0.000	0.004	0.017	0.131	0.057
	LSD (0.05)	1.888	2.359	2.175	32.716	27.086	6909	7043
	CV,%	27.409	1.907	1.718	10.220	15.852	9.683	9.880

Table 68: Performance of Early maize genotypes in CVT-E at Nepalgung

EN	Genotype	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE
1	Earlymid katamani	2.979	49	52	162	75	44667	46667
2	Rajahar local	2.812	49	53	174	85	47111	48445
3	S97TEYGHAYB(3)	4.244	50	52	167	81	48000	47556
4	POP-445/ POP-446	3.083	51	54	151	61	42889	41555
5	Pool-15	2.458	51	55	163	80	30667	28666
6	R.C./POOL-17	3.22	49	52	173	82	44889	46222
7	SO3TEY/LN	3.956	52	56	148	63	49333	53778
8	ARUN-2 (Std Chk)	2.603	50	52	171	79	44000	43556

EN	Genotype	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE
9	FARMERS VARIETY	2.951	51	55	181	89	45111	43555
10	ZM-621/Pool-15	3.88	49	52	160	71	48222	48444
11	EEYC1	4.269	49	52	162	69	48222	51111
12	SO3TEY-LN/PP	3.651	51	54	162	73	48000	43555
13	Khumal yellow/Pool-17	3.808	51	53	179	85	50000	55333
14	TDO3TEY/SEBAFAUT	2.849	50	54	152	71	49111	50667
	Grand Mean	3.34	50	53	165	76	45730	46365
	P value	0.47	0.88	0.88	0.29	0.40	0.21	0.13
	LSD(0.05)	1.77	3.61	5.05	25.06	21.86	11849.00	14541.00
	CV,%	31.55	4.29	5.65	8.89	16.79	15.44	18.69

Table 69: Performance of Early maize genotypes in CVT-E at DoAR,Lumle

EN	Genotype	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE
1	Earlymid katamani	2.965	67	71	123	50	46667	4889
2	Rajahar local	2.227	74	77	161	80	53333	7556
3	S97TEYGHAYB(3)	2.433	75	78	134	57	51111	9555
4	POP-445/ POP-446	1.996	63	67	340	119	58889	10000
5	Pool-15	2.601	68	72	127	68	48889	7111
6	R.C./POOL-17	2.275	64	68	159	78	60000	10667
7	SO3TEY/LN	1.518	74	77	142	70	46666	8444
8	ARUN-2 (Std Chk)	2.208	71	74	148	67	38889	6445
9	FARMERS VARIETY	2.204	70	73	173	85	62222	8889
10	ZM-621/Pool-15	2.886	73	77	133	60	60000	11778
11	EEYC1	1.523	69	72	129	65	43333	8222
12	SO3TEY-LN/PP	2.48	72	75	138	70	57778	11111
13	Khumal yellow/Pool-17	2.144	67	69	167	84	54444	10000
14	TDO3TEY/SEBAFAUT	2.591	70	72	145	64	52222	9778
	Grand Mean	2.289	70	73	159	73	52460	8889
	P value	0.336	0.000	0.000	0.508	0.586	0.013	0.004
	LSD (0.05)	1.134	3.195	3.208	161.276	51.391	12147	3053
	CV,%	29.516	2.724	2.618	60.592	42.127	13.796	20.464

Table 70: Performance of Early maize genotypes in CVT-E at HRS Dailekh

EN	Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE
1	Earlymid katamani	5.915	63	66	224	124	55556	43889
2	Rajahar local	6.467	64	66	261	138	55556	75000
3	S97TEYGHAYB(3)	7.285	63	65	250	139	57222	61667
4	POP-445/ POP-446	3.755	69	71	220	110	45556	32223

EN	Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE
5	Pool-15	6.693	59	61	233	134	51667	57222
6	R.C./POOL-17	6.187	69	71	243	128	52222	53333
7	SO3TEY/LN	5.647	62	64	246	133	53889	57778
8	ARUN-2 (Std Chk)	6.642	69	72	278	145	53333	52778
9	FARMERS VARIETY	6.206	63	65	308	166	53889	55000
10	ZM-621/Pool-15	5.24	65	68	212	108	38333	41111
11	EEYC1	5.749	68	70	221	110	53333	55556
12	SO3TEY-LN/PP	6.554	64	66	248	135	52778	59445
13	Khumal yellow/Pool-17	6.377	63	66	251	135	55556	50000
14	TDO3TEY/SEBAFAUT	6.577	59	61	241	120	51111	60000
	Grand Mean	6.092	64	66	245	130	52143	53929
	P value	0.002	0.024	0.040	0.002	0.030	0.337	0.024
	LSD (0.05)	1.058	5.678	6.107	31.087	26.510	12507	16678
	CV,%	8.450	4.313	4.485	6.167	9.902	11.669	15.045

Table 71: Combined results of Early maize genotypes in CVT at Rampur, Pakhribas, Dolakha, Nepalgunj, Lumle and Dailekha

EN	Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE
1	Earlymid katamani	3.317	64	67	169	86	49692	33882
2	Rajahar local	3.86	68	71	204	104	56519	47879
3	S97TEYGHAYB(3)	4.198	68	70	180	93	47787	37671
4	POP-445/ POP-446	2.962	64	67	170	77	49747	34088
5	Pool-15	4.228	63	66	187	103	47965	37153
6	R.C./POOL-17	3.884	65	67	195	103	51811	41579
7	SO3TEY/LN	3.94	67	69	184	95	51146	44282
8	ARUN-2 (Std Chk)	4.327	66	70	204	107	47500	40726
9	FARMERS VARIETY	3.467	68	71	217	115	46205	34578
10	ZM-621/Pool-15	4.046	67	71	179	88	49929	38563
11	EEYC1	4.085	65	68	182	90	54590	47204
12	SO3TEY-LN/PP	4.4	66	68	184	95	57141	47290
13	Khumal yellow/Pool-17	3.904	67	70	189	94	53147	41510
14	TDO3TEY/SEBAFAUT	4.041	65	68	181	98	49307	39072
	Grand Mean	3.904	66	69	188	96	50892	40391
	P value	0.187	0.103	0.160	0.00	0.00	0.464	0.198
	P value (GxE)	0.000	0.00	0.00	0.055	0.137	0.00	0.00
	LSD (0.05)	0.984	3.667	3.779	15.913	11.422	9594.87	11950.54
	CV,%	22.251	2.705	2.755	8.884	13.091	14.619	18.096

2.1.4.3 Coordinated farmer's Field Trial (CFFT-E)

In NMRP Rampur, maximum grain yield of 5.225 t/ha was obtained from EEYC1 followed by 4.995 t/ha of Arun-2 (Table 72). At HCRP, Dolakha, maximum grain yield of 6.9804 t/ha was produced from S03TEY-LN followed by Across-99402 (6.8501 t/ha) (Table 73). At HRS Dailekh, maximum grain yield was produced by Across-99402 (4.507 t/ha) followed by S03TEY-LN (4.443 t/ha) (Table 74).

Combined analysis of on farm experiments conducted at outreach sites of Rampur, Dolakha and Dailekh showed significant difference among genotypes only for grain yield whereas there was non-significant difference for rest of the traits viz plant height, ear height, flowering, number of plant and ear per plot, rotten cob, plant and ear aspect and huck cover (Table 88). Highest grain yield 5.466t/ha was obtained from Pool-16 followed by 5.306t/ha of Across-99402 and EEYC1 in CFFT-E across location (Table 75). These might be the potential early varieties of maize for release in coming years for Nepal. Therefore, these varieties need to be evaluated in other agronomical aspects such as response to different fertilizer doses, density, priming techniques, weed management practices etc. to generate supporting data for releases/registration in the future. Further large plot demonstration trials and minikit distribution program need to be initiated on these possible candidates.

Table 72: Performance of early maize genotypes in CFFT-E at NMRP,Rampur

EN	Genotypes	DTT	DTS	PHT(cm)	EHT(cm)	NP	NE	RC	PA	EA	HC	GY(t/ha)
1	Across-99402	71	74	160	78	36	47	1	2	2	1.5	4.562
2	Pool-16	63	64	164	93	55	54	2	2.5	2.5	2	4.975
3	SO_3TEY-LN	65	67	422	83	43	55	1	1.5	1.5	1.5	4.961
4	SO_3TEY-SEQ	64	64	157	84	41	45	2	1.5	1.5	2	4.075
5	Arun-2 (std. ck)	64	65	177	103	52	57	1	2.5	2	1.5	4.995
6	Farmers variety	61	63	192	112	36	37	1	2.5	2.5	2	3.379
7	EEYC1	63	64	149	74	58	60	1.5	1.5	1.5	2	5.225
	Mean	64	66	203	90	46	51	1.4	2	1.9	1.8	4.6
	Maximum	71	74	422	112	58	60	2	2.5	2.5	2	5.22
	Minimum	61	63	149	74	36	37	1	1.5	1.5	1.5	3.38

Table 73: Performance of early maize genotypes in CFFT-E at HCRP,Dolakha

EN	Genotypes	DTT	DTS	PHT(cm)	EHT(cm)	NP	NE	RE	PA	EA	HC	GY(t/ha)
1	Across-99402	74	76	200	148	104	106	1	2	2	2	6.850
2	S03TEY-LN	74	74	227	116	90	120	2.5	2.5	3	3	6.980
3	Pool-16	72	74	204	124	100	111	2	2.5	2.5	2.5	5.743
4	SO3TEY SEQ	68	70	194	96	100	106	2.5	3.5	3	3.5	5.196

EN	Genotypes	DTT	DTS	PHT(cm)	EHT(cm)	NP	NE	RE	PA	EA	HC	GY(t/ha)
5	Arun-2 (std ck)	70	72	206	134	105	103	2.5	2.5	3	2.5	4.922
6	Farmer's variety	74	76	238	136	110	105	3	2.5	3	2.5	4.969
	Mean	72	74	212	126	102	109	2	3	3	3	5.777
	Maximum	74	76	238	148	110	120	3	3.5	3	3.5	6.980
	Minimum	68	70	194	96	90	103	1	2	2	2	4.922

Table 74: Performance of early maize genotypes in CFFT-E at HRS, Dailekha

EN	Genotypes	DTT	DTS	PHT(cm)	EHT(cm)	NP	NE	RE	PA	EA	HC	GY(t/ha)
1	Across-99402	66	68	222.0	126.0	29	35	2	2	2	1	4.507
2	S03TEY-LN	65	67	242.0	126.0	36	38	3	3	2.5	2.5	4.443
3	Pool-16	59	61	248.0	134.0	28	30	2.5	2.5	2.5	2	2.606
4	SO3TEY SEQ	62	68	198.8	108.0	30	33	3.5	3	3.5	2.5	2.945
5	Arun-2 (std ck)	68	71	242.0	138.0	29	31	2.5	3	2.5	2.5	3.188
6	Farmer's variety	59	61	260.0	134.0	28	29	2.5	3	2.5	3	1.934
	Mean	63.2	66.0	235.5	127.7	30.0	32.7	2.7	2.8	2.6	2.3	3.271
	Maximum	68	71	260	138	36	38	3.5	3	3.5	3	4.507
	Minimum	59	61	198.8	108	28	29	2	2	2	1	1.934

Table 75: Combined CFFT at Rampur, Kabre and Dailekha, 2077

EN	Genotypes	DTT	DTS	PHT(cm)	EHT(cm)	NP	NE	RE	PA	EA	HC	GY(t/ha)
1	Across-99402	70	73	194	117	56	63	1	2	2	2	5.306
2	Pool-16	67	68	211	112	60	71	3	3	3	3	5.466
3	SO_3TEY-LN	65	67	291	114	57	65	2	2	2	2	4.437
4	SO_3TEY-SEQ	65	67	183	96	57	61	3	3	3	3	4.072
5	Arun-2 st. ck	70	72	207	136	80	83	2	3	3	2	4.865
6	Farmers variety	65	67	230	127	58	57	2	3	3	3	3.428
7	EEYC1	65	66	156	96	70	72	2	2	2	2	5.306
	Grand Mean	67	69	210	114	63	67	2	2	2	2	4.697
	P value	0.21	0.35	0.35	0.05	1	0.93	0.11	0.13	0.28	0.07	0.00
	LSD (0.05)	6.00	7.33	124.98	28.32	34.03	28.23	1.08	0.88	1.04	0.85	0.94
	CV,%	4.27	5.07	28.24	11.82	25.82	19.89	24.21	17.31	20.57	17.62	9.52

2.1.5 Development of High value maize in Nepal

2.1.5.1 Development of Popcorn maize

The coordinated varietal trial (CVT) of popcorn research was conducted at NMRP, Rampur in 2077/78. A total of 18 high popcorn genotypes with high grain yield potential selected from previous years experiment were evaluated

in randomized complete block design with 3 replications having individual plot size of 7.5m^2 with planting geometry of RR 75cm × PP 25 cm. The fertilizer application and intercultural operations were managed as per recommendations.

The data revealed that there were significant differences for flowering and ear height where as insignificant result was observed for grain yield, plant height, plant aspect and husk cover and number of plant per hectare. The mean grain yield ranged from 1.446t/ha of Pop corn Australia thulo dana W to 6.794t/ha of Pop corn Australia thulo dana Y with trial mean of 2.360t/ha. Here Pop corn Australia thulo dana Y (6.794t/ha), Pop45/pool 17 (4.089t/ha) and Popcorn-2 (3.519t/ha) produced relatively higher grain yield among tested genotypes (Table 76). There was non-significant difference among the tested genotypes for grain yield under observation indicating the similar performance of tested genotypes so we do not have any varietal selection options. This result indicates that all of the evaluated genotypes are similar except for flowering and ear height traits.

Table 76: Performance of popcorn maize genotypes, Rampur, 2020/21

EN	Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	PA	HC	NOP
1	Pop corn Bodo Kande	1.589	104	103	159	74	1	2	46528
2	Pop corn Rampur Local	1.72	125	111	147	78	2	2	48611
3	Pop45/pool 17	4.089	101	103	145	62	2	2	58333
4	pop corn Y+W(w)	1.772	104	109	133	58	2	2	50694
5	Popcorn-2	3.519	107	113	169	99	2	1	56250
6	Bhimnagar Local	1.709	105	106	146	79	2	2	46528
7	Pop corn Madhayapahad Rato	1.982	101	103	143	59	2	2	50694
8	P op corn Y+W(y)	1.517	100	103	134	57	2	2	48611
9	Pop44/Pool45	2.355	111	113	129	62	2	2	47917
10	Pop corn Bodo Kande White	1.451	102	105	154	67	2	2	49306
11	Pop corn Jumle	1.788	96	98	127	52	2	2	52083
12	Madhayapahad Rato Kande (Yellow)	2.239	115	117	151	83	2	2	52083
13	Pop corn Australia thulo dana W	1.446	109	110	151	76	2	2	51389
14	Pop corn Australia thulo dana Y	6.794	111	111	130	59	2	2	52083
15	Pop corn Australia 1 Sano Dana	1.633	95	97	126	52	2	2	47917
16	Pop corn Gorkha 3	2.691	112	109	140	77	2	2	52083
17	Pop Duplication	2.571	108	109	153	88	2	2	50694
18	Popcorn lumle 1	1.612	113	115	143	79	2	2	47917
	Grand Mean	2.360	107	108	143	70	2	2	50540
	P value	0.41	0.00	0.00	0.09	0.00	0.69	0.65	0.59
	LSD(0.05)	3.67	5.96	6.76	26.22	19.79	0.69	0.73	9517.90
	CV,%	93.80	3.37	3.79	11.02	17.03	23.41	24.89	11.35

2.1.5.2 Development of Sweet corn maize

The coordinated varietal trial (CVT) of sweet corn research was conducted at NMRP, Rampur during 2020/21. A total of 12 sweet corn genotypes with high grain yield potential selected from previous years experiment were evaluated in randomized complete block design with 3 replications having individual plot size of 7.5m^2 with planting geometry of RR 75cm× PP 25 cm. The fertilizer application and intercultural operations were managed as per recommendations. The data revealed that there were significant differences for flowering where as non-significant result was observed for grain yield plant height, ear height, number of plants, total cob, cob weight, orgaNoPepti test. There was non-significant difference among the tested genotypes for grain yield under observation indicating the similar performance of tested genotypes. The mean grain yield ranged from 9.865t/ha of ID-7964 W to 13.62t/ha of ID-8007 R with trial mean of 11.95t/ha (Table 77). Genotypes ID-8007 R (13.62t/ha), ID-8002 W (13.35t/ha) and ID- 8004 Y (W) (12.84t/ha) showed relatively better performance among tested genotypes.

Table 77: Performance of sweet corn maize genotypes, Rampur, 2020/21

EN	Genotype	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NEP	TC	Brix	OT
1	ID-7991 Y	12.619	105	108	180	68	27	26	18	6
2	ID-8002 W	13.358	105	108	148	56	24	25	23	7
3	ID- 8004 Y (R)	11.85	104	107	162	72	20	23	20	6
4	ID- 8004 Y (W)	12.84	104	105	163	56	25	24	23	5
5	ID-8004 YR	12.563	97	100	147	82	30	24	16	6
6	ID-8007 R	13.622	101	105	149	74	24	25	19	6
7	ID-8007 YR(W)	10.813	104	105	139	61	26	26	18	6
8	ID-8007 YR(R)	11.654	101	104	160	55	26	26	22	4
9	ID-7182 R	11.496	106	108	141	63	27	26	21	6
10	ID- 7147 W	10.742	104	106	145	69	26	26	22	5
11	ID-7964 W	9.865	99	103	155	58	24	24	19	5
12	ID- 7964 Y	12.065	93	97	154	57	27	26	16	7
	Grand Mean	11.957	102	105	154	64	25	25	20	6
	P value	0.406	0.000	0.001	0.500	0.294	0.303	0.675	0.563	0.358
	LSD (0.05)	3.135	4.834	4.457	33.910	22.867	6.218	3.627	7.300	2.199
	CV,%	15.484	2.800	2.516	13.042	21.018	14.462	8.521	21.972	23.263

2.1.6 Development of maize varieties for Karnali Region

The coordinated varietal trial (CVT) of maize for Karnali region was conducted at NMRP Rampur 2020/21. A total of 10 maize genotypes with high grain yield potential selected from previous years experiments were evaluated in

randomized complete block design with 3 replications having individual plot size of 12 m^2 with a planting geometry of RR 75 cm x PP 25 cm. The fertilizer application and intercultural operations were managed as per recommendations.

2.1.6.1 Coordinated Varietal Trial (CVT-K)

The data revealed that there were significant differences for 50% days to anthesis and silking, plant height, ear height and number of plant per hactare among the tested genotypes whereas numbert of ear per hectare and grain yield was found non-significant at NMRP, Rampur (Table 78) indicating the similar performance of the tested genotypes. Framer's local variety produced higher grain yield (3.827t/ha) followed by Ganesh-1 (3.735t/ha) and KKT-POP (3.261t/ha).

Table 78: Performance of maize genotypes in CVT for karnali region,NMRP Rampur, 2020/21

EN	Genotype	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	GY(t/ha)
1	KKT-01	76	79	173	83	34167	28056	2.824
2	KKT-POP	73	76	182	92	40000	38055	3.261
3	Karnali Pool Yellow	76	79	169	88	34167	36111	2.978
4	Karnali Pool White	69	72	167	81	44444	36111	2.766
5	KLW-POP	79	82	152	71	41944	39722	2.695
6	Jumka-POP	76	80	200	98	31111	28611	2.383
7	KLY-POP	76	79	186	88	40278	38333	2.340
8	KKT-03	77	79	160	74	30278	26945	2.046
9	Ganesh-1	77	81	173	67	37500	35000	3.735
10	Farmer's Local	74	77	182	93	38055	35278	3.827
	Grand Mean	75	78	174	83	37194	34222	2.885
	P value	0.00	0.002	0.007	0.03	0.009	0.069	0.167
	CV(%)	2.53	2.81	7.02	12.73	11.32	15.64	27.05
	LSD(0.05)	3.27	3.77	21	18.22	7219.72	9180.93	1.338

2.1.6.2 Coordinated Farmers Field Trial (CFFT-K)

There was difference for number of days to 50% antheiss and silking, plant height, ear height and number of plant/ha and grain yield of tested genotypes as compared to mean at NMRP, Rampur (Table 79). The genotypes KKT-POP (4.935 t/ha) produced highest grain yield in comparison to Ganesh-1 (4.470 t/ha) and local check (3.136 t/ha). The trial mean was 3.934 t/ha.

Table 79: Performance of maize genotypes in CFFT for karnali region, Rampur, 2020/21

EN	Genotypes	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	GY(t/ha)
1	KKT-POP	75	78	157	74	50000	41667	4.935
2	KLY-POP	76	78	178	77	51667	52500	3.623
3	KKT-01	77	79	162	75	48333	39167	3.501
4	KPN	65	68	203	96	49167	53333	3.939
5	Ganesh-1	71	74	154	71	54167	45000	4.470
6	Farmer's Local	72	75	169	85	38333	35000	3.136
	Mean	73	75	171	80	48611	44444	3.934

2.1.7 Development of drought tolerant maize for terai and mid hill of Nepal

Coordinated varietal trial on drought resilient cultivar was conducted at DoAR, Doti and DoAR Surkhet during summer 2020/21. A total of 12 maize genotypes were evaluated in RCBD with 3 replications having individual plot size of 5 rows of 3m long with planting geometery of RR 75cm×PP 25cm applying recommended dose of fertilizer and agronomic practices except on irrigation was supplied at the time of flowering and grain filling stage.

The data revealed that there were significant differences for days to flowering, plant height, ear height ear number per hectare and grain yield at DoAR, Surkhet (Table 80). Among the tested genotypes. TLBRS07F16 produced higher grain yield (3.45t/ha) followed by Rampur S03F08 (3.38t/ha), Rampur # 26 (3t/ha) and Rampur # 27 (2.94t/ha). However, non significant difference was found for all observed traits except days to tasseling at DoAR, Doti. Grain yield ranged from 4.793t/ha (Rampur#29) to 6.585t/ha (Rampur#27) with experimental mean 5.822t/ha. (Table 81).

Table 80: Performance of drought resilient maize genotypes CVT, DoAR Surkhet

EN	Genotypes	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	TKW	GY(t/ha)
1	Rampur# 22	49	52	216	96	36222	30889	310	2.477
2	Rampur # 25	49	52	165	83	34000	27111	339	1.891
3	Rampur # 26	51	54	226	101	39556	33778	313	3.003
4	Rampur # 27	53	55	226	112	39333	35333	336	2.947
5	Rampur # 29	52	55	201	105	37778	27778	294	2.049
6	Rampur # 33	52	55	209	103	35111	30444	364	2.883
7	Rampur # 36	52	55	212	85	36667	33111	290	2.763
8	Rampur # 37	54	57	199	99	38667	28667	285	2.141
9	Rampur # 38	54	56	205	96	31333	22000	295	1.591

EN	Genotypes	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	TKW	GY(t/ha)
10	R POP 3	54	56	194	108	34889	29556	312	1.828
11	Rampur S03F08	52	54	214	106	37111	32000	297	3.389
12	TLBRS07F16	53	55	200	112	40444	34889	305	3.453
	Grand Mean	52	55	206	100	36759	30463	312	2.535
	P value	0	0.001	0.011	0.002	0.095	0.041	0.560	0.00
	CV,%	1.86	2.34	7.72	7.87	8.98	14.01	13.87	14.47
	LSD (0.05)	1.63	2.16	26.87	13.38	5591.67	7225.42	73.18	0.62

Table 81: Performance of drought resilient maize genotypes CVT, DoAR Doti

EN	Genotype	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	PA	EA	HC	GY(t/ha)
1	Rampur# 22	45	49	251	125	60000	62222	2	2	2	5.507
2	Rampur #25	48	52	232	112	54074	54074	3	2	2	6.222
3	Rampur # 26	51	240	245	122	60000	58518	2	2	2	5.327
4	Rampur #27	51	55	264	143	52593	55555	2	2	3	6.585
5	Rampur # 29	51	55	225	125	45185	45185	2	2	1	4.793
6	Rampur # 33	49	54	246	135	51852	52592	2	2	2	6.427
7	Rampur # 36	52	56	247	119	53333	53333	2	2	2	4.803
8	Rampur # 37	51	54	255	132	52593	53333	2	2	3	6.466
9	Rampur # 38	51	55	232	128	50370	51111	2	2	2	4.985
10	R POP 3	50	54	240	150	56296	64444	3	2	2	6.132
11	Rampur So3 F 08	51	56	243	141	53333	47408	2	2	2	6.537
12	TLBROSO7F	52	58	244	136	48148	45185	2	2	3	6.080
	Grand Mean	50	70	244	131	53148	53580	2	2	2	5.822
	P value	0.01	0.47	0.63	0.12	0.32	0.13	0.48	0.74	0.55	0.15
	CV, %	3.86	132.76	8.41	11.06	12.54	14.95	21.10	16.32	48.93	16.13
	LSD	3.28	156.68	34.68	24.48	11284.03	13562.02	0.83	0.58	1.86	1.59

2.2 Agronomy

2.2.1 Studying the performance of two pipeline maize hybrids under different densities and chemical fertilizer at NMRP Rampur

The experiment was carried out at NMRP Rampur during winter season in 2077 (2020/2021). The field was laid out in strip split plot design with three replications. Two promising pipeline Nepalese hybrid RML-95/RML-96 and RM-86/RML-96 were taken as vertical factor whereas three level of Nitrogen viz. 180 kg/ha (N1), 220 kg/ha (N2), and 260 kg/ha (N3) as horizontal factors and sub plot factors were cropping geometries i.e. 60cm x 25cm, 60cm x 20cm and 50cm x 20 cm. The individual plot size was 6 rows of 5 m long. Half of nitrogen along with full Phosphorous and potash were applied during field preparation. The remaining nitrogen was applied in two equal splits during the first weeding and at the earthing up. Rest of the crop management operations were done as per the treatment. Highest grain yield of pipeline hybrids was recorded when nitrogen was applied at therate of 260 kg/ha and in the same way maximum yield was achieved when plant population is maintained @ 1,00,000 plants/ha (Table 82).

Table 82: Morphological traits and grain yield of hybrid maize influenced by varying densities and nitrogen fertilizer during winter season at NMRP, Rampur 2020/2021

Treatments	PHT(cm)	EHT(cm)	Prolificacy	NRPE	NGPR	500 KW (gm)	GY(t/ha)
Factor A(Varieties)							
RML-95/RML-96	178	98	1.1	15	31	139	5.714
RML-86/RML-96	185	100	1.2	14	32	156	6.693
F-Test	ns	ns	ns	ns	ns	ns	ns
LSD(0.05)	-	-	-	-	-	-	-
Factor B(Nitrogen kg/ha)							
180	181	98	1.2	14	30	142.4	6.243
220	180	100	1.2	15	31	150.9	5.930
260	184	100	1.2	14	32	149.7	6.437
F-Test	ns	ns	ns	ns	ns	ns	ns
LSD(0.05)	-	-	-	-	-	-	-
Factor C (Density/ha)							
66666	182	98	1.2	15	31	152.4	5.898
83333	182	100	1.2	14	31	143.6	6.014
100000	180	100	1.2	15	31	146.9	6.698
Grand Mean	181	100	1.2	15	31	147.6	6.203
F-test	ns	ns	ns	ns	ns	ns	ns
LSD (0.05)	-	-	-	-	-	-	-
CV,%	7.5	7.9	12.1	6.2	7.1	9.2	11.7

2.2.2 Identification of best sowing dates of pipeline maize genotypes at NMRP, Rampur

Two pipeline maize varieties namely OPV ZM-401 (OPV full season) and RML-86/RML-96 (Hybrid) were sown throughout the year 2077 (2020/21) at every 10 days interval starting on 6th Baishakh with 3 replications in randomized complete block design at Rampur. The soil is sandy loam. The planting geometry was 75cm x 20cm with the plot size of 12m^2 (4 rows of 3m). The fertilizer was applied at the ratio of 180:60:40 and 120:60:40 kg/ha for hybrid and OPV respectively, along with the FYM @ 10t/ha. Early tasseling (46 days) and silking (48 days) of ZM-401 was observed when planted in 25th Jestha, 3rd Ashad and 4th Shrawan while late tasseling (129 days) and silking (131 days) were observed in 30th mangsir of planting. In case of RML-86/RML-96, minimum days were required for tasseling (55 days) and silking (57 days) at 25th Jestha, 3rd Ashad, 15th Ashad, 4th Shrawan ,15th Shrawan planting and maximum days for tasseling (127 days) and silking (139 days) was recorded when this hybrid was planted on 30th Mangsir and 10th Poush. Result revealed that the higher grain yield (6.121t/ha) of ZM-401 was recorded when sown on 30th Ashwin and maximum yield (8.971t/ha) of RML-86/RML-96 was observed when sown on 10th kartik (Table 83)

Table 83: Performance study of maize genotypes throughout the year at NMRP Rampur, 2020/2021

Variety	ZM-401		RML-86/RML-96		ZM-401			RML-86/RML-96		
Sowing date	DTT	DTS	DTT	DTS	P.H	E.H	GY(t/ha)	P.H	E.H	GY(t/ha)
6th Baishakh,2077	54	56	64	66	247	144	1.355	259	168	3.756
16th Baishakh,2077	52	54	61	64	223	136	1.533	216	130	2.994
26th Baishakh,2077	52	54	62	64	236	123	-	240	136	2.533
5th Jesthа,2077	51	53	59	61	190	93	-	190	86	-
15th Jesthа,2077	51	53	58	60	187	93	-	190	100	-
25th Jesthа ,2077	46	48	55	57	176	63	-	200	86	-
3rd Ashad 2077	46	48	55	57	-	-	-	-	-	-
15 th Ashad, 2077	48	50	55	57	-	-	-	-	-	-
25 th Ashad,2077	50	52	58	60	-	-	-	-	-	-
4th Shrawan,2077	46	48	55	57	223	110	-	210	96	3.832
14th Shrawan,2077	48	50	55	57	200	103	-	186	93	2.194
24th Shrawan,2077	50	52	58	60	177	96	1.381	193	100	2.524
1st Bhadra,2077	50	52	57	59	203	103	1.667	180	100	1.808
10th Bhadra,2077	53	55	68	70	153	73	1.922	176	68	4.602
20th Bhadra,2077	63	64	79	82	188	80	5.405	186	75	6.464
30th Bhadra2077	-	-	-	-	-	-	-	-	-	-
10th Ashwin,2077	69	72	85	87	176	73	3.100	183	86	4.918

Variety	ZM-401		RML-86/RML-96			ZM-401		RML-86/RML-96		
20th Ashwin,2077	75	75	98	100	153	93	4.215	193	86	5.751
30th Ashwin,2077	89	91	101	103	183	83	6.121	197	96	5.316
10th Kartik,2077	91	93	103	105	153	90	3.730	193	96	8.971
20th Kartik,2077	93	95	109	111	203	100	4.387	206	96	7.135
30 th Kartik,2077	99	101	111	113	203	96	3.376	200	106	5.356
10th Mansir,2077	112	114	125	127	200	150	3.709	200	126	5.577
20th Mansir,2077	119	121	133	135	190	93	4.991	206	100	6.918
30th Mansir,2077	129	131	137	139	186	96	4.972	213	106	6.478
10th Poush,2077	122	125	137	139	203	103	5.008	196	96	6.630
20th Poush,2077	115	117	131	133	191	93	3.986	205	101	5.532
30th Poush,2077	100	102	121	123	216	120	3.693	210	113	6.151
10th Marga,2077	94	98	107	109	188	91	3.209	196	96	4.774
20th Marga,2077	96	98	107	109	200	90	3.564	193	93	4.339
30th Marga,2077	88	85	98	99	200	96	2.997	205	103	5.537
10th Falgun,2077	70	72	81	82	206	110	3.265	200	100	4.951
20th Falgun,2077	65	68	83	85	200	100	2.945	210	113	6.102
30th Falgun,2077	63	65	83	85	203	100	3.013	196	110	4.872
10th Chaitra,2077	62	64	81	83	196	103	2.458	200	106	5.097
20th Chaitra,2077	59	61	75	77	196	103	1.643	210	103	5.627
Grand Mean	73.4	75.3	85.85	87.85	195	100	3.370	201	102	5.059
Max	129	131	137	139	247	150	6.1212	259	168	8.971
Min	46	48	55	57	153	63	1.3545	176	68	1.808

Remarks: (-) indicates totally crop failure due to biotic and abiotic factors. The maize on Bhadra 30th planting fail due to water stagnation on field because of more rainfall. On 26th Baishak to 14th Shrawan planting crop is damaged by wildlives such as Jackle, fox and Dumshi.

2.2.3 Enhancing production and productivity of maize inbreeds through the optimum density and appropriate planting date at NMRP Rampur

The experiment was carried out during winter at NMRP Rampur at four planting date Ashwin 5th, Ashwin 20th, Mangsir 4th, Mangsir 19th in 2077 (2020/2021). The field was laid out in split split plot design with three replications. Cropping geometries i.e. 60cm x 25cm, 60cm x 20cm and 50cm x 20 cm were taken as main plot factor and three inbreed line RML-86, RML-96 and RM-95 were taken as sub-plot factor. The individual plot size was 6 rows of 5 m long. Half of nitrogen along with full Phosphorous and potash were applied during field preparation. The remaining nitrogen was applied in two equal splits during the first weeding and at the earthing up. Rest of the crop management operations were done as per the treatment.

There were significant differences observed in days to 50% anthesis and days to 50% silking among inbreed, density and in different date of sowing. Recorded highest grain yield in inbreed RML-95 (2.713 t/ha). Plant density significantly affects the grain yield. The result showed that the higher grain yield (2.559 t/ha) was achieved when plant density maintained at 50cm x 20cm. Similarly, significantly highest thousand grain weight (293 g) recorded in RML-96. Different date of sowing affect thousand grain weight (Table 84).

Table 84: Morphological traits and grain yield of Inbreed maize influenced by planting date and densities at NMRP, Rampur 2020/2021

Treatments	DTT	DTS	GY(t/ha)	TKW (g)
Planting date				
Ashwin 5th, 2077	69	72	2.081	246
Ashwin 20th, 2077	83	86	2.140	261
Mangsir 4th, 2077	118	121	2.021	278
Mangsir 19th, 2077	117	120	1.894	283.5
LSD(date)	3.017**	3.422**	ns	ns
Density				
60 cm x 25 cm	97	100	1.711	264.9
60 cm x 20 cm	97	100	1.831	262.8
50 cm x 20 cm	96	99	2.559	274.2
LSD (density)	0.879*	ns	0.455*	ns
LSD (date x density)	ns	ns	ns	ns
Inbreed				
RML-86	100	104	0.821	233.3
RML-96	94	97	2.568	293.2
RML-95	95	98	2.713	275.5
LSD (Inbreed)	1.104**	1.086**	0.377**	15.40**
LSD (date x inbreed)	ns	ns	ns	36.89*
LSD (density x inbreed)	ns	ns	ns	ns
LSD (date x density x inbreed)	ns	ns	ns	ns
C.V,%	2.4	2.3	39.1	12.2
Grand mean	96.57	99.79	2.034	267.3

2.3 Soil science

2.3.1 Performance study of integrated nutrient sources in full season maize

A field experiment was conducted at the research field of National Maize Research Program Rampur, Chitwan during winter season of 2020/21 with the objective to identify the effects of different sources of nutrient on soil properties, growth and yield parameters of maize in the concept of integrated nutrient management (INM). Manakamana-9, a full season maize variety was selected for research purpose. Field experiment was laid out in randomized complete block design comprising 10 treatment combinations of inorganic and organic sources (Table 85) with three replications. Maize seed was sown in 6 rows of 4 meter long plot and at the spacing of 60 cm row to row and 25 cm plant to plant distance. Outer two rows were used as border line and remaining four rows were harvested for grain yield and yield attributing parameter. Full dose of FYM, poultry manure, oilcake and bonemeal were applied at the time of land preparation. Full dose of P_2O_5 along with 20% N and 80% K_2O were applied at the time of seed sowing. Remaining 40% N was top dressed during knee high stage and 40% N and 20% K_2O were top dressed at pre tasseling and silking stage.

Treatment combination used to study performance of integrated nutrient sources in full season maize during winter at Rampur, 2020/21 was as given below.

T1 120:60:40 kg NPK + 15 t FYM ha^{-1}
T2 150:60:40 kg NPK + 15 t FYM ha^{-1}
T3 120:60:40 kg NPK + Rec MN+ 15 t FYM ha^{-1}
T4 150:60:40 kg NPK + Rec MN+ 15 t FYM ha^{-1}
T5 120:60:40 kg NPK + 5 t Poultry manure ha^{-1}
T6 150:60:40 kg NPK + 5 Poultry manure ha^{-1}
T7 120:60:40 kg NPK + 5 t Oilcake ha^{-1}
T8 150:60:40 kg NPK + 5 t Oilcake ha^{-1}
T9 120:40:40 kg NPK + 3 t Bonemeal ha^{-1}
T10 150:40:40 kg NPK + 3 t Bonemeal ha^{-1}

Significant difference was observed in days to silking, ear height, NGPR, grain yield and thousand grain weight (g). Maximum grain yield 7.734 t ha^{-1} was obtained from 120:60:40 kg NPK with 5 t poultry manure ha^{-1}. Details of the research result are presented in the table 85.

Table 85: Performance of integrated nutrient sources in full season maize during winter at Rampur, 2020/21

Treatments	DTT	DTS	PHT(cm)	EHT(cm)	NGRPE	NGPR	GY(t/ha)	TKW
T1	80	82	171	74	13	32	6.026	387
T2	80	84	164	60	14	29	6.131	391
T3	81	83	170	67	14	28	6.308	393
T4	79	83	167	64	13	30	6.816	437
T5	78	82	167	70	13	30	7.734	481
T6	78	81	171	72	14	29	7.117	431
T7	78	80	180	67	13	29	6.617	435
T8	78	80	169	65	14	33	7.111	521
T9	83	86	155	57	14	32	5.124	412
T10	82	85	164	61	14	33	5.445	420
Mean	80	82	168	66	14	30	6.443	431
P value	ns	*	ns	*	ns	**	*	**
LSD (0.05)	3.87	3.48	22.54	9.45	1.58	2.78	1.428	61.46
CV%	2.83	2.46	7.82	8.35	6.81	5.33	12.92	8.31

2.3.2 Variety cum fertilizer trial (VCFT) on hybrid maize

The experiment was conducted at the research farm of National Maize Research Program Rampur, Chitwan during winter season of 2020/21. Two different maize genotypes RML-86/RML-96 and CAH 1715 were selected for research purpose. The field experiment was laid out in split plot design with three replications comprising twelve treatment combinations. Maize was planted in 4 rows of 4-meter-long plot size and at the spacing of 60cm × 25cm. Full dose of FYM was applied at the time of land preparation. Full dose of P_2O_5 along with 20% N and 80% K_2O were applied at the time of seed sowing. Remaining 40% N was top dressed during knee high stage and 40% N and 20% K_2O were top dressed at pre tasseling and silking stage. Treatment combination used on this study is given below.

Variety

V1 RML-86/96

V2 CAH 1715

T1	150:60:40 kg NPK ha^{-1}	T7	180:80:40 kg NPK ha^{-1}
T2	150:60:60 kg NPK ha^{-1}	T8	180:80:60 kg NPK ha^{-1}
T3	150:80:40 kg NPK ha^{-1}	T9	210:60:40 kg NPK ha^{-1}
T4	150:80:60 kg NPK ha^{-1}	T10	210:60:60 kg NPK ha^{-1}
T5	180:60:40 kg NPK ha^{-1}	T11	210:80:40 kg NPK ha^{-1}
T6	180:60:60 kg NPK ha^{-1}	T12	210:80:60 kg NPK ha^{-1}

Significant differences were observed for plant and ear height, no. of kernel rows per ear due to variety. Similarly, there were difference for thousand grain weight and no. of NGPR due to fertilizer. There was highly significant difference for NGPR due to interaction effect of variety and fertilizer. Maximum grain yield of RML-86/RML-96 was 9.283 t ha^{-1} (210:80:40 kg ha^{-1}) followed by 9.120 t ha^{-1} (210:80:60 kg ha^{-1}). Similarly maximum grain yield 9.930 t ha^{-1} (150:80:60 kg ha^{-1}) was recorded in CAH 1715 followed by 9.643 t ha^{-1} (180:80:40 kg ha^{-1}). Details of the research result are presented in the table 86.

Table 86: Yield and yield attributing parameters of different maize genotypes as affected by different doses of major chemical fertilizers during winter at Rampur, 2020/21

Treatments	GY(t/ha)		TKW		PHT(cm)		EHT(cm)		NGRPE		NGPR	
	V1	V2	V1	V2	V1	V2	V1	V2	V1	V2	V1	V2
T1	7.541	7.643	275	348	167	213	64	82	14	13	27	30
T2	6.853	8.826	361	353	155	218	61	86	15	14	27	31
T3	7.495	9.068	357	348	142	213	56	82	15	14	26	32
T4	8.325	9.930	365	367	164	221	64	90	15	14	30	32
T5	8.281	8.396	356	353	172	219	75	83	15	14	28	31
T6	8.731	8.935	364	376	162	228	64	90	15	14	27	32
T7	8.744	9.643	353	340	167	225	73	93	16	13	26	31
T8	8.531	9.436	363	357	162	225	62	88	15	14	26	32
T9	8.378	8.645	372	374	168	222	66	88	15	13	27	32
T10	8.021	8.830	372	355	163	217	64	86	14	13	27	34
T11	9.283	9.635	365	367	166	213	65	90	15	13	32	36
T12	9.120	8.228	371	384	160	217	62	92	16	14	34	33
Mean	8.275	8.935		360		219		88		14		32
P value (V)	ns		ns		**		*		**		ns	
P value (F)	ns		*		ns		ns		ns		**	
P value (V x F)	ns		ns		ns		ns		*		ns	
LSD (V)	1.247		42		3.79		10.13		0.52		3.42	
LSD (F)	1.301		33		14.8		9.91		0.8		2.06	
LSD (V x F)	1.858		49		20.1		14.26		1.11		3.31	
CV%	13		7.8		6.7		11.2		4.9		5.9	

2.3.3 Updating fertilizer dose on Maize

2.3.3.1 Updating fertilizer dose for early maize on spring season

Experiment was conducted at NMRP research block Rampur, Chitwan during spring season, 2077/78. Early maturing maize genotypes EECY-1 was selected for research purpose. Field experiment was laid out in randomized complete block design comprising twelve treatment combinations with three replications.

Maize was planted in 6 rows of 4 meter long plot size and at the spacing of 60cm x 25cm. Full dose of FYM was applied at the time of land preparation. Full dose of P_2O_5 along with 20% N and 80% K_2O were applied at the time of seed sowing. Remaining 40% N was top dressed during knee high stage and 40% N and 20% K_2O were top dressed at pre tasseling and silking stage. Treatment combination used on this study is given below.

T1	90:60:40 kg NPK ha^{-1}	T7	120:80:40 kg NPK ha^{-1}
T2	90:60:60 kg NPK ha^{-1}	T8	120:80:60 kg NPK ha^{-1}
T3	90:80:40 kg NPK ha^{-1}	T9	150:60:40 kg NPK ha^{-1}
T4	90:80:40 kg NPK ha^{-1}	T10	150:60:60 kg NPK ha^{-1}
T5	120:60:40 kg NPK ha^{-1}	T11	150:80:40 kg NPK ha^{-1}
T6	120:60:60 kg NPK ha^{-1}	T12	150:80:60 kg NPK ha^{-1}

Significant difference was observed in plant and ear height, NGPR and thousand grain weight. Maximum grain yield 5.994 t ha^{-1} was obtained from the application of 150:80:60 kg NPK ha^{-1} followed by 5.974 t ha^{-1} with the application of 90:80:40 kg NPK ha^{-1}. The details of the research result presented in the table 87.

Table 87: Yield and yield attributing parameter of early maize genotypes as affected by different doses of major chemical fertilizers during spring at Rampur, 2021

Treatment	NPP	No. of Cob	PHT (cm)	EHT (cm)	EL	ED	NGRPE	NGPR	GY (t/ha)	TKW (g)
T1	62	69	172	65	14	4.0	13	32	5.213	299
T2	67	64	182	72	13	3.9	13	31	4.816	275
T3	65	70	180	83	12	4.1	13	28	5.247	319
T4	68	75	180	77	13	4.3	13	30	5.974	313
T5	81	77	182	72	14	3.9	13	32	4.494	268
T6	76	60	179	78	13	3.9	13	30	4.771	305
T7	67	73	176	75	13	4.0	12	32	5.139	313
T8	71	61	168	75	15	4.0	12	36	4.877	300
T9	67	70	190	83	13	4.2	12	32	5.561	328
T10	59	69	191	83	13	4.1	12	29	5.566	297
T11	69	62	188	81	13	4.0	12	31	5.014	312
T12	69	71	196	86	14	3.9	12	33	5.994	309
Mean	68	69	182	78	13	4.0	13	31	5.222	303
P value	ns	ns	*	*	ns	ns	ns	**	ns	*
LSD (0.05)	13.96	18.64	15.75	12.11	1.36	0.32	1.33	2.73	1.106	36.79
CV%	12.05	16.07	5.11	9.21	6.1	4.76	6.24	5.16	12.5	7.16

2.3.3.2 Updating fertilizer dose for parents of Rampur Hybrid 10

Experiment was conducted at NMRP agronomy farm Rampur, Chitwan during spring season 2077/78. Two different inbred lines RML-18 and RML-150 were selected for research purpose. The field experiment was laid out in split plot design comprising twelve treatment combinations with three replications. Maize was planted in 4 rows of 4 meter long plot size and at the spacing of 60cm x 25cm. Full dose of FYM was applied at the time of land preparation. Full dose of P_2O_5 along with 20% N and 80% K_2O were applied at the time of seed sowing. Remaining 40% N was top dressed during knee high stage and 40% N and 20% K_2O were top dressed at pre tasseling and silking stage. Treatment combination used on this study is given below.

Variety

V1 RML-18

V2 RML-150

T1	90:60:40 kg NPK ha^{-1}	T7	120:80:40 kg NPK ha^{-1}
T2	90:60:60 kg NPK ha^{-1}	T8	120:80:60 kg NPK ha^{-1}
T3	90:80:40 kg NPK ha^{-1}	T9	150:60:40 kg NPK ha^{-1}
T4	90:80:40 kg NPK ha^{-1}	T10	150:60:60 kg NPK ha^{-1}
T5	120:60:40 kg NPK ha^{-1}	T11	150:80:40 kg NPK ha^{-1}
T6	120:60:60 kg NPK ha^{-1}	T12	150:80:60 kg NPK ha^{-1}

Highly significant differences were observed for days to anthesis and silking, plant and ear height, no. of plants per plot, no. of cob per plot, ear length and ear circumference, thousand kernal weight and grain yield due to inbreds. There were non-significant differences due to fertilizer in all tested parameter. Similarly, there was highly significant difference for days to anthesis and silking, plant and ear height, no. of plants per plot, ear length, no. of grain per row, grain yield and thousand grain weight due to interaction effect of inbreds and fertilizer applications.

Maximum grain yield of RML-18 was 2.762 t ha^{-1} (90:60:60 kg ha^{-1}) followed by 2.716 t ha^{-1} (150:60:40 kg ha^{-1}). Similarly maximum grain yield 1.203 t ha^{-1} (90:60:40 kg ha^{-1}) was recorded in RML-150 followed by 1.101 t ha^{-1} (150:60:60 kg ha^{-1}). Details of the research result are presented in the table 88.

Table 88: Yield and yield attributing traits of parents of Rampur hybrid 10 (RML-18/ RML-150) as affected by different doses of major chemical fertilizers during spring at Rampur, 2020/21

Treatments	DTT		DTS		TKW (gm)		GY (kg)		PHT(cm)		EHT (cm)	
	V1	V2	V1	V2	V1	V2	V1	V2	V1	V2	V1	V2
T1	78	80	79	82	365	351	2.619	1.203	176	124	86	44
T2	78	81	79	82	292	369	2.762	0.924	171	121	81	43
T3	79	81	79	83	297	361	1.852	0.961	163	122	78	42
T4	80	81	81	82	273	375	2.327	0.963	161	121	78	44
T5	78	80	80	82	321	369	2.693	1.088	167	121	83	41
T6	79	81	80	81	301	349	2.219	1.015	157	119	76	42
T7	79	81	80	82	298	362	2.268	1.098	171	120	82	46
T8	78	80	79	82	298	343	2.478	1.062	164	124	82	40
T9	79	80	80	82	315	395	2.716	1.069	176	128	85	42
T10	78	81	79	83	377	328	2.377	1.101	157	119	77	43
T11	80	80	80	83	289	371	1.920	0.984	163	116	77	42
T12	79	80	80	82	313	317	1.992	1.087	166	129	81	49
Mean	79	80	80	82	311	356	2.362	1.047	166	122	81	43
P value (inbred)		**		**		**				**		**
P value (fertilizer)		0.85		0.98		0.81		0.97		0.99		1
P value (inbred x fertilizer)		**		**		**		**		**		**
LSD (inbred)		0.39		0.44		17.49		0.194		4.74		3.38
LSD (fertilizer)		1.41		1.85		51.68		0.955		29.95		25.1
LSD (inbred x fertilizer)		1.37		1.53		52.67		0.694		17.24		13.16
CV%		1.1		1.2		9.6		25.1		7.3		13.1

2.3.4 Flowering induction in maize inbreds

Field experiment was conducted at the agronomy farm of National Maize Research Program Rampur, Chitwan during spring season 2020/21. Three different maize inbreds RML-86, RML-96 and RML-95 were selected for research purpose. Field experiment was laid out in randomized complete block design with three replications comprising nine treatment combinations. Research was conducted to get information about the roles of fertilizers and growth hormones in yield responses and flowering of maize inbreds. Growth hormones like Auxin, GA and 2, 4-D were used. Maize was planted in 5 rows of 4 meter long plot size and at the spacing of 60cm x 25cm. Full dose of FYM was applied at the time of land preparation. Full dose of P_2O_5 along with 20% N and 80% K_2O were applied at the time of seed sowing. Remaining 40% N was top

dressed during knee high stage and 40% N and 20% K_2O were top dressed at pre tasseling and silking stage. Similarly, 2% urea, GA, Auxin and 2,4-D were sprayed at pre tasseling and silking stage.

Treatment combination used on this study is given below.

T1 120:60:40 kg NPK ha^{-1} + 2% Urea spray
T2 120:90:40 kg NPK ha^{-1}
T3 120:60:60 kg NPK ha^{-1}
T4 120:90:60 kg NPK ha^{-1}
T5 150:60:40 kg NPK ha^{-1}
T6 150:90:60 kg NPK ha^{-1}
T7 120:60:40 kg NPK + Rec MN ha^{-1}
T8 120:60:40 kg NPK + Auxin + GA ha^{-1}
T9 120:60:40 kg NPK + 2, 4 - D ha^{-1}

In RML-86, difference was observed for plant height and ear height, ear circumference and no. of grain per row. Maximum grain yield 1.950 t ha^{-1} was observed in RML-86 with the application of 120:60:40 kg NPK + 2% urea spray ha^{-1}(Table 89). In RML-96 difference were observed for ear length and grain yield. The highest grain yield (2.930 t ha^{-1}) in RML-96 with the application of 120:60:60 NPK kg ha^{-1}(Table 90). Similarly, the difference was observed in RML-95 for days to anthesis and grain yield. Maximum grain yield 3.325 t ha^{-1}, was recorded in RML-95 with the application of 120:90:40 kg ha^{-1}(Table 91).

Table 89: Yield and yield attributing parameter of RML-86 as affected by different dozes of major chemical fertilizers and growth hormones during spring at Rampur, 2021

Treatments	DTT	DTS	PHT(cm)	EHT(cm)	EL	ED	NGRPE	NGPR	GY(t/ha)	TKW
T1	81	82	136	76	13	3.25	14	22	1.950	221
T2	81	82	141	77	13	3.37	15	22	1.779	205
T3	81	82	133	72	13	3.30	15	23	1.754	188
T4	82	83	115	65	13	3.35	15	22	1.680	185
T5	80	81	116	62	13	3.56	14	22	1.672	219
T6	82	82	121	64	13	3.27	13	21	1.595	200
T7	80	81	113	59	13	3.50	15	24	1.352	209
T8	81	82	113	61	12	3.66	15	25	1.267	224
T9	82	82	117	61	12	3.57	15	22	1.223	241
Mean	81	82	123	66	13	3.42	15	23	1.581	210
P value	ns	ns	**	**	ns	**	ns	*	ns	ns
LSD (0.05)	1.6	1.7	16.85	11.28	1	0.23	1.21	4.11	0.613	41.38
CV%	1.14	1.2	7.78	9.8	4.53	4.02	4.72	10.54	22.42	11.37

Table 90: Yield and yield attributing parameter of RML-96 as affected by different doses of major chemical fertilizers and growth hormones during spring at Rampur, 2021

Treatments	DTT	DTS	PHT(cm)	EHT(cm)	EL	ED	NGRPE	NGPR	GY(t/ha)	TKW
T1	79	80	157	87	14	3.72	15	29	2.370	269
T2	78	80	158	85	13	3.75	14	28	2.612	280
T3	78	80	154	81	14	3.91	15	28	2.930	271
T4	79	80	150	80	13	3.73	14	28	2.617	233
T5	79	80	147	77	12	3.63	14	27	2.536	221
T6	79	79	152	82	15	4.06	14	27	2.867	307
T7	78	79	150	76	14	3.71	14	26	2.649	249
T8	78	79	142	77	14	3.87	14	26	2.919	268
T9	79	80	140	75	14	4.00	14	23	1.572	270
Mean	79	80	150	80	14	3.81	14	27	2.563	263
P value	ns	ns	ns	ns	**	ns	ns	ns	*	ns
LSD (0.05)	1.5	1.74	18.47	13.31	1.28	0.38	1.38	4.24	0.865	67.77
CV%	1.1	1.24	7.11	9.62	5.41	5.8	5.7	9.1	19.51	14.88

Table 91: Yield and yield attributing parameter of RML-95 as affected by different doses of major chemical fertilizers and growth hormones during spring at Rampur, 2021

Trt	DTT	DTS	PHT(cm)	EHT(cm)	EL	ED	NGRPE	NGPR	GY(t/ha)	TKW
T1	78	79	142	81	14	3.77	13	26	3.283	228
T2	79	80	159	87	13	3.65	13	26	3.325	284
T3	78	80	138	82	14	4.01	14	27	2.811	263
T4	78	79	141	80	14	3.96	14	29	3.120	242
T5	78	79	143	79	14	3.85	14	27	2.634	273
T6	78	79	141	78	13	3.69	14	27	3.291	217
T7	78	79	147	79	14	4.10	14	28	3.287	281
T8	79	80	135	73	13	3.76	14	27	2.635	239
T9	80	81	131	73	15	3.95	14	27	2.083	261
Mean	78	79	142	79	14	3.86	14	27	2.941	254
P value	ns	*	ns	ns	ns	ns	ns	ns	*	ns
LSD 0.05	1.25	1.3	17.88	15.3	2.18	0.4	1.42	4.18	0.697	68.71
CV%	0.92	0.94	7.27	11.17	9.23	6.11	6.03	8.92	13.7	15.61

2.4 Entomology

2.4.1 Study on relative susceptibility of maize genotypes to major insect pests

The screening activities were organized following randomized incomplete block design during spring season of 2020/21 under field condition at NMRP, Rampur, Chitwan. Sixty maize hybrids were sown on March 3, 2021(2077/11/18 BS) in 2 rows of 5 m long with the spacing of 60cm × 25cm. Cultural practices were followed as recommended. Observations were taken on early plant stand, stem borer infestation percentage, dead heart percentage, final plant stand, cob rot percentage, grain yield (t/ha) and thousand grain weight (g).

Genotypes differed significantly for early plant stand, percentage fall army worm infestation, percentage stem borer infestation, percentage dead heart, final plant stand, percentage cob rot, grain yield and thousand grain weight. The early plant stand ranged from 18-56, fall army worm infestation 25.51-68.89 %, stem borer infestation 4.79-17.96 %, dead heart 2.20- 19.97%, final plant stand 13-50 per plot, cob rot 3.85-28.49%, grain yield 2.439-9.583t/ha and thousand grain weight 275-529g (Table 92).

Out of 60 maize hybrids, the top five maize hybrids having lower percentage of stem borer infestation were RML-57/RL-174 (4.79%), RML-88/RML-18 (5.33%), RL-153/RL-105 (5.76%), RL-208/RL-174 (5.94%) and RML-57/RML-17 (6.69%). Similarly, the top five maize hybrids having lower dead heart percentage were RL-222/RML-2 (2.20%), RML-85/RML-146 (2.35%), RL-153/RL-105 (2.36%), RML-150/RL-105 (2.38%) and RL-107/RML-84 (2.76%). The maize hybrids having lower percentage of fall army worm infestation were RML-4/RL-111 (25.51%), RML-57/RL-174 (26.97%), RH-10 (28.54%), RL-242/RL-105 (28.98%) and RML-95/RML-140 (29.40%). The higher grain yield (> 8t/ha) were recorded on RML-4/RL-111 (9.583t/ha), RL-242/RL-105 (9.276t/ha), RH-10 (8.476t/ha), TX369 (8.307t/ha), RML-83/RML-146 (8.285t/ha), RL-107/RML-84 (8.038t/ha) and RML-98/RML-17 (8.023t/ha) presented in the table 92.

Table 92: Susceptibility of maize genotypes tomajor insect pests infestation at NMRP, Rampur during March to June 2021

Genotypes	EPS	IFAW (%)	SBI (%)	DH (%)	FPS	RE (%)	GY (t/ha)	TKW
RL-153/RL-105	43†	37.45	5.76	2.36	33	7.87	5.399	350
RML-80/RML-140	48	52.82	11.38	3.07	40	16.54	5.712	342
RL-238/RL-111	31	43.08	17.69	9.07	21	18.64	4.031	362
RML-145/RML-98	41	53.08	9.91	3.57	28	13.25	6.000	493
RL-94/RL-105	47	41.74	11.97	4.06	37	8.00	7.420	340

Genotypes	EPS	IFAW (%)	SBI (%)	DH (%)	FPS	RE (%)	GY (t/ha)	TKW
RML-85/RML-146	43	46.07	10.58	2.35	35	12.32	7.279	349
RL-241/RL-105	40	60.09	13.85	8.84	36	24.11	5.815	376
RL-243/RML-140	43	57.73	17.05	5.48	35	16.87	6.092	350
RML-97-1/RL-105	34	53.07	9.30	4.65	23	20.00	4.297	367
RML-87/RL105	41	52.66	11.26	5.04	30	14.00	5.894	333
RML-76/RL-105	42	49.97	13.25	10.82	35	10.42	6.792	384
RML-191/RL-105	47	51.68	15.97	7.83	32	6.31	6.748	475
RML-57/RML-17	37	55.30	6.69	5.22	33	22.15	5.862	356
RML-105/RML-140	44	53.73	10.30	6.73	29	28.49	4.864	399
RL-180/RL-105	43	58.19	13.21	5.08	36	10.56	7.891	328
RL-107/RL-105	50	55.19	7.04	5.00	36	4.60	6.951	321
RL-29/RL-105	41	60.48	7.25	7.68	29	5.38	6.281	364
RL-251/RML-17	46	57.42	7.66	4.37	35	6.12	7.001	445
RL-280/RML-96	42	56.05	7.31	3.53	29	21.54	4.404	349
RL-240/RML-96	46	62.08	8.67	5.27	41	9.51	7.808	400
RML-130/RML-96	38	37.22	11.67	6.11	28	11.31	4.749	355
RML-89/RL-105	50	36.31	13.14	5.06	40	24.75	7.010	337
RL-102/RML-17	55	49.36	11.06	3.58	38	21.16	6.483	377
RL-222/RML-2	46	45.15	8.82	2.20	37	21.69	7.013	360
RL-244/RL-105	48	45.19	10.51	8.42	39	11.20	7.432	367
RL-219/RL-151	50	40.37	8.08	4.52	38	24.17	4.058	297
RML-150/RL-105	41	43.50	13.55	2.38	33	8.96	6.859	429
RL-232/RML-18	41	45.49	12.44	5.19	33	7.94	7.817	347
RL-208/RL-174	50	38.24	5.94	6.07	34	17.82	4.321	348
RML-150/RML-98	43	42.50	9.59	7.22	35	22.02	7.364	529
RML-1/RML-17	35	68.89	7.56	9.34	34	14.82	6.292	393
RL-236/RML-96	40	41.25	12.50	6.25	33	23.90	5.764	415
RML-97-2/RL-105	46	42.78	10.97	6.57	37	3.85	6.635	390
RML-76/RML-17	48	32.29	10.42	8.34	38	12.72	6.485	393
RML-11-1/RML-18	44	32.97	12.69	4.55	40	15.09	6.921	393
RML-88/RML-18	40	38.99	5.33	10.21	32	10.98	6.307	374
RML-58/RL-111	45	32.59	7.89	6.85	32	4.85	6.142	389
RML-9/RML-105	46	38.61	10.03	5.61	38	8.54	6.665	332
RML-191/CML444	35	49.63	16.04	7.33	28	9.34	7.206	458
RL-107/RML-84	55	30.28	10.92	2.76	46	10.61	8.038	372
RML-95/RML-140	40	29.40	9.51	5.86	34	14.84	6.337	376
RML-150/RL-101	45	41.06	13.24	10.03	36	5.56	6.895	442
RML-57/RL-174	32	26.97	4.79	8.02	20	25.79	2.439	275

Genotypes	EPS	IFAW (%)	SBI (%)	DH (%)	FPS	RE (%)	GY (t/ha)	TKW
RML-86/RML-96	47	35.74	9.03	6.53	40	11.11	7.411	358
RL-243/RML-17	38	32.79	9.63	10.18	25	14.35	4.899	340
RML-98/RML-17	44	31.52	7.82	8.01	30	16.95	8.023	489
RL-274/RML-170	47	34.48	9.67	4.30	32	12.22	5.128	357
RML-84/RML-140	43	29.61	12.06	3.67	36	14.58	5.368	368
RML-4/RL-111	46	25.51	13.44	3.23	38	10.99	9.583	380
RML-37/RL-105	48	32.00	9.53	8.57	36	18.94	6.148	338
RL-242/RL-105	52	28.98	12.72	5.78	40	10.00	9.276	390
RL-246/RML-17	18	44.59	11.15	19.97	13	9.09	4.035	452
RL-239/RML-17	42	34.66	8.53	9.55	29	18.24	5.296	383
RML-95/RML-96	46	33.02	8.98	5.77	40	9.05	7.110	458
RML-83/RML-146	48	30.34	11.02	7.43	36	15.35	8.285	370
RML-98/RML-96	40	33.74	8.72	6.22	26	16.99	5.306	452
RML-115/RL105	46	31.47	10.88	8.84	33	12.64	7.017	410
RH-10	56	28.54	8.94	6.23	50	11.70	8.476	436
TX369	49	39.37	9.70	7.38	38	11.01	8.307	368
CAH1715	37	65.00	17.96	5.61	41	8.38	7.755	423
Grand mean	43.21	42.97	10.54	6.33	33.78	13.83	6.420	383.21
Min	18	25.51	4.79	2.20	13	3.85	2.439	275
Max	56	68.89	17.96	19.97	50	28.49	9.583	529
P-value	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
LSD (0.05)	10.37	2.58	1.93	1.73	3.10	3.719	0.283	2.927
CV, %	11.98	3.00	9.16	13.67	4.58	13.42	2.20	0.38

2.4.2 Testing efficacy of insecticides against maize stem borer

A field experiment with six treatments including control was conducted at NMRP, Rampur during 2020/21 (2077/78 BS) to identify efficacy of insecticides against maize stem borer. The experiment was laid in RCB design with four replications. Rampur Hybrid-10 was seeded on 2077/11/18 (march 3, 2021) in 6 rows of 5 m long with the spacing of 60 cm × 25 cm. Agronomic practices and fertilizer application were carried out as recommended. Data on final plant stand, percent borer infestation at pre- tasseling stage of maize, percent dead heart, rotten cob percentage, grain yield (t/ha) and thousand grain weight (g) were recorded.

All insecticides used in the experiment had significant effect ($P<0.01$) in percent borer infestation, percent dead heart, grain yield and thousand grain weight. The plot sprayed with Spinetoram 11.7% SC @ 0.4 ml/l of water having higher crop yield (11.760t/ha) with lower stem borer infestation (3.70%), dead heart (2.08%)

and rotten cob (4%) followed by the plot sprayed with Chloropyriphosos 20% SC @ 1.5 ml/l of water having crop yield of 11.703t/ha, 4.19% stem borer infestation, 2.49% dead heart and 5% rotten cobs. The higher percent stem borer infestation (11.14%), dead heart (9.51%), and rotten cobs (23%) with lower yield (6.148t/ha) was observed in the control plot (Table 93).

Table 93: Effectiveness of different insecticides against maize stem borer at NMRP, Rampur, during March to June 2021

Treatments	EPS	SBI %	DH %	FPS	RE %	TKW (g)	GY (t/ha)
Lambdacyhalothrin 5% EC @ 1ml/l of water	106	6.78	3.17	88	8	461	11.075
Thiomethoxam 25% WG @ 1g/l of water	96	5.49	3.10	79	8	459	11.485
Spinetoram 11.7% SC @ 0.4 ml/l of water	90	3.70	2.08	80	4	472	11.760
Chlorantraniprole 18.5% SC @ 0.5 ml/l of water	91	7.08	3.69	76	11	470	11.029
Chloropyriphyos 20% SC @ 1.5 ml/l of water	100	4.19	2.49	92	5	432	11.703
Control	100	11.14	9.51	86	23	418	6.148
Grand mean	96.96	6.39	4.01	83.50		452.00	10.533
P-value	0.206	<.001	<.001	<.001		<.001	<.001
LSD (0.01)	19.38	3.062	1.911	7.13		12.66	0.654
CV, %	9.60	23.00	22.90	4.10		1.30	3.00

2.4.3 Yield loss assessment in maize due to stem borer infestation

The yield loss assessment activities were organized following two factor randomized complete block design with three replications during spring season of 2077/078 under field condition at NMRP, Rampur, Chitwan. Five released and pipe line maize hybrids were sown on 2077/11/18 (March 3, 2021) in 4 rows of 5 m long with the spacing of 60 cm × 25 cm. Most of the cultural practices were followed as recommended. Observations were taken on early plant stand, stem borer infestation percentage, dead heart percentage, final plant stand, cob rot percentage, grain yield (t/ha) and thousand grain weight (g).

Treatment used under this study was as follows.

FactorA: Maize Varieties (A total of 5 released and pipeline maize hybrids namely: Rampur Hybrid-8, Rampur Hybrid-10, RML-95/RML-96, RML-86/RML-96, CAH-1715,TX369,Arun-2, ZM-401, ZM-627 and Rampur Composite.

Factor B: Spray and non-spray (Biorational insecticide-Spinosad 45% EC@(0.3 ml/l of water)

Maize genotypes were compared in spinosad (0.3 ml/l of water) sprayed and non-sprayed plots. Maize yield was found 14.3 % higher in spinosad sprayed plots compared to non-sprayed plots. Similarly, the higher percent infested

borer plant (>5%) and no. of dead hearts (4.37) was recorded in non-sprayed plots compared to sprayed plots i.e. percent infested borer plant (<1%) and no. of dead hearts (1.13) (Table 94)

Table 94: Effect of insecticidal (spinosad @ 0.3ml/l of water) spray and non-spray in different maize varieties infested with stem borer (*Chilopartellus* Swinhoe) at NMRP, Rampur during March to June 2021

Variety	EPS	SBI %	DHT%	FS	NOE	RE	GY(t/ha)	TKW (g)
Variety								
TX-369	111	3.66	2.65	85	83	6	9.452	396
RH-10	89	5.36	3.81	73	72	4	8.406	411
CAH1715	95	6.10	2.54	76	67	8	8.521	417
RH-4	108	6.06	3.26	85	79	6	7.399	402
RH-6	101	5.76	2.93	83	82	6	8.342	393
Arun-2	100	5.91	3.64	60	54	8	3.864	335
ZM-401	98	4.38	3.98	72	62	5	5.030	367
Rampur Composite	103	4.58	3.64	73	56	6	4.859	379
BGBY POP	102	3.96	2.03	76	63	11	5.992	375
ZM-627	52	5.07	5.27	44	41	9	3.312	353
P-value	<.001	0.07	<.001	<.001	<.001	<.001	<.001	<.001
LSD (0.05)	13.47	1.83	1.09	10.51	12.39	2.80	0.568	23.75
Treatment								
Non Spray (ns)	91	7.92	5.01	66	61	8	5.629	356
Spray (S)	101	2.25	1.74	79	71	6	7.407	410
P-value	0.003	<.001	<.001	<.001	0.002	<.001	<.001	<.001
LSD (0.05)	6.02	0.82	0.49	4.70	5.54	1.25	0.254	10.62
Variety x Treatment								
TX-369 x NS	103	6.16	4.13	80	76	8	8.589	352
TX-369 x S	118	1.16	1.16	89	90	3	10.315	440
RH-10 x NS	87	9.60	5.76	68	66	5	7.327	360
RH-10 x S	90	1.12	1.86	78	78	3	9.486	463
CAH1715 x NS	90	11.21	4.09	66	62	9	7.345	377
CAH1715 x S	100	1.00	1.00	87	72	7	9.697	457
RH-4 x NS	107	9.99	5.00	80	73	5	6.680	356
RH-4 x S	108	2.13	1.53	90	84	6	8.117	448
RH-6 x NS	103	8.42	4.51	81	78	8	7.475	382
RH-6 x S	98	3.09	1.35	84	86	4	9.209	405
Arun-2 x NS	91	8.45	5.45	48	43	10	3.061	314
Arun-2 x S	109	3.36	1.83	71	66	6	4.666	355
ZM-401x NS	94	5.73	5.68	66	61	6	4.142	355

Variety	EPS	SBI %	DHT%	FS	NOE	RE	GY(t/ha)	TKW (g)
ZM-401 x S	101	3.02	2.28	77	63	4	5.918	379
RC x NS	95	6.77	4.87	63	55	7	4.231	366
RC x S	112	2.40	2.41	83	57	4	5.488	391
BGBY POP x NS	88	4.72	2.86	71	63	9	5.038	381
BGBY POP x S	117	3.20	1.19	81	63	13	6.946	368
ZM-627 x NS	52	8.13	7.79	40	36	11	2.398	317
ZM-627 x S	52	2.00	2.74	47	46	6	4.227	389
Grand mean	95	5	3	71	64	7	6.125	382
P-value	0.32	<.001	0.242	0.59	0.797	0.069	0.75	<.001
LSD (0.05)	19.05	2.58	1.54	14.86	17.52	3.96	0.803	33.58
CV,%	12	30.7	27.7	12.4	16.1	35.3	7.5	5.3

2.4.4 Management of fall armyworm, *Spodoptera frugiperda* (J.E. Smith) in maize crop at NMRP, Rampur

2.4.4.1 Screening of maize genotypes against fall armyworm at NMRP, Rampur

Methodology

Testing genotypes: 38 (8 early genotypes, 16 full season genotypes, 7 QPM, 7 Hybrids)
Location: NMRP, Chitwan (228 m.a.s.l.)
Design: RCBD
Replication: 3
Plot size: 2 rows of 5m length
Spacing: 60 cm × 25cm
Fertilizer: 150:60:40 kg NPK/ha
Time of Sowing: Winter season (September)

Leaf infestation data as mentioned below was recorded first at knee height stage (20-25 DAS) and second at before tasselling stage (40-45 DAS) and ear infestation data was measured during harvesting stage. All plants in each plot were thoroughly examined and data were recorded as below.

Data was taken

- Total plants/plot after 15 days of germination.
- Total eggs mass/plot (5 plants /plot)
- Total healthy plant/plot (two rows)
- Total no of infested plants/plot
- Total no. of damage ear/plot
- Grain yield t/ha

Result

All the tested genotypes were found statistically non-significant on plant damage at knee high stage and dead heart but significantly varied on plant damage at before tasseling stage, cob length, cob diameter, ear damage percentage and grain yield. None of the genotypes were found resistant/tolerant against fall armyworm in this study (Table 95 and 96). However, Arun-3, EEYC-1, SPPTLYQ-A, CORRALJOS002SIYQ, Mankamana-3, Rampur-4, Deuti, BGBYPOP, 05SAVDI, R-POP-2, KSYNF10, S0128, Rampur hybrid-10, CAH 1715 were found less susceptible by the fall armyworm (Table 97).

Table 95: Effect of different genotypes on reduction of plant damage and dead heart incidence by fall armyworm in maize at NMRP, Rampur during winter season, 2020/21

Category	Genotypes	KHS (25DAS)	BTS (45DAS)	Mean damage (%)	MS (1-9)	Dead heart (%)
Early genotypes	Arun-1	73.8	89.8	81.8	6.0	5.3
	Arun-2	61.9	79.2	70.6	5.7	5.0
	Arun-3	68.6	75.6	72.1	4.0	4.3
	Arun-4	69.3	84.8	77.1	6.3	4.3
	Arun-6	74.3	90.6	82.5	7.1	6.7
	EEYC-1	68.1	83.8	76.0	4.3	4.0
	02SADVI	65.3	88.9	77.1	6.0	5.3
	Across pp402	77.7	82.5	80.1	5.7	3.7
Quality protein maize	Posilo makai-1	63.9	86.2	75.1	5.7	7.7
	Posilo makai-2	59.8	77.2	68.5	5.7	5.3
	SPPTLYQ-HBAB	61.6	91.2	76.4	7.3	5.3
	SO3TLYQAB-02	61.9	79.1	70.5	5.7	3.3
	SO1STYQ	78.2	81.1	79.6	5.0	5.3
	SPPTLYQ-A	62.6	76.3	69.4	4.3	5.3
	CORRALJOS002SIYQ	67.0	86.4	76.7	5.0	6.3

Category	Genotypes	KHS (25DAS)	BTS (45DAS)	Mean damage (%)	MS (1-9)	Dead heart (%)
Full season genotypes	ZM-401	75.3	90.9	83.1	6.0	5.0
	ZM-627	64.1	87.1	75.6	5.3	6.7
	Mankamana-3	65.6	78.5	72.0	4.7	4.7
	Manakamana-7	60.2	84.0	72.1	6.0	3.3
	Rampur composite	78.6	85.2	81.9	6.0	4.7
	Rampur-4	76.5	81.2	78.8	4.3	4.7
	Deuti	73.3	79.2	76.3	5.0	4.3
	BGBYPOP	70.8	83.9	77.3	5.0	4.7
	TLBRSO7F16	73.6	82.6	78.1	5.3	4.0
	RampurS13F26	62.7	88.3	75.5	5.7	3.0
	05SAVDI	55.7	86.6	71.2	5.0	5.0
	07SAVDI	57.3	82.1	69.7	6.3	3.7
	R-POP-2	59.3	76.4	67.9	4.7	5.0
	HG-7	70.2	88.5	79.3	6.7	7.3
	KSYNF10	62.7	75.3	69.0	4.0	5.3
	S0128	47.6	68.2	57.9	4.0	3.7
Hybrid genotypes	RML-86/RML-96	50.2	75.0	62.6	5.7	6.7
	RML-95/96	68.8	79.9	74.3	5.7	4.3
	Rampur hybrid-4	73.5	87.3	80.4	6.3	5.3
	Rampur hybrid-6	70.3	80.6	75.4	6.0	6.3
	Rampur hybrid-10	77.0	55.5	66.3	4.7	5.0
	CAH 1715	74.1	51.1	62.6	4.0	3.7
	RML 145/RL 298	68.1	87.9	78.0	7.2	4.3
	Grand mean	67.1	81.25	74.17	5.39	4.95
	CV, %	24	12.2	11.8	23.4	45.8
	P value	ns	*	*	*	ns
	LSD (0.05)	-	16.177	14.223	2.05	-

KHS=knee high stage, BTS= before tasseling stage, DAS=Days after sowing MDP=Mean damage percentage, MS= Mean score

Table 96: Evaluation of different genotypes against fall armyworm on grain yield and yield attributing traits at NMRP, Rampur during winter season 2020/21

Category	Genotypes	CL (cm)	CD (cm)	Total ear (no.)	Damage ear (no.)	Score (1-9 scale)	Damage ear (%)	GY (t/ha)
Early genotypes	Arun-1	12.5	3.8	11.0	4.7	4.0	46.5	0.631
	Arun-2	12.6	3.8	10.7	3.3	3.3	34.6	0.644
	Arun-3	11.8	4.0	18.0	7.0	4.0	39.1	1.256
	Arun-4	11.2	3.5	11.7	3.3	2.7	28.4	0.626
	Arun-6	14.3	4.2	14.7	3.0	3.3	29.0	1.765
	EEYC-1	12.2	3.9	23.3	5.3	3.7	29.4	1.713
	02SADVI	12.0	3.9	11.7	4.7	4.0	45.2	0.584
	Across pp402	14.2	4.2	27.7	4.3	3.0	16.0	2.474
Quality protein maize	Posilo makai-1	14.7	4.1	13.3	3.0	1.7	25.2	1.581
	Posilo makai-2	14.2	4.0	18.7	5.3	3.3	29.9	1.742
	SPPTLYQ-HBAB	12.6	3.8	17.7	5.3	3.7	33.2	1.720
	SO3TLYQAB-02	13.1	3.6	12.7	2.7	2.0	21.0	1.431
	SO1STYQ	16.0	4.1	27.3	4.0	1.7	14.6	2.992
	SPPTLYQ-A	14.8	4.1	26.3	4.7	3.0	17.5	2.578
	CORRALJOS002SIYQ	13.9	3.8	26.0	4.3	3.0	19.4	2.246
Full season genotypes	ZM-401	14.9	3.8	28.0	7.3	4.0	27.6	2.933
	ZM-627	13.2	4.1	13.0	4.7	3.0	36.5	1.270
	Mankamana-3	15.9	4.1	13.0	2.3	1.7	19.0	1.530
	Manakamana-7	14.6	3.7	16.7	3.3	2.7	21.3	1.637
	Rampur composite	14.7	4.3	18.3	5.3	3.3	29.4	2.068
	Rampur-4	13.4	3.9	24.0	3.3	1.7	13.7	2.386
	Deuti	15.2	4.2	15.7	2.3	2.0	15.6	2.019
	BGBYPOP	15.5	4.5	23.7	3.7	2.0	15.0	3.602
	TLBRSO7F16	16.3	4.3	16.3	2.7	1.7	19.0	1.826
	RampurS13F26	15.0	4.0	25.0	3.3	2.3	15.4	2.524
	05SAVDI	15.7	4.1	20.3	5.7	4.0	28.6	2.018
	07SAVDI	12.6	3.9	15.7	4.3	3.3	30.0	1.545
	R-POP-2	14.3	4.3	21.0	4.0	3.0	22.5	2.058
	HG-7	12.8	4.1	18.0	6.3	7.0	39.2	1.669
	KSYNF10	13.7	3.9	28.3	4.0	2.3	16.2	2.797
	S0128	12.7	3.8	22.7	4.0	3.0	24.4	2.547

Category	Genotypes	CL (cm)	CD (cm)	Total ear (no.)	Damage ear (no.)	Score (1-9 scale)	Damage ear (%)	GY (t/ha)
Hybrid genotypes	RML-86/RML-96	15.1	4.3	24.3	3.3	2.0	15.4	3.050
	RML-95/96	15.2	4.2	21.7	2.0	1.7	12.2	2.542
	Rampur hybrid-4	14.4	3.8	22.3	2.0	1.0	11.2	2.517
	Rampur hybrid-6	15.6	4.3	20.7	1.0	1.3	5.7	2.251
	Rampur hybrid-10	12.9	3.7	10.7	2.0	1.7	26.8	1.439
	CAH 1715	17.7	3.9	30.7	1.7	1.0	5.9	4.951
	RML 145/RL 298	15.3	4.1	18.3	4.0	2.7	24.0	2.006
	Grand mean	14.12	3.995	19.45	3.89	3.02	23.8	2.031
	CV, %	9.4	6.9	41.9	41.8	122.3	46.4	45.5
	P value	**	*	*	**	ns	**	**
	LSD (0.05)	2.149	0.448	13.25	2.64		17.96	0.154

Table 97: Classification of maize genotypes against fall armyworm based on leaf damage rating (1-9 scale)

Maize genotypes	Categories	Rating scale
Arun-6, SPPTLYQ-HBAB, RML 145/RL 298	Highly susceptible	>7-9
Arun-1, Arun-2, Arun-4, 02SADVI, Across pp402, Posilo makai-1, Posilo makai-2, SO3TLYQAB-02, SO1STYQ, ZM-401, ZM-627, Manakamana-7, Rampur composite, RampurS13F26, 07SAVDI, HG-7, RML-86/RML-96, RML-95/96, Rampur hybrid-4, Rampur hybrid-6	Moderately susceptible	>6-7
Arun-3, EEYC-1, SPPTLYQ-A, CORRALJOS002SIYQ, Mankamana-3, Rampur-4, Deuti, BGBYPOP, 05SAVDI, R-POP-2 KSYNF10, S0128, Rampur hybrid-10, CAH 1715	Least susceptible	1-5

2.4.4.2 Evaluation of safe chemical insecticides available in market against fall armyworm at field condition

Methodology

Location: NMRP, Chitwan
Design: RCBD Treatment: 7
Replication: 4
Plot size: 8 rows of 5m length
Spacing: 60 cm × 25 cm
Fertilizer: 120:60:40 kg NPK/ha
Variety: Manakaman-3
Time of Sowing: Spring season (Feb),
Winter season (Sept)

Treatments details

T1: Chlorantraniliprole 18.5%SC (Allcora) @0.4ml/liter of water
T2: Azadirechtin 1500 ppm Commercial product of neem @ 5.0 ml/ liter of water
T3: Spinosad 45% SC (Tracer) biological insecticide @ 0.5ml/liter of water
T4: Spinetoram 11.7% SC (delegate) @ 0.4 ml/liter of water
T5: Novaluron 10% EC (Rimon) @2 ml/liter of water
T6: Emamectin benzoate 5% SG @ 0.4 g/liter of water
T7: Control (without application)

Duration of spray: 3 times (10 days interval)

Data taken

Middle 4 rows/plot was sampled for leaf and ear injury measurement.

Plant injury: Leaf damage was scored by visual observation using the scoring scale of 1-9 reported by Davis and Williams (1992)

- Sample plant: Total plant/4 middle rows
- Field data was measured after 3 days of each treatment application

Ear injury: Same sample plants were examined in each plot at harvesting time and ear damage was measured by the rating scale developed by Davis and Williams (1992)

- Grain yield, t/ha
- Other minor insects
- Beneficial insects (Predators and parasitoids)

Result

Statistical analysis showed that all treatments were significantly different as compared to untreated control ($p<0.05$) in the case of plant damage and grain yield measurement but non-significant results were found in plant height, ear height, cob length (Table 98 and 99). The lower plant infestation (10.4%) due to fall armyworm was found in Spinosad 45% SC treated plot followed by Chlorantraniliprole 18.5% SC (11.3%) and Spinetoram 11.7% SC (19.1%) in visual observation as compared to untreated control (76.7%). Similarly, the highest grain yield (5.198t/ha) was found in Spinosad 45% SC treated plot followed by Spinetoram treated plot (4.807t/ha) and Novaluron 10% EC (4.635t/ha) as compared to untreated control (1007t/ha). Azadirechtin 1500 ppm was found least effective among the treatments but was significantly superior to untreated control.

Table 98: Effect of different treatments on reduction of plant damage and dead heart incidence by fall armyworm in maize at NMRP, Rampur during winter season, 2020/21

Treatments	Plant damage at different leaf stage (%)			
	15 Day after seed sowing	25 Day after seed sowing	40 Day after seed sowing	Mean damage (%)
Chlorantraniliprole 18.5% SC	22.9[a]	5.9[a]	4.5[a]	11.3[a]
Azadirechtin 1500 ppm	87.0[c]	18.0[b]	36.4[b]	47.1[d]
Spinosad 45% SC	20.5[a]	5.4[a]	5.2[a]	10.4[a]
Spinetoram 11.7% SC	35.9[ab]	6.3[a]	15.1[ab]	19.1[ab]
Novaluron 10% EC	56.4[b]	51.1[c]	6.8[a]	38.1[cd]
Emamectin benzoate 5% SC	38.8[ab]	19.1[b]	19.7[ab]	25.9[bc]
Untreated control	85.9[c]	75.0[d]	69.2[c]	76.7[e]
GM	49.6	25.8	22.5	32.6
CV, %	37.3	26.5	64.0	26.9
P value	**	**	**	**
LSD (0.05)	27.53	10.14	21.36	13.04

Table 99: Effect of different treatments on grain yield and yield attributing traits at NMRP, Rampur during winter season 2020/21

Treatments	Plant height (cm)	Ear height (cm)	Total Plant (number)	Cob length (cm)	Cob diameter (cm)	GY (t/ha)
Chlorantraniliprole 18.5% SC	196.9	87.5[cd]	70.0[a]	14.4	4.4[bc]	4.298[b]
Azadirechtin 1500 ppm	181.6	67.0[ab]	36.0[b]	12.7	4.3[a]	1.769[c]
Spinosad 45% SC	209.4	103.0[d]	64.8[a]	14.1	4.6[c]	5.198[a]
Spinetoram 11.7% SC	193.5	88.0[cd]	66.8[a]	13.5	4.5[bc]	4.807[ab]
Novaluron 10% EC	210.1	87.5[cd]	65.8[a]	13.8	4.4[bc]	4.635[ab]
Emamectin benzoate 5% SC	190.8	83.0[bc]	62.8[a]	13.8	4.5[bc]	4.521[ab]
Untreated control	161.0	59.5[a]	20.5[c]	12.1	3.9a	1.007[c]
GM	191.9	82.2	55.2	13.47	4.4	3.748
CV, %	13.3	14.5	14.3	11	4.7	13.9
P value	ns	*	**	ns	*	**
LSD (0.05)		17.68	11.73		0.3055	0.774

2.4.4.3 Field efficacy of Push-Pull approach against fall armyworm at NMRP, Rampur

Habitat management is one of the best eco-friendly options for the management of fall armyworm. Here, Desmodium grass was planted in between the rows of maize. It produces a smell or odour that the stem borers and fall armyworm moths do not like i.e. repel the moth from the main field. Napier grass is planted around the maize crop as a trap crop. Napier grass is more attractive to them than maize it pulls the moths to lay their eggs on it.

Methodology

Location: NMRP, Chitwan
Push crop 1: Napier grass *(Pennisetum purpureum)*
Push crop 2: *Brachiaria* cv. Mulato
Pull crop: Green leaf desmodium grass *(Desmodium intortum)*
Main plot: Desmodium intercropping with maize (1:1)
Variety: Rampur hybrid-10
Spacing: 75 cm × 20cm
Fertilizer: 180:60:40 kg NPK/ha
Time of Sowing: Spring season

Data to taken

- Infestation level was scored from ten plant/rows in stratified method
- Grain yield
- Fresh fodder yield of Napier, desmodium and bracheria
- Scouting of egg masses

Result

The severity of plant infestation was found lower on Napier and Desmodium (13.3%) intercropping followed by Bracheria + Desmodium (15.9%) with compared to mono-cropped maize (62.8%) (Table 100). Nepier grass was found more effective for fall armyworm adult for egg laying as compare to Bracheria grass.

Table 100: Cumulative infestation of fall armyworm (FAW) at plant growth stages of maize intercropped with leguminous crops and mono-cropped maize at Rampur, Chitwan, 2020/21

Treatments	Mean leaf damage (%)	Mean score (0-9 scale)	CL (cm)	CD (cm)	TKW (g)	Ear damage score (0-9)	GY (t/ha)
Napier+Desmodium	13.3	2.6	14.7	4.0	486.7	2.3	10.263
Bracheria+Desmodium	15.9	3.2	14.7	3.9	453.3	2.7	9.287
Sole maize	62.8	5.0	12.0	3.7	406.7	5.7	4.960
Mean	30.6	3.6	13.8	3.8	448.9	3.56	8.17
DTS	22.7	1.01	1.27	0.12	32.8	1.51	2.3
SE±	13.1	0.58	0.73	0.07	18.94	0.87	1.33

2.4.2.4 Effect of seasonal variation on the incidence of FAW at NMRP, Rampur

Foliar damage under natural infestation by fall armyworms was evaluated on two maize promising genotypes namely; ZM-401 (Open Pollinated genotype) and RML-86/RML-96 (Hybrid genotype). These genotypes were planted at every 10 days interval throughout the year at Rampur, Chitwan, Nepal. The geography of the

experimental site is latitude 27º40'N, longitude 84º 19'E, and 228 meter above sea level.

Tested genotypes: ZM-401 (OPV) and RML-86/RML-96 (Hybrid)
Planting interval: At 10 days intervals for two consecutive years
Design: Factorial RCBD
Treatments: Variety (2 level), Date of sowing (10 days interval)
Spacing: 60 cm×25 cm Fertilizer: 150:60:40kg NPK/ha
Plot size: 2 rows of 5 meter long (6m^2)

Data taken

Sample plant: Ten plants /plot were sampled for leaf and ear injury measurement.

Plant injury: Leaf damage was scored by visual observation using the scoring scale of 1–9 reported by Davis and Williams (1992)

- Knee high stage (V8) leaf stage-25-30 DAS
- Before tasseling stage (V12) leaf stage-45-50 DAS

Ear injury: Same sample plants were examined in each plot at harvesting time and ear damage was measured by Davis and Williams (1992)

Result

The observation showed that infestation due to fall armyworm was found round the year in natural field condition at NMRP, Rampur (Table 101). Here, the infestation level was varied according to the month and season because weather variations have played the significant role for growth and development of the fall armyworm. The study revealed that FAW incidence was high (61.7% and 55.0%) in the month of September in both hybrid and Open Pollinated (OP) genotypes respectively followed by May (58.8% and 52.3%) in same genotypes. The crop planted August-September reach to vegetative stage during September-October and crop planted in the month of April-May reach to vegetative stage during May-July were favorable for the growth and development of fall armyworm when the mean temperature range were 27-30°C. In season-wise comparison, summer season was recorded highest plant damage followed by spring season and winter season in both of the genotypes. Least infestation (5.7) in hybrid and (5.8%) in OP genotype were found in the month of December followed by January (5.9 and 6.5%) in the same genotype respectively. Non-significant different was found between the genotypes, however, little bit higher infestation was found in OP genotype than hybrid.

Table 101: Monthly damage assessment of fall armyworm in maize crop on natural field condition at NMRP, Rampur during 2020/21

Month	Score (1-9)		Plant damage (%)		Temperature (ºC)		
	ZM401	RML-86/ RML-96	ZM401	RML-86/ RML-96	Maximum	Minimum	Mean
January	2.4	2.6	5.9	6.5	23.5	8.8	16.1
February	3.4	0.3	10.0	11.0	25.4	13.0	19.2

Month	Score (1-9)		Plant damage (%)		Temperature (°C)		
	ZM401	RML-86/ RML-96	ZM401	RML-86/ RML-96	Maximum	Minimum	Mean
March	3.4	2.6	15.6	12.8	30.0	16.4	23.2
April	3.4	2.0	9.9	9.4	32.9	22.5	27.7
May	5.4	5.5	58.8	52.3	36.2	25.1	30.6
June	4.5	5.1	37.0	45.8	36.1	27.1	31.6
July	4.4	4.6	33.9	35.4	33.2	26.2	29.7
August	3.4	3.1	18.8	14.3	35.4	26.6	31.0
September	6.5	6.1	61.7	55.0	29.6	23.4	26.5
October	5.4	4.9	50.1	39.0	31.4	22.1	26.7
November	3.0	3.5	13.2	14.6	28.7	17.4	23.0
December	2.3	2.4	5.7	5.8	22.8	10.6	16.7
Mean	3.9	3.5	26.7	25.1	30.4	19.9	25.2
DTS	1.2	1.7	20.8	18.8	4.7	6.5	5.6
SE±	0.3	0.5	6	5.4	1.3	1.9	1.6

2.4.4.4 Eco-friendly management of stem borer complex on maize

For the evaluation of eco-friendly management practices against stem borer complex, the study result revealed that the lower % damage (4.84) with highest crop yield (4.80t/ha) was observed in plot sprayed with Spinosad 45%SC @ 0.5 ml/liter followed by released of egg parasitoids; *Trichogramma chilonis* @ 100000 eggs/ha which recorded 11.1% damage in leaf with 4.49t/ha grain yield.

The lowest maize grain damage (1.02%) was observed in the treatment of bojho rhizome dust @ 10 g/kg of seed followed by 8 gm/kg seed (2.3%) and @ 6g/kg seeds having (3.40%) respectively after 6 month in storage condition. Similarly, the germination percentage was not loss by using the celphos i.e. 4th time application. The lowest grain damage (1.54%) with higher germination percentage (91.0%) was observed after fourth application of celphos in monthly interval.

Conclusion

We concluded that fall armyworm can survive throughout the year in Chitwan condition if the host plants are available. The study clearly indicated that Spinosad 45% SC, Spinetoram 11.7% SC, Chlorantraniliprole 18.5% SC and Novaluron 10% EC were found effective for the management of fall armyworm applied three times in 10 days interval. None of the genotypes were identified toward tolerant/resistant level against fall armyworm in natural field condition however, few genotypes were found less susceptible against fall armyworm. In habitat management, Napier and desmodium grass intercropping with maize was found effective against fall armyworm as compare to sole maize. Further verification study should be necessary for its validation. For the management

of fall armyworm by using bio-control agents, now, we have been rearing of *T. chilonis* in our laboratory in mass scale and will be tested in field level for evaluation of its efficacy in coming year.

2.5 Plant pathology

2.5.1 Monitoring of major diseases in maize

Maize disease monitoring was done during different stages of the crop. In winter, NARC stations in terai and seed companies were visited to observe status of diseases. Disease monitoring in the hill stations couldn't be accomplished due to COVID threats. Detail of the disease survey and the observations are presented in the table 102.

Table 102: Monitoring of major diseases in maize during 2020/21

SN	Date	Location	Variety	Growth stage	Maize Disease/ Status	Disease score (1-5)
1	30-Sep-20	Kiratanpur, Madi	ZM401	Stem elongation	Northern leaf blight	1.2
2	30-Sep-20	Kiratanpur, Madi	S07F16	Stem elongation	Northern leaf blight	1
3	04-Nov-20	NMRP, Rampur	Inbred line trial	Knee height stage	Northern leaf blight	2.5
4	10-Nov-20	Shivanagar, Chitawan	RML-150	Knee height stage	Fusarium Seed rot	
5	07-Jan-21	Madi, Chitwan	RML-18	Tasseling stage	Northern leaf blight	1.2
6	25-Jan	Bara Dumarabana	unidentified	Tasseling stage	Disease free	1
7	27-Jan-21	Maharanijhoda, Jhapa	RML 18	Knee height stage	Disease free	1
8	16-Feb-21	Dhangadhi	RML 150	Seedling stage	Disease free	1
9	16-Feb-21	Dhangadhi	RML 18	Seedling stage	Disease free	1
10	17-Feb-21	Nepalgunj	RML 18	Seedling stage	Disease free	
11	18-Feb-21	Dang	RML 150	Stem elongation	Disease free	
12	19-Feb-21	Bhairahawa	RML 150	Stem elongation	Disease free	
13	19-Feb-21	Bhairahawa	RML 18	Stem elongation	Disease free	
14	21-Apr	Nepalgunj	MNCH	Milk filling stage	Physoderma leaf spot	1.2
15	07-Jun-21	Baradhi, Tanhun	RH-10	Milk filling stage	Disease free	
16	20-Jun-21	Sundarbazar, Lamjung	unidentified	Milk filling stage	SLB	2.5
17	15-Jul-21	NMRP, Rampur	Inbred line trial	Milk filling stage	SLB	3
18	24-Jul-21	NMRP, Rampur	Inbred line trial	Dough stage	BLSB	4
19	10-Sep-21	NMRP, Rampur	Inbred line trial	Dough stage	Stalk rot	3 (1-9 Scale)

2.5.2 Evaluation of maize genotypes for northern leaf blight resistance

Northern or turcicum leaf blight caused by *Exserohilum turcicum* is one of the major maize diseases of summer season maize in hills and winter season maize in plain and valley of terai. Screening of maize genotypes against this disease was carried out in winter of 2020/21 at NMRP Rampur.

Methodology

The experiment was carried out in non replicated rod row design. 125 different maize genotypes received from NMRP breeding department were allocated in two rows of four meter plot. One of the popular open pollinated maize variety Rampur composites and recently released hybrid Rampur hybrid-10 were included in the trial as a check variety. In each plot, 10 randomly selected plants were used as a sample plant to observe required parameters. Local race of turcicum inoculum was multiplied in NMRP laboratory and mass culture was done in sorghum. Artificial inoculation was done by whorl placement method 45 days after sowing. Other agronomic management practices were followed as per recommendation.

For scoring disease, all the leaves on infected plants were scored using 0-5 scale adopted by maize pathology unit CIMMYT (2004) and disease reaction class were defined based on the scale.

Disease rating number	Disease symptoms	Disease reaction /susceptibility class
0	no visible lesion	Immune
2	Moderate number of lesions on leaves covering 11-25% leaf area	Moderately resistant
3	Abundant lesions on lower leaves, few on other leaves covering 26-50% leaf area	Moderately susceptible
4	lesions abundant on lower and mid leaves, extending to upper leaves covering 51-75% leaf area	Susceptible
5	lesions abundant on almost all leaf, plant prematurely dried with 76-100% leaf area covered	Highly susceptible

Disease rating was started just after first symptom appeared after inoculation. Water spray was conducted in every evening after inoculation for 7 days to favor disease development. Disease rating was done 6 times over a growing season in each randomly tagged plant. Each rating score was used to calculate disease severity of that particular date and all the disease severity scores were used in calculating AUDPC.

Results

Number of lesions on leaf

Number of lesions on leaf ranged from 1-13 with average value 2. Maximum value was 13 for Pop corn budhokande 2 followed by ID-8007® (9) and RML-145(8) whereas least value (1) was observed on 23 genotypes viz. RL-133, RL-150, RL-165, RL-215, RL-229, RL-232, RL-238, RL-281-1, RL-30-3, RL-269, RML-142, RML-62, RML-68-2, RML-93, RML-97-2, Pop-corn-madhyapahad, Pop corn lumle-1, Pop corn Y+W(Y), Australian-1-sanodana, Rampur composite, RL-217, Pop-corn-Gorkha-3, RML-37 and RML-84. Details are presented in the table 103.

Lesion length

Average lesion length value was 7 cm among 125 tested genotypes.Maximum lesion length value was 14 cm in Pop duplicaiton followed by 6 other genotypes having value 12. Miniumum lesion length was observed on RL-165 (2 cm) followed by RML-83, RL-215, RML-11-1, RL-84, RL-202 and RML-62 with value of 3 cm. Details are presented in the table 103.

Number of infected leaves per plant

Among 125 tested genotypes, 10 genotypes Rampur composite, Pop-corn-Y+W(Y), RL-232, RL-265, RH-10, RML-142, RL-36, Pop corn Lumle-1, Australian-1-sanodana and RL-281-1 were infected on only one leaf. Maximum number of leaves was infected on RML-85 (8) and RL-241 (8). Trial average for number of leaves infected per plant was 4. In 41 genotypes, five or more than five leaves were infected during the season. Details are presented in the table 103.

Leaf disease incidence (LDI)

Among all, 10% disease incidence was observed on Rampur composite followed by Pop corn Lumle (26%), RML-142 (29%) and RL-232 30%. Hundred percentage incidence was observed on more than 40 genotypes. Trial average of leaf disease incidence was 84%. Details are presented in the table 103.

Area under disease progress curve (AUDPC)

Mean AUDPC value was 866. Highest AUDPC value was of Pop corn budhokande2 (1750) and RL-290 (1750). 59 genotypes had AUDPC value above average whereas RML-62 (133), RL-232 (154) and Rampur composite (182) were top most resistant genotypes among all. Details are presented in the table 103.

2.5.3 Categorization of maize genotypes based on host response

Based on the average disease score of randomly selected 10 plants at dough stage, 11 genotypes were resistant with disease score value below 1 or below. Fifty-nine genotypes were found moderately resistant with score value below or equal to 2. Whereas 48 genotypes were moderately susceptible with score value less or equal to 3. Only 7 genotypes were found susceptible with score value more than 3. Details are presented in the table 103.

Table 103: Response of maize genotypes to northern leaf blight at NMRP, 2020/21

EN	Genotypes	DI %	ILP	NLL	LL (cm)	AUDPC	FDS	Host response
1	RL-100	100	2	3	5	420	1.2	Moderately resistant
2	RL-101	95	5	4	5	1624	2.8	Moderately susceptible
3	RL-105	93	5	2	12	749	1.5	Moderately resistant
4	RL-111	89	4	2	9	1036	2.2	Moderately susceptible
5	RL-133	57	2	1	6	448	1.2	Moderately resistant
6	RL-150	68	3	1	6	574	1.0	Resistant
7	RL-153	81	4	2	12	1190	2.6	Moderately susceptible
8	RL-165	91	3	1	2	336	1.2	Moderately resistant
9	RL-173	89	4	3	8	1078	2.0	Moderately resistant
10	RL-13	93	5	4	7	1421	2.9	Moderately susceptible
11	RL-180	92	3	2	11	847	1.7	Moderately resistant
12	RL-202	100	4	3	3	973	1.7	Moderately resistant
13	RL-21	78	2	2	4	840	1.6	Moderately resistant
14	RL-213	83	2	2	8	791	1.3	Moderately resistant
15	RL-215	75	2	1	3	448	1.2	Moderately resistant
16	RL-217	53	4	1	6	644	1.6	Moderately resistant
17	RL-221	80	3	3	8	1113	2.1	Moderately susceptible
18	RL-293	100	4	3	6	1547	2.7	Moderately susceptible
19	RL-229	76	3	1	11	301	1.1	Moderately resistant
20	RL-232	30	1	1	6	154	0.2	Resistant
21	RL-99	100	5	3	9	371	2.3	Moderately susceptible
22	RL-235	50	4	3	12	777	1.7	Moderately resistant
23	RL-236	83	3	5	7	609	1.3	Moderately resistant
24	RL-238	100	3	1	7	287	1.3	Moderately resistant
25	RL-239	100	4	3	9	1470	2.8	Moderately susceptible
26	RL-240	56	2	2	10	490	1.0	Resistant
27	RL-241	100	8	3	5	1484	3.0	Moderately susceptible
28	RL-242	100	6	3	8	903	2.5	Moderately susceptible
29	RL-243	81	4	2	5	455	1.3	Moderately resistant

EN	Genotypes	DI %	ILP	NLL	LL (cm)	AUDPC	FDS	Host response
30	RL-244	100	3	5	7	511	2.2	Moderately susceptible
31	RL-246	100	5	3	11	1169	2.3	Moderately susceptible
32	RL-248	80	3	3	6	1036	2.0	Moderately resistant
33	RL-249	87	4	4	10	1127	2.3	Moderately susceptible
34	RL-251	60	5	2	6	385	1.1	Moderately resistant
35	RL-265	71	1	3	10	546	0.8	Resistant
36	RL-270	100	2	2	8	693	1.6	Moderately resistant
37	RL-271	84	3	2	7	833	1.9	Moderately resistant
38	RL-272	100	5	2	6	1176	3.0	Moderately susceptible
39	RL-279	81	4	2	4	756	1.6	Moderately resistant
40	RL-280	100	5	2	4	1001	2.1	Moderately susceptible
41	RL-281-1	53	1	1	5	343	0.9	Resistant
42	RL-281-2	42	3	2	5	581	1.3	Moderately resistant
43	RL-283	100	6	4	6	1190	2.4	Moderately susceptible
44	RL-286	73	4	2	9	875	1.7	Moderately resistant
45	RL-288	71	3	3	6	658	1.4	Moderately resistant
46	RL-29	100	6	6	6	1197	2.9	Moderately susceptible
47	RL-290	97	7	2	6	1750	3.0	Moderately susceptible
48	RL-291	77	3	2	7	364	1.2	Moderately resistant
49	RL-294	96	6	4	8	1610	3.0	Moderately susceptible
50	RL-296	80	6	2	7	728	1.8	Moderately resistant
51	RL-297	100	7	2	10	1232	2.6	Moderately susceptible
52	RL-142-2	80	3	2	10	896	1.8	Moderately resistant
53	RL-30-3	83	2	1	5	252	1.3	Moderately resistant
54	RL-35-1	100	2	3	8	728	1.8	Moderately resistant
55	RL-36	72	1	3	4	504	1.2	Moderately resistant
56	RL-78	100	5	4	9	896	3.6	Susceptible
57	RL-84	83	4	3	3	1610	3.2	Susceptible
58	RL-94	100	4	2	8	875	2.7	Moderately susceptible
59	RML-107	100	4	2	6	616	2.0	Moderately resitant
60	RML-108	92	5	2	5	1092	2.6	Moderately susceptible
61	RML-11-1	89	3	2	3	1127	2.1	Moderately susceptible
62	RML-114	81	5	2	5	875	1.9	Moderately resistant
63	RML-115	79	4	2	11	707	1.9	Moderately resistant
64	RL-269	90	3	1	8	917	1.7	Moderately resistant
65	RML-138	93	6	3	7	1316	2.0	Moderately resitant
66	RML-140	100	4	2	7	868	2.6	Moderately susceptible
67	RML-142	29	1	1	4	308	1.0	Resistant

EN	Genotypes	DI %	ILP	NLL	LL (cm)	AUDPC	FDS	Host response
68	RML-144	100	4	4	11	1155	2.1	Moderately susceptible
69	RML-145	73	2	8	4	511	1.1	Moderately resistant
70	RML-146	83	3	2	12	959	2.1	Moderately susceptible
71	RML-147	85	5	3	7	994	2.0	Moderately resitant
72	RML-149	100	4	3	7	259	1.8	Moderately resistant
73	RML-150	67	3	2	8	448	1.4	Moderately resistant
74	RML-17	100	5	4	6	1155	1.9	Moderately resistant
75	RML-170	100	6	2	6	994	2.2	Moderately susceptible
76	RML-18	100	5	4	9	1414	2.8	Moderately susceptible
77	RML-188	92	3	2	8	721	1.7	Moderately resistant
78	RML-191	77	3	3	10	1582	2.6	Moderately susceptible
79	RML-2	93	4	2	7	847	2.3	Moderately susceptible
80	RML-37	78	3	1	11	532	1.2	Moderately resistant
81	RML-4	100	5	2	6	1085	1.9	Moderately resistant
82	RML-57	90	4	4	9	1603	3.1	Susceptible
83	RML-58	100	4	3	10	735	2.1	Moderately susceptible
84	RML-62	50	3	1	3	133	0.8	Resistant
85	RML-65	95	6	3	7	1183	3.1	Susceptible
86	RML-68-1	100	6	2	9	728	1.8	Moderately resistant
87	RML-68-2	88	4	1	7	721	2.3	Moderately susceptible
88	RML-76	52	2	2	7	679	1.5	Moderately resistant
89	RML-83	80	2	2	3	294	1.6	Moderately resistant
90	RML-84	91	3	1	4	889	1.9	Moderately resistant
91	RML-85	97	8	2	11	1218	3.0	Moderately susceptible
92	RML-86	100	3	2	9	301	2.3	Moderately susceptible
93	RML-87	94	6	6	7	1512	2.8	Moderately susceptible
94	RML-88	88	4	2	6	721	1.9	Moderately resistant
95	RML-89	75	3	2	9	406	1.5	Moderately resistant
96	RML-93	93	4	1	6	595	1.1	Moderately resistant
97	RML-94	100	6	3	6	1547	3.1	Susceptible
98	RML-95	58	2	2	7	560	1.4	Moderately resistant
99	RML-96	100	4	4	12	714	1.8	Moderately resistant
100	RML-97-1	100	7	3	6	1512	3.4	Susceptible
101	RML-97-2	88	4	1	11	476	1.3	Moderately resistant
102	RML-98	100	6	4	9	1575	2.9	Moderately susceptible
103	Pop-corn-2	90	5	3	12	1253	2.9	Moderately susceptible
104	Pop corn lumle	100	2	2	7	903	2.1	Moderately susceptible
105	Pop-corn-Gorkha-3	67	3	1	7	448	1.4	Moderately resistant

EN	Genotypes	DI %	ILP	NLL	LL (cm)	AUDPC	FDS	Host response
106	Pop-corn-Y+W(W)	100	5	3	7	742	3.2	Susceptible
107	Pop-corn-budhokande	89	6	2	5	1456	2.6	Moderately susceptible
108	Pop corn lumle-pahelo	88	5	2	9	1456	2.6	Moderately susceptible
109	Pop-corn-madhyapahad	70	2	1	5	595	1.1	Moderately resistant
110	Pop-duplicaiton	59	2	2	14	763	1.7	Moderately resistant
111	Pop corn lumle-1	26	1	1	4	413	0.5	Resistant
112	Pop-corn-Y+W(Y)	46	1	1	5	273	0.7	Resistant
113	Australian-1-sanodana	67	1	1	9	406	0.8	Resistant
114	Madhyapahad-ratokande	100	4	2	7	574	2.5	Moderately susceptible
115	Australian-thulodana(W)	74	5	3	9	1204	2.4	Moderately susceptible
116	Pop45/pool-17	83	4	2	5	791	1.5	Moderately resistant
117	Pop corn budhokande 2	100	7	13	6	1750	3.0	Moderately susceptible
118	ID-8002(w)	90	4	2	10	777	1.5	Moderately resistant
119	ID-7147(w)	90	3	2	8	945	2.3	Moderately susceptible
120	ID-8007®	91	5	9	11	1484	2.6	Moderately susceptible
121	ID-8004Y®	100	6	4	5	1204	2.6	Moderately susceptible
122	ID-7964(Y)	100	6	4	10	1484	2.8	Moderately susceptible
123	ID-8007YR®	84	3	2	8	1113	2.3	Moderately susceptible
124	RH-10	31	1	2	7	574	1.4	Moderately resistant
125	Rampur composite	10	1	1	4	182	0.6	Resistant
	Average	84	4	2	7	866	2.0	
	Maximum	100	8	13	14	1750	3.6	
	Minimum	10	1	1	2	133	0.2	

2.5.4 Response of maize hybrids tested against stalk rot at Surkhet during 2020/21

Thirty-two maize hybrids were tested to assess stalk rot resistance in field condition at surkhet during summer of 2077/78. Disease rating was done in 0-5 scale. Trial average for disease score was 0.9. Disease incidence was low during the season. Most of the hybrids were found least affected by the disease. Among all, RML-191/CML-444, RML-150/RL-105, RML-117/RL-111, RML-191/RML-18, RML-150/RML-96 and RL-294/RML-170 were found immune whereas RML-84/RL-105, RML-97-2/RL-105, RML-88/RML-18 and RML-84/RML-96 were moderately susceptible to stalk rot. Other details are presented in the the Table 104

Table 104: Response of maize hybrids to stalk rot at field condition in surkhet during 2020/21

SN	Genotypes	DTT	DTS	PHT (cm)	EHT (cm)	G (t/ha)	Stalk Rot score (0-9)
1	RML-191/CML-444	52	55	226	120	3.0	0
2	RML-150/RL-101	55	59	209	106	4.5	0.5
3	RL-107/RL-101	54	56	200	101	3.2	0.5
4	RML-84/RL-105	54	58	192	86	1.3	2
5	RL-153/RL-105	56	59	198	102	5.8	0.5
6	RL-242/RL-105	53	56	204	91	5.6	0.5
7	RML-9/RL-105	56	60	189	78	2.6	0.5
8	RML-98/RL-105	54	57	197	87	4.8	1
9	RL-94/RL-105	52	56	185	102	3.7	1.5
10	RML-150/RL-105	54	54	208	105	4.5	0
11	RML-97-2/RL-105	55	59	179	82	2.6	2
12	RML-117/RL-111	53	57	206	105	5.3	0
13	RL-208/RL-174	52	56	192	86	3.6	0.5
14	RML-145/RL-298	52	56	220	109	3.4	0.5
15	RML-94/RL-298	54	58	195	89	4.3	1
16	RL-94/RML-2	54	57	195	100	1.8	1
17	RML-139/RML-17	54	57	175	90	3.2	1.5
18	RML-981/RML-17	51	54	190	91	5.6	1.5
19	RML-12/RL-17	50	54	178	92	2.6	0.5
20	RL-94/RML-17	53	55	170	94	4.0	0.5
21	RML-191/RML-18	52	55	206	96	4.1	0
22	RL-288/RML-18	52	56	183	79	4.4	0.5
23	RML-88/RML-18	54	56	185	81	2.6	2
24	RL-280/RML-96	54	57	205	91	3.1	0.5
25	RML-150/RML-96	53	56	206	96	3.5	0
26	RML-249/RML-96	52	55	185	76	3.2	1.5
27	RML-84/RML-96	53	57	196	88	4.8	3
28	RL-100/RML-140	54	57	169	83	4.7	1.5
29	RML-85/RML-146	53	57	211	100	3.7	1.5
30	RL-294/RML-170	54	56	192	89	3.0	0
31	RH 10	51	55	161	84	3.4	1
32	Rajkumar	53	57	195	89	3.6	1.5
Mean		53	56	194	92	3.7	0.9
F-test		ns	ns	*	**	**	
LSD (0.05)		3.9	3.6	24.9	15.9	1.54	
CV%		3.6	3.1	6.3	8.4	20.4	

2.5.5 Evaluation of wheat advance lines for foliar blight (spot blotch complex) and leaf rust resistance in National wheat disease screening nursery (NWDSN)

Altogether 658 wheat genotypes received from National Wheat Research Program (NWRP) were evaluated for foliar blight resistance at National Maize Research Program (NMRP) experimental block in natural epiPHTytotic condition. Each entry was allocated in two rows of one meter long at 25 cm spacing. Susceptible line Morocco was placed in 20 intervals. Whole experimental block was surrounded by susceptible mixture of Morocco and agra local to provide equal distribution of the inoculums. All the recommended agronomic practices were followed for optimum growth of the crop. Nitrogen was applied in two split dose once during tillering and next in booting stage to facilitate susceptibility of the host.

Disease recording was started after anthesis. Double digit scoring scale (00 to 99) developed as a modification of Saari and Prescott's scale for assessing severity of foliar disease of wheat (Saari *et al*., 1975). The first digit (D1) indicates disease progress in caNoPy height from the ground level and the econd digit (D2) refers to severity measured based on diseased leaf area. Both D1 and D2 are scored on a scale of 1 to 9. Four scoring were done at the interval of 7 days. For each valuation, percent disease severity was estimated based on the formula. Disease severity (%) = (D1/9) × (D2/9) ×100. The area under disease progress curve (AUDPC) was calculated by summarizing the progress of disease severity.

Results:

Area under disease progress curve (AUDPC) for foliar blight

There was mixed type of the results from different trial sources in terms of disease resistance. Average AUDPC value for the trial was 326. Highest AUDPC was 806 on WVD 12 (Siddhartha) variety whereas least value was observed on NAL65 (122). Susceptible line Morocco was repeated 36 times in the experiment. Average AUDPC value of the Morocco was 320. Three hundred fourty seven varieties had AUDPC value below trial average. Details are presented in the table 105.

Wheat genotype responses to leaf rust in natural epiphytes

Rust scoring was done when 40% incidence was observed on susceptible border. 551 genotypes showed immune response in natural epiphytotic condition at NMRP. However, 100 % severity was observed in Morocco. Old wheat varieties were found highly susceptible having rust score above 80. Details are presented in the table 105.

Table 105: Response of wheat genotypes to spot blotch complex and leaf rust

EN	Genotypes	DTH	DTM	PHT(cm)	GY (g) /0.5m^2	SB	LR	Rust response
1	CVT BWY 1	73	115	104	106	291	0	
2	CVT BWYT 10	77	115	85	112	269	0	
3	CVT BWYT 11	76	115	85	98	381	0	
4	CVT BWYT 12	76	115	88	114	225	0	
5	CVT BWYT 13	75	115	88	112	308	0	
6	CVT BWYT 14	73	115	90	120	377	0	
7	CVT BWYT 15	74	115	90	172	204	0	
8	CVT BWYT 16	75	119	94	156	182	10	MR
9	CVT BWYT 17	76	119	86	204	174	0	
10	CVT BWYT 18	74	115	86	178	524	0	
11	CVT BWYT 2	77	117	113	148	420	0	
12	CVT BWYT 3	75	117	88	164	489	0	
13	CVT BWYT 4	74	114	88	118	494	0	
14	CVT BWYT 5	76	114	87	144	415	0	
15	CVT BWYT 6	75	115	86	146	230	0	
16	CVT BWYT 7	75	114	87	88	420	0	
17	CVT BWYT 8	78	114	84	88	446	0	
18	CVT BWYT 9	78	117	84	74	300	0	
19	CVT -TTL 1	78	120	94	74	235	0	
20	CVT- TTL 2	75	121	119	185	182	10	MR
21	CVT-HS 1	74	121	89	174	303	0	
22	CVT-HS 10	79	121	79	134	303	0	
23	CVT-HS 11	79	115	85	112	322	0	
24	CVT-HS 12	80	118	84	184	381	0	
25	CVT-HS 13	75	114	92	188	382	0	
26	CVT-HS 14	74	114	88	204	230	30	MS
27	CVT-HS 15	73	115	90	254	290	0	
28	CVT-HS 16	74	115	85	174	411	0	
29	CVT-HS 17	74	115	82	168	382	0	
30	CVT-HS 18	74	115	86	150	192	0	
31	CVT-HS 2	75	120	98	162	191	0	
32	CVT-HS 3	73	117	116	178	355	0	
33	CVT-HS 4	73	117	87	216	225	0	
34	CVT-HS 5	78	117	86	210	299	0	
35	CVT-HS 6	74	117	85	210	338	0	

EN	Genotypes	DTH	DTM	PHT(cm)	GY (g) /0.5m^2	SB	LR	Rust response
36	CVT-HS 7	75	117	91	202	338	0	
37	CVT-HS 8	72	115	92	190	459	0	
38	CVT-HS 9	75	115	92	178	408	0	
39	CVT-MHH 1	75	115	98	138	507	20	MR
40	CVT-MHH 10	72	115	84	148	450	0	
41	CVT-MHH 11	77	114	84	180	342	0	
42	CVT-MHH 12	76	115	91	240	399	0	
43	CVT-MHH 13	74	115	76	206	191	0	
44	CVT-MHH 14	75	116	87	214	407	0	
45	CVT-MHH 15	75	116	80	320	494	0	
46	CVT-MHH 16	75	116	76	108	191	0	
47	CVT-MHH 17	75	115	88	176	264	0	
48	CVT-MHH 18	72	116	91	278	243	0	
49	CVT-MHH 19	74	115	92	206	243	0	
50	CVT-MHH 2	75	115	87	120	278	0	
51	CVT-MHH 20	72	115	91	190	191	0	
52	CVT-MHH 21	74	115	81	164	338	0	
53	CVT-MHH 22	75	114	81	172	321	0	
54	CVT-MHH 3	76	115	89	134	394	0	
55	CVT-MHH 4	76	116	83	184	286	0	
56	CVT-MHH 5	69	114	87	160	407	0	
57	CVT-MHH 6	75	114	80	132	395	0	
58	CVT-MHH 7	73	114	83	154	416	0	
59	CVT-MHH 8	77	115	88	192	295	0	
60	CVT-MHH 9	76	115	88	104	373	0	
61	CVT-TTL 10	76	119	87	192	412	0	
62	CVT-TTL 11	73	115	87	150	307	0	
63	CVT-TTL 12	76	115	89	194	173	0	
64	CVT-TTL 13	76	120	83	122	252	0	
65	CVT-TTL 14	71	114	90	180	490	0	
66	CVT-TTL 15	71	114	79	196	517	0	
67	CVT-TTL 16	80	120	93	150	251	0	
68	CVT-TTL 17	75	114	84	214	281	0	
69	CVT-TTL 18	76	114	84	144	468	0	
70	CVT-TTL 19	76	115	91	164	338	0	
71	CVT-TTL 20	75	115	85	168	338	0	
72	CVT-TTL 21	79	120	96	138	225	0	

EN	Genotypes	DTH	DTM	PHT(cm)	GY (g) /0.5m^2	SB	LR	Rust response
73	CVT-TTL 3	76	115	88	148	377	0	
74	CVT-TTL 4	75	117	88	240	286	0	
75	CVT-TTL 5	74	114	95	184	368	0	
76	CVT-TTL 6	74	115	91	162	451	0	
77	CVT-TTL 7	73	115	92	174	221	0	
78	CVT-TTL 8	75	118	92	150	182	0	
79	CVT-TTL 9	76	115	93	172	260	0	
80	IET-MHH 1	77	119	97	186	299	0	
81	IET-MHH 10	77	117	85	170	593	0	
82	IET-MHH 11	77	117	86	188	303	0	
83	IET-MHH 12	79	118	86	150	299	0	
84	IET-MHH 13	74	115	85	156	338	0	
85	IET-MHH 14	75	115	88	222	484	0	
86	IET-MHH 15	76	121	87	128	356	0	
87	IET-MHH 16	76	115	80	158	308	0	
88	IET-MHH 2	78	115	84	104	260	0	
89	IET-MHH 3	77	115	85	122	338	0	
90	IET-MHH 4	76	115	97	212	316	0	
91	IET-MHH 5	76	115	94	244	281	0	
92	IET-MHH 6	77	118	90	144	173	0	
93	IET-MHH 7	75	120	92	206	269	0	
94	IET-MHH 8	74	117	83	164	472	0	
95	IET-MHH 9	78	117	84	196	329	0	
96	IET-MHH17	79	121	74	157	183	0	
97	IET-MHH18	78	118	79	230	299	0	
98	IET-MHH19	77	117	79	220	235	0	
99	IET-MHH20	79	119	90	202	243	0	
100	IET-MHH21	77	115	86	172	446	0	
101	IET-MHH22	80	118	90	184	299	0	
102	IET-MHH23	68	115	84	196	550	0	
103	IET-MHH24	72	115	84	167	338	0	
104	IET-MHH25	70	115	83	146	230	0	
105	IET-MHH26	77	115	80	150	312	0	
106	IET-MHH27	78	115	86	168	377	0	
107	IET-MHH28	81	115	92	138	299	0	
108	IET-MHH29	81	117	93	170	338	30	MS
109	IET-MHH30	79	117	86	162	507	0	

EN	Genotypes	DTH	DTM	PHT(cm)	GY (g) /0.5m^2	SB	LR	Rust response
110	IET-MHH31	80	117	83	172	342	0	
111	IET-MHH32	68	115	108	200	408	30	MRMS
112	IET-MHH33	66	115	90	152	533	30	MRMS
113	IET-MHH34	77	115	89	160	455	0	
114	IET-MHH35	70	117	98	100	355	60	S
115	IET-MHH36	76	115	89	160	429	40	MRMS
116	IET-TTL 1	81	120	85	84	300	60	S
117	IET-TTL 10	72	114	95	190	307	0	
118	IET-TTL 11	74	114	90	154	299	0	
119	IET-TTL 12	74	114	86	178	381	0	
120	IET-TTL 13	73	114	88	174	420	0	
121	IET-TTL 14	73	114	91	204	191	0	
122	IET-TTL 15	74	114	90	206	420	0	
123	IET-TTL 16	76	115	83	158	221	0	
124	IET-TTL 17	76	114	87	132	299	0	
125	IET-TTL 18	73	114	87	168	321	0	
126	IET-TTL 19	74	114	89	156	382	0	
127	IET-TTL 2	75	115	99	230	212	0	
128	IET-TTL 20	75	114	93	198	447	0	
129	IET-TTL 21	74	114	93	172	300	0	
130	IET-TTL 22	76	115	90	190	191	0	
131	IET-TTL 23	73	114	89	130	338	0	
132	IET-TTL 24	73	118	90	182	368	0	
133	IET-TTL 25	77	118	86	168	342	0	
134	IET-TTL 26	79	117	90	216	489	0	
135	IET-TTL 27	76	117	91	242	416	0	
136	IET-TTL 28	75	115	90	202	260	0	
137	IET-TTL 29	74	115	87	182	230	0	
138	IET-TTL 3	76	115	88	98	299	0	
139	IET-TTL 30	74	115	79	136	191	0	
140	IET-TTL 31	74	114	88	186	300	0	
141	IET-TTL 32	76	114	89	190	261	0	
142	IET-TTL 33	76	114	90	202	299	0	
143	IET-TTL 34	76	114	89	222	182	0	
144	IET-TTL 4	78	115	96	194	191	20	MR
145	IET-TTL 5	76	115	93	170	273	10	MR
146	IET-TTL 6	76	116	89	148	199	10	MR

EN	Genotypes	DTH	DTM	PHT(cm)	GY (g) /0.5m^2	SB	LR	Rust response
147	IET-TTL 7	79	116	87	166	313	0	
148	IET-TTL 8	71	114	86	204	446	0	
149	IET-TTL 9	70	114	89	144	304	30	MS
150	NAL 370	74	114	89	122	270	0	
151	NAL 371	75	114	86	162	459	0	
152	NAL 372	74	115	86	198	416	0	
153	NAL 373	75	115	81	168	230	0	
154	NAL 374	76	115	83	180	191	0	
155	NAL 375	76	115	82	150	400	0	
156	NAL 376	75	115	85	164	454	0	
157	NAL 377	74	121	89	156	174	0	
158	NAL 378	76	119	82	98	226	0	
159	NAL 379	76	114	83	160	230	0	
160	NAL 381	75	114	86	192	290	0	
161	NAL 381	75	115	88	162	507	0	
162	NAL 382	74	115	84	172	269	0	
163	NAL1	72	121	112	120	352	20	MRMS
164	NAL10	77	116	87	214	212	30	MSS
165	NAL101	77	115	98	276	338	0	
166	NAL102	78	115	88	256	407	0	
167	NAL103	79	118	85	140	381	0	
168	NAL104	80	119	89	168	269	0	
169	NAL105	80	115	93	268	304	0	
170	NAL106	78	113	89	248	286	0	
171	NAL107	77	117	84	182	260	0	
172	NAL108	74	117	89	170	291	0	
173	NAL109	77	117	92	170	338	0	
174	NAL11	77	115	91	205	320	0	TR
175	NAL110	78	119	93	178	451	0	
176	NAL111	77	116	92	218	199	0	
177	NAL112	76	115	90	188	320	0	
178	NAL113	74	115	90	230	407	0	
179	NAL114	78	118	84	186	213	0	
180	NAL115	81	120	88	168	173	0	
181	NAL116	80	115	86	204	282	0	
182	NAL117	76	117	93	252	182	0	
183	NAL118	78	117	83	194	338	0	

EN	Genotypes	DTH	DTM	PHT(cm)	GY (g) /0.5m^2	SB	LR	Rust response
184	NAL119	77	119	93	180	320	0	
185	NAL12	77	115	89	194	338	0	
186	NAL121	81	122	96	142	217	0	
187	NAL122	77	115	88	246	446	0	
188	NAL123	78	115	81	230	390	0	
189	NAL124	77	117	83	234	230	0	
190	NAL125	74	116	90	260	413	0	
191	NAL126	80	119	87	190	343	0	
192	NAL127	82	121	79	178	338	0	
193	NAL128	81	121	85	160	300	0	
194	NAL129	77	115	87	228	438	0	
195	NAL13	79	116	84	174	762	0	
196	NAL130	78	115	86	200	269	0	
197	NAL131	81	121	85	205	182	0	
198	NAL132	76	116	88	156	438	0	
199	NAL133	77	117	88	176	459	0	
200	NAL134	77	117	84	196	308	0	
201	NAL135	77	115	93	194	308	0	
202	NAL136	77	115	86	180	529	0	
203	NAL137	76	119	87	198	173	0	
204	NAL138	78	117	85	160	339	0	
205	NAL139	76	117	88	176	377	0	
206	NAL14	78	116	90	215	511	5	MR
207	NAL141	77	115	85	134	213	0	
208	NAL142	79	115	89	176	295	0	
209	NAL142	69	115	87	210	368	0	
210	NAL143	74	116	81	198	213	0	
211	NAL143	74	115	86	205	260	0	
212	NAL144	77	116	81	128	191	0	
213	NAL144	74	115	84	158	450	0	
214	NAL145	76	115	84	178	343	0	
215	NAL145	77	115	84	190	412	0	
216	NAL146	77	115	80	164	173	0	
217	NAL146	77	115	83	122	217	0	
218	NAL147	76	115	83	206	338	0	
219	NAL147	77	115	90	140	447	0	
220	NAL148	76	116	88	196	307	0	

EN	Genotypes	DTH	DTM	PHT(cm)	GY (g) /0.5m^2	SB	LR	Rust response
221	NAL148	74	115	88	214	446	0	
222	NAL149	79	117	120	130	204	0	
223	NAL149	75	117	89	218	299	0	
224	NAL15	79	118	96	215	515	0	
225	NAL150	77	117	83	242	182	0	
226	NAL150	77	117	79	214	304	0	
227	NAL151	74	115	80	220	300	0	
228	NAL151	75	116	77	150	451	0	
229	NAL152	76	117	85	206	320	0	
230	NAL152	75	116	81	162	381	0	
231	NAL153	76	117	92	200	299	0	
232	NAL153	75	117	83	214	468	0	
233	NAL154	73	115	76	246	191	0	
234	NAL154	77	117	90	194	212	0	
235	NAL155	74	115	92	186	234	0	
236	NAL155	75	115	78	190	299	0	
237	NAL156	78	115	86	190	239	0	
238	NAL156	77	118	77	192	269	0	
239	NAL157	74	117	87	190	192	0	
240	NAL157	76	115	80	180	389	0	
241	NAL158	75	115	73	176	260	0	
242	NAL158	77	115	80	170	407	0	
243	NAL159	73	115	84	248	282	0	
244	NAL159	76	115	78	148	299	0	
245	NAL16	78	117	87	192	589	0	
246	NAL161	75	115	58	206	368	0	
247	NAL162	77	115	85	124	313	0	
248	NAL163	78	115	89	156	230	0	
249	NAL164	77	115	83	150	235	0	
250	NAL165	74	116	85	174	394	0	
251	NAL166	80	119	79	150	260	0	
252	NAL167	77	120	84	202	217	0	
253	NAL168	76	121	82	170	273	0	
254	NAL169	77	115	88	174	347	0	
255	NAL17	78	115	96	160	637	10	MR
256	NAL170	78	119	79	152	217	0	
257	NAL171	78	117	83	126	411	0	

EN	Genotypes	DTH	DTM	PHT(cm)	GY (g) /0.5m^2	SB	LR	Rust response
258	NAL172	77	117	83	156	191	0	
259	NAL173	76	117	83	184	342	0	
260	NAL174	78	115	86	130	230	0	
261	NAL175	75	115	84	154	338	0	
262	NAL176	77	117	81	158	429	0	
263	NAL177	78	117	84	176	243	0	
264	NAL178	77	115	80	134	377	0	
265	NAL179	78	115	82	136	467	0	
266	NAL18	77	115	80	235	468	60	MSS
267	NAL181	80	115	83	152	251	0	
268	NAL182	76	115	79	154	308	0	
269	NAL183	75	116	92	164	269	0	
270	NAL184	74	117	93	208	243	0	
271	NAL185	77	117	89	194	243	0	
272	NAL186	77	120	87	224	372	0	
273	NAL187	78	116	83	160	281	0	
274	NAL188	80	120	71	320	320	0	
275	NAL189	79	120	75	322	385	0	
276	NAL19	79	115	95	208	212	60	S
277	NAL190	78	120	89	278	281	0	
278	NAL191	76	115	81	254	421	0	
279	NAL192	77	115	86	190	428	0	
280	NAL193	77	115	93	195	489	0	
281	NAL194	80	115	70	130	468	0	
282	NAL195	79	117	81	172	593	0	
283	NAL196	78	117	78	180	182	0	
284	NAL197	76	120	88	166	230	0	
285	NAL198	80	115	82	142	165	0	
286	NAL199	74	121	79	194	308	0	
287	NAL2	76	121	87	230	389	0	
288	NAL201	77	121	78	220	173	0	
289	NAL202	78	121	81	204	294	0	
290	NAL203	78	115	87	174	312	0	
291	NAL204	79	121	77	198	343	0	
292	NAL205	80	115	79	200	165	0	
293	NAL206	76	115	78	138	268	10	MR
294	NAL207	77	115	84	148	252	30	MS

EN	Genotypes	DTH	DTM	PHT(cm)	GY (g) /0.5m^2	SB	LR	Rust response
295	NAL208	70	117	84	160	438	0	
296	NAL209	76	116	84	194	338	0	
297	NAL21	77	117	83	200	351	20	MRMS
298	NAL21	76	115	84	182	338	0	
299	NAL210	78	116	95	220	260	0	
300	NAL211	75	116	83	186	426	0	
301	NAL212	76	117	89	175	338	0	
302	NAL213	79	115	78	186	251	0	
303	NAL214	78	117	77	126	346	0	
304	NAL215	75	115	81	124	342	0	
305	NAL216	74	115	82	172	305	0	
306	NAL217	77	115	76	200	378	0	
307	NAL218	73	115	83	154	261	0	
308	NAL219	75	122	83	172	338	0	
309	NAL22	76	115	85	140	308	0	
310	NAL22	78	117	86	225	454	10	MR
311	NAL224	75	115	93	206	451	0	
312	NAL225	76	115	80	170	230	0	
313	NAL226	74	115	88	236	346	0	
314	NAL226	77	115	81	184	377	0	
315	NAL227	75	115	84	168	429	0	
316	NAL228	76	115	88	162	360	0	
317	NAL229	76	115	85	184	191	0	
318	NAL23	72	155	86	230	260	0	
319	NAL23	77	117	87	216	506	30	MS
320	NAL230	75	118	93	261	300	0	
321	NAL231	74	115	83	196	299	0	
322	NAL232	77	115	92	256	411	0	
323	NAL233	77	115	86	188	446	0	
324	NAL234	76	115	102	146	386	0	
325	NAL235	77	115	83	144	252	0	
326	NAL236	73	115	135	204	261	0	
327	NAL237	74	115	82	182	191	0	
328	NAL238	76	115	85	226	291	0	
329	NAL239	72	115	88	200	463	0	
330	NAL24	81	115	95	285	212	20	MR
331	NAL241	74	115	80	205	299	0	

EN	Genotypes	DTH	DTM	PHT(cm)	GY (g) /0.5m^2	SB	LR	Rust response
332	NAL25	78	115	90	180	260	60	MS
333	NAL26	77	115	89	220	351	0	MRMS
334	NAL261	76	115	77	200	234	0	
335	NAL262	74	115	77	158	260	0	
336	NAL263	75	115	73	122	381	0	
337	NAL264	73	115	84	162	230	0	
338	NAL265	75	115	83	166	260	0	
339	NAL266	77	115	81	172	290	0	
340	NAL267	77	115	78	152	260	0	
341	NAL268	76	119	84	124	173	0	
342	NAL269	74	120	77	170	312	0	
343	NAL27	78	118	89	190	173	40	MS
344	NAL270	72	115	78	182	420	0	
345	NAL271	72	115	85	174	420	0	
346	NAL272	76	115	86	158	230	0	
347	NAL273	72	115	83	214	377	0	
348	NAL274	77	119	80	194	152	0	
349	NAL275	77	115	76	98	152	0	
350	NAL276	76	119	81	202	308	0	
351	NAL277	76	118	79	170	230	0	
352	NAL278	75	120	82	280	225	0	
353	NAL279	75	115	89	348	381	0	
354	NAL28	77	115	93	192	281	30	MS
355	NAL281	76	115	87	192	299	0	
356	NAL282	75	115	85	164	381	0	
357	NAL283	74	116	79	166	342	0	
358	NAL284	75	115	86	130	446	0	
359	NAL285	81	115	78	168	183	0	
360	NAL286	80	115	84	134	286	0	
361	NAL287	75	121	81	200	182	0	
362	NAL288	76	117	84	142	251	0	
363	NAL289	75	115	81	120	286	0	
364	NAL29	78	117	109	272	299	0	
365	NAL290	74	115	84	152	321	0	
366	NAL291	74	118	85	164	173	0	
367	NAL292	79	118	85	198	412	0	
368	NAL293	79	115	84	199	407	0	

EN	Genotypes	DTH	DTM	PHT(cm)	GY (g) /0.5m^2	SB	LR	Rust response
369	NAL294	76	115	85	192	421	0	
370	NAL295	76	115	89	214	338	0	
371	NAL296	77	118	84	226	260	0	
372	NAL297	76	115	82	174	268	0	
373	NAL298	76	115	84	164	485	0	
374	NAL299	78	115	80	156	294	0	
375	NAL3	77	117	116	250	508	20	MRMS
376	NAL30	81	120	84	75	139	40	MR
377	NAL301	74	117	84	166	312	0	
378	NAL302	77	115	86	160	360	0	
379	NAL303	80	121	81	134	320	0	
380	NAL304	81	121	82	152	343	0	
381	NAL305	79	115	80	202	407	0	
382	NAL306	77	115	84	174	437	0	
383	NAL307	76	115	82	158	338	0	
384	NAL308	74	115	86	232	191	0	
385	NAL309	74	115	87	176	446	0	
386	NAL31	82	122	98	200	269	0	
387	NAL310	73	115	87	168	191	0	
388	NAL311	73	115	86	210	212	0	
389	NAL312	74	115	89	150	278	0	
390	NAL313	76	117	85	214	238	0	
391	NAL314	75	115	83	230	230	0	
392	NAL315	76	115	83	190	338	0	
393	NAL317	74	115	84	134	291	0	
394	NAL318	77	118	84	184	182	0	
395	NAL319	76	117	85	132	369	0	
396	NAL32	78	115	91	240	407	0	
397	NAL320	76	117	82	160	321	0	
398	NAL321	77	115	83	200	230	0	
399	NAL322	76	115	85	400	304	0	
400	NAL323	78	118	77	202	299	0	
401	NAL324	76	115	86	210	454	0	
402	NAL327	74	115	85	210	260	0	
403	NAL328	75	115	88	148	303	0	
404	NAL329	74	115	87	202	377	0	
405	NAL33	78	118	82	190	226	5	MR

EN	Genotypes	DTH	DTM	PHT(cm)	GY (g) /0.5m^2	SB	LR	Rust response
406	NAL330	73	115	85	180	433	0	
407	NAL331	76	115	83	152	338	0	
408	NAL332	76	115	83	148	260	0	
409	NAL333	75	116	87	178	191	0	
410	NAL334	76	116	85	138	261	0	
411	NAL335	74	115	87	146	299	0	
412	NAL336	74	116	85	120	191	0	
413	NAL337	75	115	82	158	342	0	
414	NAL338	76	115	84	166	260	0	
415	NAL339	75	115	90	172	338	0	
416	NAL34	77	122	90	188	226	0	
417	NAL341	72	115	88	204	338	0	
418	NAL342	74	115	89	204	494	0	
419	NAL343	76	115	92	188	226	0	
420	NAL344	77	115	83	150	299	0	
421	NAL345	74	115	86	164	269	0	
422	NAL346	77	116	84	194	408	0	
423	NAL347	77	115	83	156	330	0	
424	NAL348	74	115	88	196	472	0	
425	NAL349	75	115	83	168	252	0	
426	NAL35	77	122	93	155	377	0	
427	NAL350	77	116	81	190	360	0	
428	NAL351	77	116	81	186	183	0	
429	NAL352	73	116	84	172	338	0	
430	NAL353	74	115	85	176	446	0	
431	NAL354	74	115	78	152	191	0	
432	NAL355	74	115	74	180	338	0	
433	NAL356	75	117	87	176	230	0	
434	NAL357	76	115	83	152	191	0	
435	NAL358	76	115	79	222	173	0	
436	NAL359	75	115	83	180	550	0	
437	NAL36	76	115	99	240	191	0	
438	NAL361	79	115	80	186	225	0	
439	NAL362	76	115	93	172	386	0	
440	NAL363	76	116	83	200	355	0	
441	NAL364	75	116	87	188	472	0	
442	NAL365	77	116	85	180	368	0	

EN	Genotypes	DTH	DTM	PHT(cm)	GY (g) /0.5m^2	SB	LR	Rust response
443	NAL366	78	118	86	180	455	0	
444	NAL367	77	115	89	192	299	0	
445	NAL368	77	115	85	136	355	0	
446	NAL369	72	115	111	280	481	0	
447	NAL37	77	115	97	198	156	20	MS
448	NAL38	75	115	93	179	316	0	
449	NAL39	81	117	81	170	338	80	MR
450	NAL4	77	117	90	184	260	5	MR
451	NAL41	77	115	110	232	260	8	
452	NAL42	77	115	102	204	299	0	MR
453	NAL43	78	115	89	250	390	20	MS
454	NAL44	78	115	82	180	320	10	MR
455	NAL45	76	116	85	264	321	0	MSS
456	NAL46	76	116	81	176	243	5	S
457	NAL47	77	116	87	166	342	40	
458	NAL48	78	117	96	154	351	10	
459	NAL49	78	117	89	154	355	60	
460	NAL5	77	117	100	185	269	5	MR
461	NAL50	77	117	85	188	282	80	
462	NAL51	77	115	92	134	391	0	
463	NAL52	78	115	95	200	299	0	
464	NAL53	75	115	91	224	377	0	
465	NAL54	75	115	89	198	251	0	
466	NAL55	77	117	90	198	156	0	
467	NAL56	77	118	87	172	204	0	
468	NAL57	78	115	93	160	277	0	
469	NAL58	77	120	84	156	269	0	
470	NAL59	76	115	91	258	390	0	
471	NAL6	75	116	105	220	407	60	MSS
472	NAL61	78	115	87	182	368	0	
473	NAL62	80	118	84	200	191	0	
474	NAL63	80	118	81	190	243	0	
475	NAL64	81	116	83	164	174	0	
476	NAL65	80	117	88	170	122	0	
477	NAL66	77	115	73	216	234	0	
478	NAL67	78	115	82	204	139	0	
479	NAL68	76	117	84	166	157	0	

EN	Genotypes	DTH	DTM	PHT(cm)	GY (g) /0.5m^2	SB	LR	Rust response
480	NAL69	75	115	87	174	260	0	
481	NAL7	76	115	88	180	499	20	MRMS
482	NAL70	76	115	83	178	213	0	
483	NAL71	76	115	80	154	265	0	
484	NAL72	80	118	82	140	204	0	
485	NAL73	76	117	85	168	299	0	
486	NAL74	76	115	84	174	308	0	
487	NAL75	76	115	90	174	299	0	
488	NAL76	78	115	85	130	212	0	
489	NAL77	77	119	89	144	226	0	
490	NAL78	81	122	85	150	199	0	
491	NAL79	77	115	80	210	135	0	
492	NAL8	77	115	78	255	408	0	
493	NAL81	78	115	82	168	252	0	
494	NAL82	77	115	81	200	273	0	
495	NAL83	77	115	87	202	421	0	
496	NAL84	78	116	88	210	320	0	
497	NAL85	80	119	85	182	299	0	
498	NAL86	78	115	88	192	322	0	
499	NAL87	78	116	85	192	281	0	
500	NAL88	79	120	80	136	400	0	
501	NAL89	78	115	84	166	235	0	
502	NAL9	65	115	92	192	221	0	
503	NAL90	77	115	93	194	356	0	TR
504	NAL91	76	115	89	284	338	0	
505	NAL92	75	115	90	246	303	0	
506	NAL93	78	115	81	254	212	0	
507	NAL94	79	122	92	186	196	0	
508	NAL95	78	116	80	212	234	0	
509	NAL96	77	117	88	228	269	0	
510	NAL97	77	118	84	178	477	0	
511	NAL98	78	118	91	170	395	0	
512	NAL99	79	119	87	190	251	0	
513	NRN 1	81	120	105	204	390	80	S
514	NRN 10	78	119	104	158	303	5	MR
515	NRN 11	76	113	108	126	299	60	MS
516	NRN 12	75	113	108	120	443	0	TRY

EN	Genotypes	DTH	DTM	PHT(cm)	GY (g) /0.5m^2	SB	LR	Rust response
517	NRN 13	77	118	88	110	307	10	MR
518	NRN 14	81	117	90	150	320	90	S
519	NRN 15	76	117	90	142	338	5	MS
520	NRN 16	77	121	90	164	342	0	TR
521	NRN 17	76	115	102	176	299	0	TR
522	NRN 19	78	115	99	210	451	0	TR
523	NRN 21	78	119	105	178	512	40	MS
524	NRN 22	77	115	77	166	225	0	TR
525	NRN 23	79	115	87	140	342	0	TR
526	NRN 24	79	115	89	172	377	0	TR
527	NRN 25	77	117	95	170	322	5	MR
528	NRN 26	76	120	116	278	321	20	MRMS
529	NRN 27	75	117	83	180	329	10	MR
530	NRN 28	75	117	85	176	152	0	
531	NRN 29	79	117	87	156	330	0	
532	NRN 3	78	115	112	238	290	40	MS
533	NRN 30	77	117	87	200	286		TR
534	NRN 31	78	117	82	146	342	0	
535	NRN 32	81	118	85	218	376	0	
536	NRN 33	79	119	89	236	277	0	
537	NRN 34	77	119	82	199	321	0	
538	NRN 35	76	120	84	150	260	0	
539	NRN 36	81	119	86	180	182	0	
540	NRN 37	79	119	84	210	242	0	
541	NRN 38	78	121	81	182	260	0	
542	NRN 39	81	115	88	167	390	0	
543	NRN 4	77	115	101	198	174	30	MRMS
544	NRN 41	77	117	87	214	312	0	
545	NRN 42	80	117	79	157	381	0	
546	NRN 43	81	118	82	180	321	0	
547	NRN 44	80	118	85	189	412	0	
548	NRN 45	80	119	84	189	299	0	
549	NRN 46	80	115	85	220	303	0	
550	NRN 47	78	118	80	172	342	10	MR
551	NRN 48	79	115	83	198	304	0	TR
552	NRN 49	78	121	89	178	342	0	
553	NRN 5	77	114	106	200	213	20	MR

EN	Genotypes	DTH	DTM	PHT(cm)	GY (g) /0.5m^2	SB	LR	Rust response
554	NRN 50	81	119	88	214	260	0	
555	NRN 51	81	121	84	158	373	0	
556	NRN 52	79	119	88	198	412	5	MR
557	NRN 53	80	123	82	160	269	0	
558	NRN 54	81	120	80	150	343	0	
559	NRN 55	77	115	89	276	360	0	
560	NRN 56	78	115	77	156	260	0	
561	NRN 57	78	115	79	150	429	0	
562	NRN 58	77	115	93	266	412	0	
563	NRN 59	79	120	79	240	260	0	
564	NRN 6	72	114	96	298	446	10	MR
565	NRN 61	76	119	88	204	438	0	
566	NRN 62	77	120	83	158	322	0	
567	NRN 63	78	118	82	208	221	0	
568	NRN 64	78	117	81	190	559	0	
569	NRN 65	77	118	90	194	196	0	
570	NRN 66	77	123	82	192	191	0	
571	NRN 67	78	118	83	175	230	0	TR
572	NRN 68	78	115	82	188	343	0	
573	NRN 69	77	115	86	238	260	0	
574	NRN 7	78	114	89	192	485	30	MRMS
575	NRN 70	80	115	87	244	459	0	
576	NRN 71	76	117	91	225	624	0	
577	NRN 72	77	115	93	160	307	0	
578	NRN 73	77	115	87	208	234	0	
579	NRN 74	77	115	85	180	320	0	
580	NRN 75	77	117	87	260	281	0	
581	NRN 76	80	117	82	194	417	0	
582	NRN 77	81	119	86	246	390	0	
583	NRN 78	80	115	102	146	351	0	
584	NRN 79	76	115	88	140	455	0	
585	NRN 8	79	116	88	162	234	5	MR
586	NRN 81	80	115	90	160	454	0	
587	NRN 82	80	117	88	98	498	0	
588	NRN 83	80	117	94	190	351	0	
589	NRN 84	78	115	88	190	351	0	
590	NRN 85	77	119	98	216	477	20	MSS

EN	Genotypes	DTH	DTM	PHT(cm)	GY (g) /0.5m^2	SB	LR	Rust response
591	NRN 86	80	115	93	212	368	0	
592	NRN 87	77	116	90	275	351	0	
593	NRN 88	77	118	91	220	494	10	MR
594	NRN 89	76	122	85	230	222	0	
595	NRN 9	77	116	89	222	338	5	MR
596	NRN 90	81	122	82	170	191	0	
597	NRN 91	80	117	82	220	360	0	
598	NRN 92	78	117	87	170	671	0	
599	NRN 93	77	117	85	190	182	0	
600	NRN 94	78	117	85	208	390	0	
601	NRN 95	78	117	82	226	320	0	
602	NRN 96	77	116	81	200	338	0	
603	NRN 97	76	116	91	264	454	0	
604	NRN 98	76	121	85	220	312	0	
605	NRN 99	77	118	86	240	347	0	
606	NRN18	77	115	93	156	308	40	S
607	NRN2	76	115	105	218	130	5	MR
608	WVD1	76	115	112	160	520	20	MRMS
609	WVD10	72	117	91	172	281	30	MRMS
610	WVD11	69	115	86	184	753	90	S
611	WVD12	69	115	80	158	806	100	S
612	WVD13	73	115	79	202	230	80	S
613	WVD14	70	115	89	202	299	80	S
614	WVD15	72	117	93	258	433	90	S
615	WVD16	77	117	86	132	611	100	S
616	WVD17	77	115	92	260	520	8	
617	WVD18	76	113	87	224	550	20	MR
618	WVD19	69	115	91	126	559	20	MS
619	WVD2	75	115	92	152	368	30	MSS
620	WVD20	75	115	87	200	307	10	MR
621	WVD21	68	115	96	202	572	0	
622	WVD22	72	115	103	228	559	0	
623	WVD23	77	115	90	160	415	60	S
624	WVD24	72	116	105	238	454	20	MS
625	WVD25	77	117	112	182	576	80	S
626	WVD26	77	117	111	246	446	30	MRMS
627	WVD27	68	117	94	180	381	30	

EN	Genotypes	DTH	DTM	PHT(cm)	GY (g) /0.5m^2	SB	LR	Rust response
628	WVD28	77	120	96	184	251	0	
629	WVD29	78	120	80	182	381	40	MRMS
630	WVD3	77	115	86	224	508	20	MR
631	WVD30	72	120	80	242	230	0	
632	WVD31	72	117	88	204	309	0	
633	WVD32	77	121	86	212	234	0	
634	WVD33	77	115	98	232	485	100	S
635	WVD34	72	115	95	218	299	80	S
636	WVD35	74	115	89	186	307	60	MSS
637	WVD36	81	117	95	158	191	20	MRMS
638	WVD37	72	115	85	190	230	0	
639	WVD38	72	115	80	180	235	0	
640	WVD39	81	119	86	184	191	10	MR
641	WVD4	78	115	78	114	351	80	S
642	WVD40	80	119	92	216	173	0	
643	WVD41	74	119	91	182	412	10	MR
644	WVD42	74	115	82	230	260	0	
645	WVD43	74	115	89	210	476	0	
646	WVD44	73	115	89	188	490	0	
647	WVD45	75	115	93	236	191	5	MR
648	WVD46	76	119	89	196	403	10	MR
649	WVD47	75	117	94	236	454	40	MRMS
650	WVD48	76	117	87	188	403	40	MS
651	WVD49	78	117	82	176	342	0	
652	WVD5	69	115	90	165	447	60	S
653	WVD50	77	117	83	134	321	0	
654	WVD51	73	115	96	116	174	0	
655	WVD6	77	115	85	138	359	80	S
656	WVD7	80	119	92	210	377	60	S
657	WVD8	76	118	70	148	338	80	S
658	WVD9	75	117	92	170	451	80	S
Check	Morocco+Agralocal	76	146	105	164	320	80	S
Average		76	116	87	183	326	6	
Maximum		82	155	135	400	806	100	
Minimum		65	113	58	74	122	0	

2.6 Outreach research

The outreach research program is designed to verify and validate the newly generated technologies on the farm using participatory approach and to disseminate them in farming communities. Besides, the program is also involved in action oriented research/technologies, surveys, problem identification and their prioritization, feedback collection, formulation and implementation of the action or need based research agendas. Research and promotional activities conducted by NMRP at outreach research sites during 2020/21 were summarized on this report.

2.6.1 Participatory technology verification and dissemination at NMRP outreach research sites

2.6.1.1 Coordinated farmers' field trial (CFFT)

Coordinated farmers' field trial (CFFT) of maize, rice and wheat were carried out in different sites of command districts. All experiments were laid out in RCB design. Each trial includes farmers' cultivars to compare the performance of newly tested genotypes. The chemical fertilizers applied were 180:60:40 NPK kg/ha for hybrids and 120:60:40 for full season varieties. Half dose of nitrogen and full dose of Phosphorous and potash was applied as basal dose at the time of final land preparation and remaining half dose of nitrogen was splitted into two; first part applied at 20-25 and second part at 40-45 days after sowing. All other intercultural operations were done by farmers as per recommendation. In case of rice and wheat the chemical fertilizers were applied @100:30:30 and 60:30:30 NPK kg/ha, respectively.

2.6.1.1.1 Coordinated farmers' field trial (CFFT) on maize

Coordinated Farmers Field Trial, Hybrid maize (CFFT-H)

Single cross hybrids were evaluated in Coordinate Farmer's Field Trial in the year 2020/21 at Suping, Makawanpur and Madi Chitwan with two replications in each site for the identification of superior high yielding, disease and insect pest resistance/ tolerance genotypes.

Among eight tested hybrid genotypes, grain yield ranges from 2.275 t ha^{-1} of genotype VH1829 to 5.034 t ha^{-1} of genotype CAH1715 with mean grain yield was 3.971 t ha^{-1}. The genotype CAH1715 produced higher grain yield (5.034t/ha) grain yield as compared to other genotypes which is followed by CAH196 (4.645 t ha^{-1}), Rajkumar (4.633 t ha^{-1}) and Rampur Hybrid-10 (4.558 t ha^{-1}) and so on (Table 106).

Table 106: Evaluation of hybrids maize in coordinated farmers field trial at NMRP, Rampur on spring season of 2020/21

Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	EA
CAH1715	5.034	97	101	162	75	41296	38889	2.8
CAH196	4.645	99	101	188	85	34445	34815	2.5
RAJKUMAR	4.633	99	103	183	103	42593	42037	2.8
Rampur Hybrid-10	4.558	93	98	158	73	40185	37592	3.0
RML-86/RML-96	3.912	98	100	167	83	37593	40000	2.8
RML-95/RML-96	3.543	93	94	198	107	36667	33519	3.2
VH13729	3.165	95	98	163	77	33333	27222	2.7
VH1846	2.275	98	101	173	78	25370	24259	3.2
Mean	3.971	96	100	174	85	36435	34792	2.9
F test	**	**	**	*	*	*	*	ns
LSD (0.05)	1.05	2.45	3.60	24.96	12.03	9056	9743	
CV, %	15.1	1.5	2.1	8.2	8.1	14.2	16.0	14.9

Coordinated Farmers Field Trial (CFFT-H) Hill set

Among seven tested genotypes standard check variety Manakamana-7 showed better performance produced 6.035t/ha which is followed by RAMPUR S13F28 and KSYNF10 which produced 5.875t/ha and 5.080t/ha respectively (Table 107). Farmers variety was late in flowering and tallest among tested varieties.

Table 107: Performance of maize genotypes in coordinated farmers field trial (CFFT-H) hill set at outreach sites of NMRP, 2020/21

Genotypes	DTT	DTS	PHT(cm)	EHT(cm)	PA	EA	HC	GY(t/ha)
TLBRS07F16	60	63	205	98	3	3	2	4.035
FARMERS VARIETY	62	65	275	160	5	3	2	4.435
ZM401	57	60	213	117	3	3	2	5.020
KSYNF10	57	60	180	85	3	3	2	5.080
RAMPUR S13F28	60	64	210	104	2	2	1	5.875
MANAKAMANA-7	60	64	199	103	3	3	1	6.035
Grand Mean	59	63	214	111	3	3	2	5.080

Coordinated Farmers Field Trial (CFFT-T) Terai set

Under CFFT terai set, 6 genotypes were evaluated at Madi, Chitwan. Genotype HGA produced the highest yield (5.354t/ha) followed by S0128 (4.939t/ha) and Farmer's variety (4.610t/ha). Detai data is presented in the table 108.

Table 108: Performance of maize genotypes in CFFT full season terai set, Madi, Chitwan 2020/21

Genotypes	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	RE	GY(t/ha)	HC	PA	EA
S 0128	49	51	163	78	52727	52222	6	4.939	2	2	2
Rampur S13F26	48	50	167	83	42727	58889	10	4.367	3	2	3
RAMPUR 4	51	53	203	100	43636	50000	3	3.840	2	2	2
R POP-2	50	53	183	93	48182	44444	5	3.910	2	2	2
HG. A	52	53	188	83	44545	57778	7	5.354	3	3	2
FARMERS VARIETY	52	54	182	93	22727	50000	11	4.610	2	2	2
Grand Mean	50	52	181	88	42424	52222	7	4.503	2	2	2

Coordinated Farmers Field Trial (CFFT-Q) on quality protein maize

Significant difference was observed among tested genotypes at farmers fields at Madi, Chitwan for number of days to 50% antheiss and silking, plant height, ear height and number of plant/ ha and grain yield (Table 109). The genotypes S99TLYQ-AB (6.914t/ha) produced highest grain yield in comparison to std check Poshilo Makai-1 (6.071t/ha) and local check (6.688t/ha). The trial mean was 5.724t/ha.

Table 109: Performance of QPM in CFFT at Outreach sites of NMRP, Rampur, 2020/21

EN	Name of genotypes	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	GY(t/ha)
1	S99TLYQ-HG-AB	68	71	201	104	41667	38889	5.351
2	S01SIYQ	78	82	191	96	42778	55556	5.969
3	S00TLWQ-B	80	84	179	90	28333	30000	3.348
4	S99TLYQ-AB	75	78	205	110	41667	44444	6.914
5	Poshilo Makai-1	76	79	200	92	50000	47778	6.071
6	Farmer's variety	71	74	200	101	50556	55556	6.688
	Grand Mean	75	78	196	99	42500	45370	5.724

Coordinated Farmers Field Trial (CFFT-E) Early set

Among the tested genotypes at outreach research sites of NMRP Rampur, maximum grain yield of 5.225t/ha was obtained from EEYC1 followed by 4.995t/ha of Arun-2. Detail data presented in the table 110.

Table 110: Performance of early maize genotypes in CFFT-E, Chitwan 2020/21

EN	Genotypes	DTT	DTS	PHT(cm)	EHT(cm)	NP	NE	RC	PA	EA	HC	GY(t/ha)
1	Across-99402	71	74	160	78	36	47	1	2	2	1.5	4.562
2	Pool-16	63	64	164	93	55	54	2	2.5	2.5	2	4.975
3	SO3TEY-LN	65	67	422	83	43	55	1	1.5	1.5	1.5	4.961
4	SO3TEY-SEQ	64	64	157	84	41	45	2	1.5	1.5	2	4.075
5	Arun-2 (std. ck)	64	65	177	103	52	57	1	2.5	2	1.5	4.995
6	Farmers variety	61	63	192	112	36	37	1	2.5	2.5	2	3.379
7	EEYC1	63	64	149	74	58	60	1.5	1.5	1.5	2	5.225
	Mean	64	66	203	90	46	51	1.4	2	1.9	1.8	4.6

2.6.1.1.2 Coordijixnated farmers' field trial (CFFT) on Rice

Coordinated farmers field trial (CFFT-RN) Rainfed normal

Experiment was conducted at Madi, Chitwan during summer. This trial was composed of seven genotypes including std. check sabitri and farmer's variety. Genotype was TP-30617 (4.55t/ha) and TP-26777 (4.05t/ha) produced higher grain yield as compared to standard check variety sabitri (3.56t/ha) and Farmer's variety (2.52t/ha) as shown in the table 111.

Table 111: Performance of Rice Genotypes Evaluated in FFT-RN, Madi, Chitwan, 2020/21

EN	Name of Genotypes	PHT (cm)	GY (t/ha)
1	TP-26777	110	4.056
2	NR-2175-66-2-3-1-1	105	3.449
3	IR-106523-25-34-3-1-B-23-1	97	3.521
4	IR-106522-39-37-1-1-B-B-5	100	3.503
5	TP-30617	103	4.553
6	Sabitri(check)	111	3.569
7	Farmer's variety	105	2.528
	Grand Mean	105	3.597

Coordinated farmers field trial (CFFT-RF) Rainfed Fine

This trial was composed of seven genotypes including std. check Samba Masuli Sub-1 and farmer's variety. Genotypes were compared with Samba Masuli Sub-1 and farmer's variety. High yielding genotype was NR-2191-1-6-2-1-2-1 (3.79t/ha) and NR-2191-1-6-2-4-5-1 (3.33t/ha) where std. check Samba Masuli Sub-1 and Farmers variety gave 2.90t/ha and 3.02t/ha respectively as shown in the table 112.

Table 112: Performance of Rice Genotypes Evaluated in CFFT-RF, Madi, Chitwan, 2020/21

EN	Genotypes	PHT (cm)	GY (t/ha)
1	NR-2191-1-6-2-4-5-1	112	3.333
2	NR-2191-1-6-2-1-2-1	116	3.792
3	NR-2184-187-1-1-1-1	108	3.29
4	NR-2210-15-1-1-5-1	109	2.921
5	NR-2170-1-1-1-4-1-1-1	130	2.959
6	Samba Masuli Sub-1	96	2.902
7	Farmer's variety	92	3.021
	Mean	109	3.174

Coordinated farmers field trial (CFFT-RE) Rainfed Early

This trial was composed of seven genotypes including std. check Hardinath-3 and farmer's variety. Genotypes were compared with Hardinath-3 and farmer's variety. Genotype was HHZ26-DT1-L11-L11 (4.24t/ha) and HHZ25-DT9-Y1-Y1 (3.91t/ha) was found high yielders as comapered to std. check Hardinath-3(2.69t/ha) and Farmer's variety (2.74t/ha) as shown in the table 113.

Table 113: Performance of Rice Genotypes Evaluated in FFT-R-E, Madi, Chitwan, 2020/21

EN	Genotypes	PHT (cm)	GY (t/ha)
1	HHZ26-DT1-L11-L11	90	4.249
2	HHZ25-DT9-Y1-Y1	101	3.918
3	NR-2157-122-1-2-1-1-1	118	3.811
4	IR98853-6-1-3-2	122	2.644
5	IR-14 L-363	127	3.491
6	GSR 310	109	3.370
7	Hardinath-3(check)	113	2.691
8	Farmer's Variety	NA	2.745
	Grand Mean	111	3.36
	Maximum	127	4.240
	Minimum	90	2.640

Coordinated farmers' field trial (CFFT) on Wheat

Altogether seven genotypes including one standard check Bandganga and one local check were evaluated in four farmers field at Madi, Chitwan considering farmers as a replication. None of the evaluated genotypes produced higher yield

than standard check variety (Table 114) indicated that Bandganga could be the suitable wheat variety for the areas.

Table 114: Performance of wheat genotypes evaluated in coordinated Farmer's field Trial at NMRP, Rampur

EN	Genotypes	PHT(cm)	GY(t/ha)
1	BL-4818	96	2.87
2	BL-4868	95	3.15
3	NL-1202	87	3.14
4	NL-1349	92	2.08
5	NL-1360	93	3.18
6	BANDGANGA	82	3.46
7	Farmer's variety	91	2.74
	Grand Mean	91	2.94
	P value	0.06	0.35
	CV (%)	5.35	23.62
	LSD (0.05)	8.64	1.23

2.6.1.2 Demonstration of best technology of maize entomological research in farmer's field condition

In farmers field of maize outreach research sites (Devchuli area of Nawalpur and Madi area of Chitwan), two maize hybrids Rampur Hybrid-10 and CAH1715 were compared in spinosad 45%EC @ (0.3 ml/l of water) sprayed and non-sprayed plots. The higher percent infested borer plant (12.23 %) and no. of dead hearts (6.5) was recorded in non-sprayed plots compared to sprayed plots i.e. percent infested borer plant (5 %) and no. of dead hearts (3.7%) presented in the table 115.

Table 115: Effect of insecticide (spinosad) spray and non-spray in different maize hybrids infested with stem borer (*Chilopartellus* Swinhoe) at farmers field in March to June 2021

SN	Farmers Name	Location	Varieties	Sprayed (Spinosad)			Non-Sprayed (Control)		
				%DH	%ISP	GY(t ha^{-1})	%DH	%ISP	GY(t ha^{-1})
1	Sunita Lamichane	Madi-7	RH-10	3.4	5.6	10.56	7.0	12.0	7.12
2	Ram Lal Adhikari	Madi-7	CAH1715	4.2	5.0	11.05	6.7	13.6	8.15
3	Gynendra Poudel	Devchuli-13	RH-10	4.3	5.0	8.61	6.5	13.0	6.69
4	Sunita Duwadi	Devchuli-13	CAH1715	2.8	4.3	11.99	5.8	10.3	7.77

2.6.1.3 Farmers Acceptance Test

Maize varieties Rampur Hybrid-10, CAH1715, Manakamana-9, Manakamana-7 were distributed to 60 farmers of Chitwan, Nawalpur and Makawanpur.

Due to covid insurgency, farmers response was collected through telephone communication. Farmers reported 10 to 35% more yield of these varieties as compared to Adopted maize varieties on those areas.

2.6.1.4 Front line demonstration of newly released maize varieties

Three released national hybrids two pipline hybrids, one multinational company hybrid was demonstrated at Madi, Chitwan with two replications. Plot size having 10 rows of 5 m long (35 m^2) for each variety were planted in farmers' field. Agronomic practices were followed as per recommendation. Released and pipeline hybrids were at par for grain yield. Data presented in the table 116

Table 116: Performance of hybrid maize genotypes in demonstration trial at Madi, Chitwan in winter season 2019/20

Genotypes	GY (t/ha)	PHT (cm)	EHT (cm)
Rampur Hybrid-2	6.250	185	90
Rampur Hybrid-6	6.140	190	86
Rampur Hybrid-10	5.875	210	104
RML-95/RML-96	5.535	225	111
RML-86/RML-96	5.640	210	106
Rajkumar	6.135	200	98
Grand mean	5.929	203	99

2.6.1.5 Village level planning workshop

A one day village level planning workshop was accomplished at outreach research site Madi Chitwan. There were 54 participants in which 40 were maize growers and NMRP's collaborative farmers from makwanpur, Nawalpur and Chitwan. Ward president of Madi-7 was also invited as a guest. Thirteen NMRP team as a resourece person were participated in the program. Problem of ear rot, stalk rot, stem borer, barren cob, lodging, fertilizer management etc were discussed thoroughly in the program and committed to prepare the project plan for the next year. The program was lunched by Mr. Suk Bahadur Gurung, scientist and planning officer of NMRP, Rampur.

2.6.1.6 Farmers training

One day farmers training was organized at Madi Chitwan and Suping Hetauda. Thirty farmers were participated at Madi, Chitwan and 25 were in suping, Makawanpur. The training was conducted on different aspects (variety, agronomy, insect, disease, roughing, threshing, post harvest management, tagging, bagging and marketing) of hybrid seed production, OPV seed production and cultivation practices. Moreover, one-week residential training was conducted at NMRP,

Rampur where 30 farmers throughout the country was participated. The traiing was focused on hybrid maize seed production and marketing.

2.7 Collaborative/multilocation experiments

As usual multi-location experiments received from different commodity research program were conducted at NMRP Rampur during 2020/21 for performance testing of the genotypes over the different environment. Different experiments on rice and wheat were carried out in summer and winter season at NMRP, Rampur. The sets of experiments in rice and wheat received from respective commodity program were tested as per provided protocols.

2.7.1 Rice

Different rice experiments were conducted at NMRP Rampur during 2020/21 in collaboration with National Rice research Program, Hardinath, Janakapur. Three experiments namely CVT-Normal, CVT-Early and CVT-aromatic. Each experiment plot of 12m^2 with spacing 20cm x 20cm.Fertilizer was applied for CVT-Normal and CVT-Fine was 100:40:30 kg NPK/ha whereas CVT-Early was 90:40:30 kg NPK/ha. CVT-normal consisted up 24 genotypes, CVT- early consisted up 24 genotypes and CVT-Fine consisted up 20 genotypes were tested in RCBD design with 3 replications at NMRP during summer season of 2020/21.

In CVT-Normal Sabitri and Makawanpur-1 were kept as check varieties. Grain yield, days to 50% flowering and grains per panicle were found significant. Grain yield ranged from 2.60t/ha to 5.42t/ha with mean value 3.81t/ha. High yielding genotype were NR-2189-11-4-1-2-1 (5.42t/ha) followed by NR-2187-25-2-4-3-1 (4.90t/ha), SVIN 323 (4.43t/ha) and NR-2184-20-2-1-7-1 (4.42t/ha). All these genotypes produced more yield than check varieties Sabitri (3.91t/ha) and Makawanpur-1 (3.84t/ha) (Table 117). Likewise, in CVT-Fine Sugandhit dhan-1 and Samba masuli sub-1 wrer kept as check varieties. Highly significant differences were observed for 50% DTF, Grain per panicle, number of unfilled grains, plant height and grain yield. High yielding genotype found was SVIN-054 (4.77t/ha) followed by NR-2195-22-1-1-2-1 (3.78t/ha) which gave relatively higher yield over check varieties Samba masuli sub-1 (3.66t/ha) and Sugandhit dhan-1 (3.62t/ha) (Table 118). Similarly, in CVT-Early, genotypic differences were observed for 50% DTF, Grain per panicle, plant height and grain yield (Table 119). Genotype was TP-30535 (5.17t/ha), IR 15L1717 (4.96t/ha) and TP 30529 (4.49t/ha produced higher yield over check varieties Radha-4 (4.42t/ha) and Hardinath-3 (4.26t/ha).

Table 117: Performance of Rice Genotypes Evaluated in CVT-N-NMRP, Rampur, 2020/21

EN	Name of entry	DTF	GP	UGP	PHT(cm)	GY(t/ha)
1	NR-2184-20-2-1-7-1	96	108	43	127	4.42
2	NR-2181-60-4-1-2-1-1-1-1	106	147	18	128	3.07
3	NR2187-25-1-3-3-1	105	213	22	132	3.71
4	NR-2189-11-4-1-2-1	105	145	29	130	5.42
5	NR-2184-233-3-1-2-1	104	99	27	129	3.01
6	NR-2187-25-2-4-3-1	117	216	38	128	4.90
7	NR-2187-6-2-2-1-1	101	121	31	120	3.44
8	NR-2189-1-1-1-2-1	111	149	45	136	2.60
9	SVIN-307	87	108	22	126	3.89
10	SVIN-333	85	70	48	122	3.88
11	SVIN 072	99	70	54	120	2.84
12	SVIN 323	89	126	50	114	4.43
13	Sabitri	104	138	28	121	3.91
14	Makawanpur-1	109	94	38	128	3.84
	Grand Mean	101	129	35	126	3.81
	P Value	0.00	0.000	0.05	0.23	0.00
	CV (%)	6.75	24.04	38.04	6.72	14.11
	LSD (0.05)	11.46	52.02	22.45	14.18	0.90

Table 118: Performance of Rice Genotypes Evaluated in CVT-R-F-NMRP,Rampur, 2020/21

EN	Genotype	DTF	GP	UGP	PHT(cm)	GY(t/ha)
1	NR-2184-87-1-1-3-1-1	93	113	93	123	2.67
2	NR-2191-1-6-2-1-2-1	106	146	36	127	3.40
3	NR-2191-22-1-4-1-1-	107	128	66	129	3.03
4	NR-2181-15-1-1-6-1-1-1	101	68	55	123	2.31
5	NR-2191-6-2-1-2-1	107	112	43	119	3.45
6	NR-2200-8-1-1-2-1	95	131	67	117	2.88
7	NR-2192-7-1-1-1-1	103	139	33	128	2.37
8	NR-2199-54-2-1-4-1	132	46	131	134	2.37
9	NR-2191-18-1-3-4-1	105	133	68	128	3.10
10	NR-2199-9-1-1-1-1	133	68	74	129	2.26
11	NR-2191-80-1-2-1-1	107	113	48	126	3.27
12	NR-2195-22-1-1-2-1	112	144	39	120	3.78
13	NR-2191-6-2-4-5-1	106	143	42	125	3.13
14	NR-2199-19-1-1-1-1	135	44	152	126	1.65

EN	Genotype	DTF	GP	UGP	PHT(cm)	GY(t/ha)
15	NR-2191-6-2-6-2-1	111	154	24	126	3.39
16	NR-2210-15-1-1-5-1	107	122	86	118	2.69
17	SVIN-054	84	120	15	120	4.77
18	NR-2199-54-2-1-6-1	134	62	124	132	2.26
19	Sugandhit dhan-1	87	106	47	125	3.62
20	Samba masuli sub-1	93	152	26	106	3.66
	Grand Mean	108	112	64	124	3.00
	P Value	0.000	0.000	0.00	0.00	0.00
	CV (%)	3.82	25.19	55.24	3.86	13.84
	LSD (0.05)	6.81	46.72	58.01	8.01	0.69

Table 119: Performance of Rice Genotypes Evaluated in CVT-R-E-NMRP, Rampur, 2020/21

EN	Genotype	DTF	GP	UGP	PHT(cm)	GY(t/ha)
1	IR-103587-22-2-3-B	85	87	48	115	3.83
2	SVIN 141	85	67	42	113	3.87
3	SVIN-224	87	100	58	109	4.54
4	IL 16 l 1704	88	81	54	115	3.71
5	IR 16 L 1831	87	97	46	117	4.11
6	IR-17 L 1341	87	95	47	125	4.06
7	IR 17 l 1415	82	82	33	108	4.00
8	Hardinath-3	81	123	26	121	4.26
9	Radha-4	84	109	50	115	4.42
10	IR-101465-5-25	88	116	37	120	4.25
11	IR-16 L 1829	83	81	35	114	4.12
12	IR 99993-B-B-RGA-1RGA-2RGA	88	119	40	115	3.48
13	TP-30535	83	125	39	101	5.17
14	TP 30529	86	153	48	101	4.49
15	IR 15 L 1717	86	95	71	113	4.96
16	NR-2169-10-4-1-1-1-1-1	84	104	30	117	4.12
17	IR 16 L 1678	78	92	48	113	2.71
18	TP-30539	88	88	35	114	3.97
19	SVIN 207	83	118	37	114	4.22
20	SVIN 188	83	80	29	121	3.43
21	IR 16 L 1844	87	88	39	120	4.04
22	SVIN 189	87	107	57	114	3.67
23	IL-16 L 1753	84	81	44	121	3.82
24	IR 16L 1637	89	105	51	117	4.11

EN	Genotype	DTF	GP	UGP	PHT(cm)	GY(t/ha)
	Grand Mean	85	100	43	115	4.06
	P Value	0.00	0.00	0.59	0.00	0.00
	CV, %	1.77	19.62	43.75	4.30	11.49
	LSD (0.50)	2.50	32.34	31.46	8.16	0.77

2.7.2 Wheat

2.7.2.1 Varietal evaluation of wheat genotypes

Different trials namely IET, CVT, varietal display received form NWRP, Bhairahawa were conducted at NMRP Rampur during 2020/21. In IET, 36 genotypes were tested in RCBD design with 2 replications in plot size 3 m^2. CVT consisted of 24 genotypes in RCBD design with 2 replications in plot size 6m^2. In addition to 5t FYM/ha chemical fertilizer was applied @ 60:30:30 $NP_2O_5K_2O$ kg/ha. In IET two varieties namely Bhrikuti and Gautam were kept as standard check. ANOVA showed that genotypes were highly significantly different for days to 50% heading and plant height whereas non-significant for spike/m^2, grain per spikes and grain yield. Statistically genotypes were found similar in yielding performance. Grain yield ranged from 1.88t/ha to 4.31t/ha with trial mean was 3.43t/ha. BL-5121 was observed earlies in heading took 68days to flower. Among tested genotypes BL-5121 (89cm) was found tallest and BL-5066 was shortest in height. Detail results are presented in the table 120. Likewise in CVT days to 50% heading, plant height were found significant and spikes/m^2, grains/spike and grain yield were found non-significant. Genotypes NL-1444 was found early heading (67days) followed by NL-1408 (69days) and remaiming genotypes were observed similar to standard check Bhrikuti and Gautam took 71days to heading.Genotypes NL-1446 was found dwarf (72cm) and rest of the genotypes were observed similar to standard check Bhrikuti (75cm) and Gautam (84cm).Grain yield ranged from 2.13 to 3.86t/ha with mean value 3.43t/ha. Detail data were presented in the table 121.

Table 120: Performance of wheat genotypes evaluated in IET,Rampur, 2020/21

EN	Genotypes	DTH	PHT(cm)	Spike/m^2	G/S	GY(t/ha)
1	BL-5066	75	72	322	28	1.88
2	BL-5080	69	85	289	44	3.52
3	BL-5081	73	78	321	45	3.14
4	BL-5087	75	89	291	45	3.28
5	BL-5099	74	86	309	39	3.82
6	BL-5106	74	76	285	44	3.62
7	BL-5116	76	74	366	37	3.23

EN	Genotypes	DTH	PHT(cm)	Spike/m^2	G/S	GY(t/ha)
8	BL-5121	68	89	334	44	3.75
9	BL-5125	69	87	337	35	3.28
10	NL-1488	70	81	279	38	3.58
11	NL-1489	73	78	320	40	3.3
12	NL-1490	72	73	313	40	3.36
13	NL-1491	72	74	318	49	3.64
14	NL-1492	76	76	315	39	3.33
15	NL1493	72	78	315	36	4.18
16	NL-1494	74	75	301	35	3.83
17	NL-1495	74	74	312	35	2.54
18	NL-1496	72	81	300	38	3.8
19	NL-1497	73	80	269	34	3.04
20	NL-1498	73	81	380	35	3.42
21	NL-1499	72	72	354	51	4.31
22	NL-1500	71	76	319	32	3.43
23	NL-1502	75	86	304	33	3.44
24	NL-1503	73	83	278	35	3.43
25	NL-1504	75	76	290	44	3.57
26	NL-1505	76	83	278	37	3.06
27	NL-1506	76	88	353	35	3.48
28	NL-1507	74	74	345	42	3.87
29	NL-1501	72	77	312	37	3.81
30	NL-1508	74	70	344	22	2.79
31	NL-1509	71	77	303	51	3.27
32	NL-1510	73	81	323	39	3.71
33	NL-1511	75	80	357	35	3.58
34	NL-1512	72	78	308	47	3.05
35	Bhrikuti	71	72	363	44	3.73
36	Gautam	73	83	314	45	3.58
	Grand Mean	73	79	317	39	3.43
	P value	0.00	0.00	0.256	0.245	0.170
	CV, (%)	1.66	4.78	10.88	16.46	15.42
	LSD (0.05)	2.53	7.86	72.09	16.34	1.11

Table 121: Performance of wheat genotypes evaluated in CVT, NMRP,Rampur, 2020/21

EN	Genotypes	DTH	PHT(cm)	spikes/ m^2	GS	GY(t/ha)
1	BL-4946	74	87	241	37	2.90
2	BL-4951	72	80	229	37	2.75
3	BL-4954	71	83	283	28	3.35
4	NL-1403	72	78	296	30	2.72
5	NL-1408	69	82	228	50	3.19
6	NL-1415	73	82	257	27	2.13
7	NL-1423	71	89	257	39	3.78
8	BL-4982	73	88	224	45	3.03
9	BL-4984	70	87	268	35	3.04
10	BL-5002	74	89	292	40	3.07
11	NL-1436	69	81	260	44	2.85
12	NL-1437	72	85	247	32	3.75
13	NL-1438	75	76	296	27	2.42
14	NL-1443	68	92	211	38	3.58
15	NL-1444	67	92	262	36	2.94
16	NL-1445	75	84	240	25	2.63
17	NL-1446	70	72	279	38	3.02
18	NL-1447	71	86	257	49	3.55
19	NL-1450	71	82	212	37	3.06
20	NL-1451	71	79	276	41	3.34
21	NL-1452	73	78	224	40	3.86
22	RR-21	68	90	299	36	2.83
23	Bhrikuti	71	75	250	37	2.78
24	Gautam	71	84	229	48	3.22
	Grand Mean	71	83	255	37	3.07
	P value	0.000	0.027	0.732	0.068	0.462
	CV, (%)	0.99	5.95	17.15	19.13	19.36
	LSD (0.05)	1.45	10.24	90.29	14.67	1.23

2.7.2.2 Disease scoring in Wheat Varietal Display (WVD), Rampur

Fifty one wheat varieties (released and pre-released) were demonstrated for yield performance and response to major diseases and pests in experimental block of NMRP in natural epiphytotic condition. Two rows of two-meter-long plot was allocated for each variety in rod row design. Double digit rating was done for spot blotch complex starting from heading to maturity at 7 days

interval. Each day's record was converted to severity and summed up in Area under disease progress curve (AUDPC). Meanwhile leaf rust incidence and host response were observed during dough stage once.

Based on AUDPC value, top 10 resistant varieties were Triticale -23, BL -4818, Khajura Durum -1, NL 971, Khajura Durum -2, Chyakhura (NL1164), NL 1094(Danphe), NL -1278, Gaura and NL -1179 with AUDPC value less than 380. Maximum AUDPC value was observed on Pitic 62 (748) followed by Vinayak (553) and Kalyansona (553). Trial average value of AUDPC was 344.

Based on leaf rust incidence, 10 wheat varieties Aditya, NL 971, Bandganga (BL3623) , Chyakhura (NL1164), NL -1307, NL -1327, NL -1202, Khajura Durum -1, Khajura Durum -2 and Triticale -23 were found immune whereas Annapuran 4, Gautam, Sowgdawari, NL-1369 and BL 1135 were moderately resistant in field condition. Highly susceptible varieties were Dhaulagiri, Gaura, Kanti, Rohini, Annapuran-1, Vinayak, RR21 and Pitic 62 having 100 S reactions. Other details are presented in the table 122.

Table 122: Response of wheat varieties to leaf rust and spot blotch complex, Rampur, 2020/21

Entry number	Genotypes	Spot blotch-AUDPC	LR- FRS	GY (g/m^2)
1	Lerma-52	519	30MS	272
2	LermaRojo-64	393	60S	336
3	Kalyansona	544	80S	308
4	Pitic 62	748	100S	244
5	RR21	475	100S	276
6	NL30	320	60S	254
7	HD 1982	380	40S	430
8	UP 262	415	80S	236
9	Lumbini	363	80S	250
10	Tribeni	415	40S	234
11	Vnayak	553	100S	280
12	Siddhartha	497	80S	268
13	Vasakr	294	60S	340
14	Nepal 297	359	80S	338
15	Nepal 251	259	80S	388
16	Annapurna-1	346	100S	250
17	Annapurna-2	328	80S	500
18	Annapurna-3	410	80S	180
19	BL 1022	415	40MR	288
20	Bhrikuti	415	30S	296

Entry number	Genotypes	Spot blotch-AUDPC	LR- FRS	GY (g/m^2)
21	BL 1135	389	10MR	276
22	Annapurna 4	531	5MRMS	280
23	Achyut	501	80S	276
24	Rohini	328	100S	328
25	Kanti	294	100S	286
26	Pasang Lhamu	242	20MRMS	248
27	BL 1473	363	30MS	198
28	Gautam	324	5MR	228
29	WK 1204	458	80S	314
30	Aditya	363	0TR	298
31	Vijaya	363	20MRMS	248
32	NL 971	143	0TR	324
33	Gaura	216	100S	354
34	Ddhaulagiri	233	100S	416
35	Tiottama (NL)	328	80S	550
36	NL 1094(Danphe)	190	30MSS	316
37	Bandganga (BL3623)	346	0TR	328
38	Sowgdawari (BL3629)	311	5MR	272
39	Munal (NL 1055)	233	60S	308
40	Chyakhura (NL1164)	181	00	328
41	RL -4341	506	40MRMS	210
42	NL -1307	320	00	290
43	NL -1327	290	00	268
44	NL -1369	363	5MR	264
45	BL -4818	138	20MRMS	374
46	NL -1202	294	00	296
47	NL -1179	225	20MSS	378
48	NL -1278	190	30MS	340
49	Khajura Durum -1	138	00	280
50	Khajura Durum -2	173	00	240
51	Triticale -23	104	00	580
	Average	344		307
	Maximum	748		580
	Minimum	104		180

2.7.2.3 Wheat Rust Trap Nursery (RTN)

Altogether 20 wheat genotypes were received in RTN from National wheat research program (NWRP). Each genotype was allocated in two rows of 1 m long and evaluated for leaf rust resistance.

Check variety morocco was found severely infected with the leaf rust score of 80 S. HP-163, Faisalabad 83, INQUILAB 85, Faisalabad 83, PBW-660 and H-2687 were only trace infected but others had shown moderately resistant to susceptible response. Other details are presented in the table 123.

Table 123: Reacion of wheat genotypes in Rust Trap Nursery during 2020/21 winter at NMRP

EN	Genotypes	LR
1	ANNAPURNA-1	30 S
2	WL-1563	20 MS
3	HD-2204	10 MR
4	PBW-660	TR
5	HD-2687	TR
6	HD-2189	20 MRMS
7	HP-163	0
8	RAJ-3765	20 MS
9	PBW-373	20 MS
10	PAK-81	60 S
11	PUNJAB-85	20 MS
12	CHAKWAL-86	20 MS
13	FAISALABAD-85	TR
14	INQUILAB 85	TR
15	FAISLABDTT 83	TR
16	RAWAL 87	10 MR
17	KOHSAR	30 MS
18	BAKHTWAR	80 S
19	GAURAB	60 S
20	MOROCCO	80 S

3. Source seed production

3.1 Breeder and foundationseed production of Maize, Rice and Sun hemp

National Maize Research Program, Rampur, Chitwan had produced 21,368 kg of maize seed, 17,079 kg of rice seed, 200 kg of Sun hemp seed and 350 kg of sesbania seed in the fiscal year of 2077/78. Seed production details are shown in the table 124 and 125.

Table 124: Seed production of different maize varieties at NMRP, Rampur, (2020/21)

SN	Varieties	Breeder Seed (kg)	Foundation Seed (kg)	Total (kg)
1	Rampur Composite	2100	3000	5100
2	Arun-2	200	713	913
3	Arun-4	830	6490	7320
4	Manakamana-3	1400	1540	2940
5	Deuti	800	2415	3215
6	Poshilo Makai-1	100	170	270
7	Manakamana-7	960	650	1610
8	Rampur-4	-	-	-
9	Arun-3	-	-	-
10	Arun-6	-	-	-
11	Poshilo Makai-2	1	-	1
Sub Total		6391	14978	21368
Mixed maize				25697
Grand Total				47065

Table 125: Seed production of Rice, Sunhemp and Sesbania at NMRP, Rampur, 2020/21

S.N.	Crop	Varieties	Foundation Seed (kg)
1	Rice	Ramdhan	8214
2	Rice	Sabitri	8865
3	Sun hemp		200
4	Sesbania		350
	Sub Total		17629
	Mixed Rice		2698
	Grand Total		20327

3.2 Maintenance of released maize varieties

To maintain the released maize varieties, in first year, we conducted grid selection and in the second year, we conducted half sib family selection. In grid selection, we prepared 100 grids and selection of 6 ears was done in each grid. In each grid, there were 6 rows and from each row one ear was selected. Length and width of each grid was 5 m and 4.5 m respectively. In half sib family selection, male and female lines were planted in 1:3 ratio. Male lines were prepared by bulking seeds of all ears and each selected ear was used as a female line. After crossing, selected ears of the female lines were bulked to make nucleus seed. Grid selection was completed in Rampur Composite and Deuti. Half sib family selection was completed in Arun-2, Manakamana-3 and Poshilo Makai-1 and 2.5 kg, 3.0 kg and 2.0 kg nucleus seed was produced in those varieties respectively.

3.3 Seed production through Cummunity based seeed production (CBSP) under MASS project

Community bed seed production program was conducted under MASS project in different districts of Nepal. Seventeen hundred kilogram foundation seed of Arun-2 was produced in Gorkha. Seven hundred kilogram foundation seed of Rampur Composite was produced in Gulmi. Three thousand kilogram foundation seed of Rampur Composite was produced in Arghakhachi. Three thousand five hundred kilogram foundation seed of Manakamana-7 was produced in Pyuthan. Similarly, four thousand kilogram foundation seed of Manakamana-3 was produced in Rolpa. In every district, foundation seed production was done in communitybased seed producer groups. Likewise fifty tons of hybrid seed of Rampur hybrid 10 was produced by different seed production companies through the support of this project.

4. Special projects

4.1 Heat stress maize for Asia (HTMA)

In collaboration with CIMMYT, field research was conducted to evaluate heat tolerant maize hybrids at Rampur, Nepalgung and Dhangadi during winter season of 2020/21 with the objective of identifying better performing heat stress tolerant maize genotypes under terai environment of Nepal.

Evaluation of drought tolerant hybrids, Rampur, winter 2020/21

During the winter season of 2020/21, evaluation of drought tolerant maize hybrid trial was conducted at NMRP, Rampur, which had the 10 drought tolerant genotypes. Main objective of this trial was to identify drought tolerant maize hybrids suitable for Rampur like location where drought condition prevails during the major maize growing season. For this trial, plot size was 6 rows of 4-m length having the net plot area of 18 m^2. Among those 10 genotypes, RH-10 and Rajkumar were used as check variety. Among the evaluated traits for those genotypes, grain yield and number of ears per hectare were found statistically highly significantly different while other traits were found statistically significantly different. Mean grain yield for those genotypes was 7.31 tons per hectare having the CV of 3.8%. VH18687 was the top high yielding genotype having the yield of 10.3 t ha^{-1} which is almost 91.66% and 157.4% higher than check varieties RH-10 and Rajkumar respectively. Other high yielding drought tolerant hybrid maize genotypes were VH1846 (9.46 t ha^{-1}), VH171143 (9.05 t ha^{-1}), CAH196 (8.5 t ha^{-1}), VH18614 (7.94 t ha^{-1}) and so on (Table 126). Out of the evaluated 10 genotypes, 5 genotypes had grain yield higher than 7.5 tons per hectare. All genotypes showed perfect flowering synchronization having the maximum ASI of only 2 days. Mean plant height and ear height for those 10 genotypes were 198 cm and 109 cm respectively. Detail information about those evaluated drought tolerant maize hybrids is presented in the table 126.

Table 126: Evaluation of drought tolerant hybrids in NMRP, Rampur, winter, 2020/21

Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	TKW	CL	NGRPE	NGPR
VH18687	10.350	106	107	198	118	59444	61389	445	19.3	14.8	32
VH1846	9.467	106	107	205	125	42500	43889	494	19.0	16.4	35
VH171143	9.050	106	107	183	98	53333	53333	444	18.2	15.8	36
CAH196	8.500	107	109	215	120	54444	53056	420	18.3	14.8	36
VH18614	7.947	108	108	198	113	39444	40833	471	18.0	16.0	33
VH19482	6.717	108	110	223	120	35556	36944	435	18.0	15.4	34
VH13729	6.465	105	107	175	103	35833	37778	441	19.4	14.8	34
RH-10	5.402	107	108	183	80	51111	45556	443	17.7	12.8	33
VH19489	5.218	111	112	205	105	25278	25833	411	19.3	17.2	34

Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	TKW	CL	NGRPE	NGPR
RAJKUMAR	4.027	104	106	198	113	37500	30833	406	20.0	15.4	37
Mean	7.314	107	108	198	109	43444	42944	441	18.7	15.3	34
F test	**	*	*	*	*	*	**	*	*	*	*
CV, %	3.8	1.0	0.9	6.1	12.7	15.3	10.9	3.8	2.3	5.0	3.2
LSD (0.05)	0.624	2.4	2.1	27.5	31.4	15045	10557	37.9	0.99	1.74	2.45

Evaluation of HY2111-28D at Directorate of Agriculture Research (DoAR), Khajura in the spring season of 2021

The results of 170 genotypes evaluated in HY2111-28D in spring season of Directorate of Agriculture Research (DoAR), Khajura is presented in the table 27. The results showed the differences on grain yield, days to anthesis, anthesis silking interval, ear position, ear per plant, and ear aspect (Table 127). The high yielding nine genotypes were ZH201785 (5.55 t ha^{-1}), ZH201731 (5.480 t ha^{-1}), ZH2011733 (5.44 t ha^{-1}), ZH201797 (5.420 t ha^{-1}), ZH201713 (5.393 t ha^{-1}), ZH201644 (5.28 t ha^{-1}), ZH201803 (5.23 t ha^{-1}), ZH201754 (5.20 t ha^{-1}) and ZH201773 (5.03 t ha^{-1}) having average yield of 3.78 t ha^{-1}. The experiment showed that male flowering was started after 60 days of planting and it was extended up to 74 days with mean value of 66 days in Nepalgunj. The flowering synchronization between male and female was found satisfactory for almost all genotypes except for few entries which had long duration of anthesis and silking interval. The average plant and ear height were of 168 cm and 65 cm respectively which shows the non-significant plant and ear height difference among tested genotypes. Almost all genotypes had little middle cob bearing character showing the mean value of cob position 0.38. Minimum E:P ratio was 0.60 while maximum was 1.10 with mean value of 0.96. Genotypes likes ZH201785, ZH201731, ZH2011733, ZH201797, ZH201713, ZH201644, ZH201803, ZH201754 and ZH201773 showed single cob bearing characters having E:P ratio greater than 0.66. Heritability of 0.38 for grain yield, 0.4 for anthesis days, 0.6 for plant and ear height, and 0.2 for ear aspect respectively showing lower to medium ability of transferring those traits.

Table 127: Evaluation of HY2111-28D at DoAR, Nepalgunj in spring season of 2021

Genotypes	GY(t/ha)	DTT	PHT(cm)	EHT(cm)	EP	E/P	EA
ZH201785	5.559	66	186	94	0.51	0.96	3.0
ZH201731	5.480	62	167	63	0.38	1.00	2.0
ZH201733	5.447	64	176	74	0.42	0.97	2.5
ZH201797	5.420	65	178	73	0.41	0.99	2.0
ZH201713	5.393	64	182	67	0.37	1.04	2.0
ZH201644	5.281	66	161	63	0.39	1.00	2.0
ZH201803	5.237	64	185	77	0.41	1.01	2.5

Genotypes	GY(t/ha)	DTT	PHT(cm)	EHT(cm)	EP	E/P	EA
ZH201754	5.204	65	178	75	0.43	1.00	1.5
ZH201773	5.037	65	178	80	0.45	1.01	3.5
ZH201694	4.960	65	163	60	0.37	0.97	2.5
ZH201722	4.942	64	173	67	0.38	1.00	2.0
ZH201751	4.876	66	170	68	0.40	0.92	2.5
ZH201724	4.874	66	172	71	0.41	1.02	2.9
ZH201742	4.839	64	190	71	0.38	0.97	2.5
ZH201717	4.814	64	173	66	0.38	1.05	1.4
ZH201725	4.812	64	182	73	0.40	0.99	4.0
ZH201807	4.803	64	186	74	0.40	0.97	2.5
ZH201678	4.802	68	173	60	0.35	0.96	2.5
ZH201799	4.784	64	181	81	0.45	1.02	2.4
ZH201776	4.778	66	185	70	0.38	1.00	2.0
ZH201805	4.741	66	186	80	0.43	0.90	2.0
ZH201735	4.710	66	172	67	0.39	1.02	2.0
ZH201765	4.695	65	169	63	0.38	1.00	2.0
ZH201721	4.688	66	165	69	0.42	0.96	1.5
ZH201784	4.674	65	168	62	0.36	1.00	2.5
ZH201766	4.672	67	170	71	0.41	0.97	2.0
ZH201791	4.625	65	195	81	0.41	1.07	2.0
ZH201752	4.621	66	181	72	0.40	0.97	3.5
ZH201811	4.594	66	169	69	0.41	0.96	3.0
ZH201777	4.576	68	189	77	0.41	1.04	2.0
ZH201783	4.571	63	190	86	0.45	0.96	2.4
ZH201744	4.522	65	177	67	0.38	0.99	2.0
ZH201768	4.521	64	172	77	0.45	1.00	2.5
ZH201656	4.472	67	152	51	0.34	0.96	2.5
ZH201800	4.438	66	176	65	0.37	0.99	2.5
ZH201759	4.431	64	167	60	0.36	1.04	2.5
ZH201718	4.430	64	164	63	0.39	1.01	3.0
ZH201737	4.416	65	172	67	0.39	0.93	3.0
ZH201760	4.395	66	173	64	0.37	1.05	3.0
ZH201787	4.374	65	165	58	0.35	0.93	2.5
ZH201786	4.366	64	172	65	0.38	0.97	2.0
ZH201739	4.339	60	177	67	0.38	0.98	2.9
ZH201716	4.332	64	193	77	0.40	0.91	3.5
ZH201810	4.332	65	171	72	0.42	1.08	2.0
ZH201648	4.321	66	164	55	0.34	0.97	3.0

Genotypes	GY(t/ha)	DTT	PHT(cm)	EHT(cm)	EP	E/P	EA
ZH201647	4.310	67	175	71	0.41	1.01	3.0
ZH201732	4.277	64	169	65	0.39	0.99	2.5
ZH201808	4.272	63	140	50	0.35	1.00	3.0
ZH201666	4.269	67	174	64	0.37	1.01	2.9
ZH201712	4.259	65	171	71	0.42	0.93	3.5
ZH201764	4.244	67	184	72	0.39	0.97	3.0
ZH201655	4.231	70	177	68	0.38	0.90	2.4
ZH201795	4.213	66	182	72	0.40	0.97	2.0
ZH201767	4.196	64	189	78	0.42	1.00	2.4
ZH201719	4.186	64	163	74	0.45	0.91	4.0
ZH201660	4.176	65	173	64	0.37	0.94	1.9
ZH201755	4.167	66	194	82	0.42	1.10	3.0
ZH201695	4.158	66	156	59	0.38	1.00	2.5
ZH201670	4.145	63	146	58	0.40	0.97	3.5
ZH201798	4.110	66	178	71	0.40	0.96	3.0
ZH201770	4.106	69	173	67	0.38	0.87	2.5
ZH201758	4.104	63	167	72	0.43	1.00	2.5
ZH201792	4.070	66	188	75	0.40	1.00	1.5
ZH201741	4.056	67	167	57	0.34	0.82	2.5
ZH201704	4.050	67	175	60	0.34	1.01	2.0
ZH201756	4.047	63	165	64	0.38	1.00	1.5
ZH201696	4.018	65	154	56	0.36	0.93	2.5
ZH201649	3.997	66	146	51	0.35	0.99	2.5
ZH201774	3.995	64	180	78	0.43	0.97	3.5
ZH201757	3.990	64	170	75	0.44	1.00	3.0
ZH201762	3.987	65	162	58	0.35	0.96	2.0
ZH201801	3.974	65	185	68	0.37	1.02	3.9
ZH201674	3.962	72	187	71	0.38	0.97	3.5
ZH201720	3.960	65	162	70	0.43	0.99	3.5
ZH201729	3.957	64	172	71	0.41	0.96	3.5
ZH201746	3.956	63	163	68	0.42	1.00	2.9
ZH201748	3.947	64	173	61	0.35	0.93	2.0
ZH201736	3.899	64	170	67	0.39	1.00	3.0
ZH201707	3.896	67	165	63	0.38	0.96	2.0
ZH201769	3.879	67	186	76	0.41	0.97	3.5
ZH201790	3.872	67	174	73	0.42	0.93	3.5
ZH201781	3.870	67	181	74	0.41	0.97	2.5
ZH201692	3.839	67	157	57	0.36	1.00	3.0

Genotypes	GY(t/ha)	DTT	PHT(cm)	EHT(cm)	EP	E/P	EA
ZH201750	3.809	64	179	73	0.41	1.00	3.0
ZH201657	3.801	67	161	69	0.43	0.94	1.5
ZH201796	3.797	68	174	70	0.40	0.87	2.5
ZH201738	3.785	65	162	55	0.34	1.02	3.5
ZH201789	3.766	67	170	60	0.35	0.93	2.0
ZH201763	3.765	67	173	72	0.41	0.98	3.5
ZH201726	3.763	67	163	62	0.38	0.99	3.0
ZH201771	3.757	64	171	70	0.41	1.01	2.0
ZH201747	3.749	65	181	72	0.40	1.02	2.9
ZH201740	3.746	67	166	58	0.36	1.00	3.0
ZH201749	3.726	65	161	53	0.34	1.00	2.5
ZH201779	3.721	69	197	85	0.43	0.94	3.5
ZH201687	3.713	66	176	69	0.39	0.91	2.5
ZH201662	3.695	71	165	61	0.37	0.86	2.5
ZH201730	3.678	64	182	70	0.38	0.92	2.5
ZH201664	3.669	64	172	63	0.37	0.92	3.0
ZH201683	3.664	67	157	69	0.44	0.95	3.5
ZH201727	3.654	64	167	62	0.37	1.00	2.5
ZH201793	3.654	65	175	62	0.36	0.97	2.5
ZH201697	3.645	67	160	63	0.40	0.95	3.5
ZH201702	3.585	69	162	56	0.34	0.98	3.0
ZH201780	3.582	67	148	61	0.40	0.92	3.0
ZH201643	3.536	67	133	56	0.42	0.93	3.5
ZH201723	3.515	66	161	63	0.39	0.99	3.5
ZH201682	3.482	68	149	62	0.42	0.96	3.5
ZH201689	3.467	67	154	70	0.47	0.96	3.0
ZH201714	3.467	66	153	65	0.41	1.00	2.5
ZH201699	3.466	66	159	58	0.37	0.96	2.0
ZH201677	3.429	67	167	61	0.37	0.97	4.0
ZH201668	3.410	67	165	53	0.32	0.97	2.5
ZH201680	3.405	68	156	54	0.35	0.97	2.5
ZH201708	3.388	67	160	62	0.39	0.97	2.5
ZH201809	3.381	68	185	72	0.39	0.89	4.0
ZH201653	3.316	64	140	42	0.30	1.00	2.0
ZH201659	3.316	68	165	51	0.30	0.75	2.9
ZH201804	3.300	64	170	64	0.38	0.98	2.0
ZH201709	3.292	67	142	76	0.55	0.80	4.0
ZH201806	3.292	67	188	76	0.40	0.96	2.0

Genotypes	GY(t/ha)	DTT	PHT(cm)	EHT(cm)	EP	E/P	EA
ZH201802	3.290	65	184	74	0.40	0.94	3.0
ZH201701	3.267	65	147	50	0.34	0.90	2.5
ZH201672	3.262	65	164	60	0.36	0.97	3.0
ZH201663	3.258	67	164	62	0.37	0.95	3.0
ZH201710	3.253	67	165	60	0.36	0.95	3.5
ZH201711	3.245	68	146	51	0.35	0.81	3.0
ZH201646	3.242	67	159	55	0.35	0.99	3.0
ZH201676	3.228	72	158	59	0.38	0.79	2.5
ZH201761	3.227	64	182	62	0.35	1.03	4.0
ZH201684	3.222	66	155	63	0.40	0.98	2.0
ZH201703	3.219	69	158	54	0.34	0.92	3.0
ZH201743	3.180	66	182	77	0.43	1.01	4.0
ZH201782	3.155	65	158	61	0.38	0.99	2.5
ZH201686	3.152	67	171	57	0.33	0.97	3.5
ZH201753	3.104	66	172	66	0.39	0.94	2.5
ZH201651	3.071	67	146	48	0.33	0.93	3.5
ZH201652	3.066	67	160	58	0.36	0.60	2.0
ZH201679	3.061	68	154	55	0.36	0.82	3.0
ZH201671	3.059	67	147	53	0.36	0.97	3.0
ZH201715	3.059	66	160	64	0.41	1.00	2.5
ZH201673	3.052	67	158	61	0.38	0.96	2.5
ZH201788	2.975	67	188	60	0.32	0.99	1.5
ZH201665	2.950	69	180	69	0.39	0.92	3.5
ZH201669	2.906	67	161	53	0.33	0.93	3.0
ZH201772	2.895	65	178	64	0.36	1.00	3.0
ZH201658	2.891	65	143	53	0.37	1.00	3.4
ZH201778	2.888	65	173	64	0.37	0.97	3.0
ZH201734	2.877	65	178	66	0.36	1.00	4.0
ZH201775	2.849	65	174	76	0.44	0.92	2.0
ZH201690	2.839	65	160	65	0.41	1.00	2.0
ZH201705	2.817	67	160	51	0.32	0.99	3.0
ZH201745	2.807	64	182	70	0.38	1.05	3.0
ZH201794	2.807	65	163	65	0.39	0.93	3.0
ZH201675	2.780	66	137	52	0.38	0.99	2.0
ZH201645	2.706	70	158	49	0.30	0.92	2.9
ZH201661	2.686	67	140	58	0.41	0.79	3.4
ZH201654	2.676	68	177	57	0.32	0.95	2.9
ZH201691	2.672	67	153	48	0.31	0.88	3.5

Genotypes	GY(t/ha)	DTT	PHT(cm)	EHT(cm)	EP	E/P	EA
ZH201667	2.646	68	162	60	0.37	1.00	1.4
ZH201698	2.491	67	171	62	0.36	0.91	3.0
ZH201728	2.491	67	190	84	0.44	1.10	3.0
ZH201700	2.311	74	155	51	0.33	0.92	3.0
ZH201688	2.298	72	157	54	0.35	0.93	3.0
ZH201706	2.190	67	156	53	0.33	0.87	3.0
ZH201681	2.051	67	160	59	0.37	1.00	3.4
ZH201693	1.883	69	159	58	0.36	0.96	3.5
ZH201663	1.742	73	158	57	0.35	0.68	4.0
ZH201685	1.704	69	151	51	0.34	0.77	4.0
ZH201650	1.670	69	161	54	0.33	0.69	4.0
Mean	3.784	66	168	65	0.38	0.96	2.8
F test	*	***	ns	ns	**	***	***
LSD (0.05)	1.77	4.1	22.3	14.9	na	0.22	1.6
CV, %	21.27	3.1	7.7	13.8	9.64	7.31	23.4
Phenotypic Variance	0.65	4.1	167.5	79.4	0.00	0.01	0.4
Genotypic Variance	0.24	1.7	99.1	49.7	na	0.00	0.1
Heritability	0.38	0.4	0.6	0.6	na	0.00	0.2

Evaluation of HY2111-38D at DoAR, Nepalgunj in spring season of 2021

The results of 170 genotypes evaluated in HY2111-38D in spring season of DoAR Nepalgunj is presented on table x. The results showed the differences for grain yield, days to anthesis, anthesis silking interval, ear position, ear per plant and ear aspect. (Table 128). The high yielding (t ha^{-1}) thirteen genotypes were ZH201558 (6.0), ZH201640 (5.94), ZH201549 (5.34), ZH201613 (5.34), ZH201556 (5.20), ZH201575 (5.16), ZH201638 (5.16), ZH201530 (5.13), ZH201623 (5.07), ZH201569 (5.05), ZH201544 (5.03), ZH201532 (5.02) and ZH201567 (5.0) having average yield of 3.95. The experiment showed that male flowering was started after 60 days of planting and it was extended up to 72 days with mean value of 65 days in Nepalgunj. The average plant and ear height were of 177cm and 80 cm respectively which shows the non-significant for plant height and significant for ear height among tested genotypes. Almost all genotypes had middle cob bearing character showing the mean value of cob position 0.45. Minimum E:P ratio was 0.56 while maximum was 1.04 with mean value of 0.96. Genotypes likes ZH201558, ZH201640, ZH201549, ZH201613, ZH201556, ZH201575, ZH201638, ZH201530, ZH201623, ZH201569, ZH201544, ZH201532 and ZH201567 showed double cob bearing characters having E:P ratio greater than 0.66. Zero heritability recorded for almost all traits.

Table 128: Evaluation of HY2111-38D at DoAR, Nepalgunj in spring season of 2021

Genotypes	GY (t/ha)	DTT	PHT(cm)	EHT(cm)	EP	E/P	EA
ZH201558	6.001	63	171	78	0.46	0.99	2.02
ZH201640	5.944	61	165	79	0.48	1.00	1.51
ZH201549	5.348	63	197	94	0.47	1.04	1.51
ZH201613	5.343	61	190	89	0.47	1.00	1.53
ZH201556	5.201	64	196	99	0.51	0.99	3.53
ZH201575	5.169	63	189	86	0.45	0.98	2.53
ZH201638	5.160	63	184	78	0.42	0.92	2.02
ZH201530	5.131	69	186	92	0.48	0.92	2.03
ZH201623	5.078	62	194	92	0.48	1.03	1.99
ZH201569	5.059	65	166	77	0.46	0.98	2.53
ZH201544	5.038	65	180	92	0.51	0.94	2.05
ZH201532	5.026	66	181	82	0.44	0.99	3.53
ZH201567	5.001	63	187	89	0.48	0.99	2.49
ZH201577	4.948	63	170	78	0.46	1.02	2.99
ZH201534	4.915	63	180	76	0.41	0.99	1.50
ZH201519	4.871	65	174	80	0.47	0.99	2.02
ZH201566	4.852	64	191	82	0.43	0.98	2.53
ZH201500	4.847	64	171	70	0.39	1.01	0.91
ZL20878	4.828	64	171	83	0.49	1.03	2.99
ZH201596	4.821	63	179	81	0.45	0.99	1.52
ZH201551	4.751	64	181	86	0.48	1.00	2.41
ZH201550	4.747	64	183	96	0.53	1.01	2.03
ZH201592	4.731	64	183	83	0.46	0.93	3.02
ZH201642	4.731	63	182	83	0.46	0.99	2.02
ZH201562	4.721	64	164	94	0.59	0.95	2.53
ZH201580	4.704	65	190	84	0.44	0.95	3.03
ZH201543	4.697	64	163	66	0.41	1.01	2.93
ZH201604	4.693	64	174	75	0.43	1.00	2.01
ZH201528	4.681	64	167	72	0.43	0.99	2.52
ZH201584	4.680	61	182	81	0.44	0.99	2.03
ZH201608	4.677	65	184	82	0.45	1.01	2.93
ZH201546	4.667	64	180	89	0.49	1.01	3.41
ZH201624	4.652	62	192	100	0.52	0.92	1.43
ZH201509	4.651	64	178	85	0.47	0.99	1.53
ZH201572	4.651	64	177	75	0.42	0.95	2.54
ZH201573	4.643	65	182	88	0.48	0.92	2.51
ZH201504	4.621	66	168	70	0.41	0.93	2.03

Genotypes	GY (t/ha)	DTT	PHT(cm)	EHT(cm)	EP	E/P	EA
ZH201512	4.590	65	180	75	0.41	0.99	2.56
ZH201552	4.586	65	166	77	0.47	0.97	2.95
ZH201564	4.583	64	149	77	0.52	1.03	3.03
ZH201526	4.572	66	177	93	0.52	0.94	2.53
ZH201531	4.563	66	189	75	0.40	0.94	2.55
ZH201590	4.537	65	174	80	0.46	0.98	1.43
ZH201576	4.525	67	164	72	0.44	0.99	2.99
ZH201559	4.514	63	176	80	0.45	1.03	3.01
ZL20871	4.506	65	196	94	0.48	0.91	2.45
ZH201502	4.498	65	184	84	0.45	0.93	2.01
ZH201612	4.496	63	184	85	0.47	0.93	2.52
ZH201602	4.466	62	189	92	0.49	1.04	2.91
ZH201581	4.460	63	195	85	0.44	0.96	2.02
ZL20886	4.457	67	190	93	0.48	1.01	1.91
ZH201554	4.447	64	185	83	0.45	1.01	2.91
ZL20877	4.417	61	175	82	0.47	1.01	1.91
ZH201615	4.283	64	168	79	0.47	0.93	2.05
ZH201565	4.280	66	164	69	0.42	0.99	2.49
ZH201598	4.278	64	176	80	0.45	1.03	3.03
ZH201545	4.267	65	171	78	0.45	1.01	3.43
ZL20883	4.248	65	167	66	0.39	1.03	1.99
ZH201494	4.245	65	183	79	0.43	0.90	3.02
ZL20881	4.227	64	174	71	0.41	1.01	3.41
ZH201521	4.211	65	178	79	0.44	0.95	2.45
ZH201618	4.209	61	201	106	0.53	1.00	2.44
ZH201637	4.203	65	173	79	0.46	1.00	3.51
ZH201538	4.200	66	173	79	0.44	0.96	2.06
ZH201583	4.193	63	177	81	0.46	1.02	2.99
ZH201555	4.186	70	163	74	0.46	0.99	3.02
ZH201541	4.165	67	193	84	0.43	0.96	3.06
ZH201542	4.116	66	157	64	0.41	0.86	1.99
ZH201517	4.113	64	178	73	0.42	1.03	2.53
ZH201587	4.110	65	181	74	0.41	0.89	2.53
ZH201525	4.097	65	171	71	0.41	0.97	2.41
ZL20884	4.091	63	175	83	0.47	1.01	2.45
ZH201539	4.086	66	175	70	0.40	0.99	2.04
ZH201514	4.085	65	148	63	0.41	0.99	3.02
ZH201588	4.068	63	172	77	0.45	1.01	2.55

Genotypes	GY (t/ha)	DTT	PHT(cm)	EHT(cm)	EP	E/P	EA
ZH201599	4.046	64	183	83	0.45	1.00	2.41
ZH201518	4.000	64	160	69	0.43	0.93	2.49
ZH201633	3.975	63	189	88	0.46	0.96	4.00
ZH201597	3.958	64	173	83	0.48	0.98	3.05
ZH201574	3.954	63	174	80	0.46	1.03	2.01
ZH201499	3.926	68	178	72	0.40	0.99	2.99
ZH201547	3.911	63	193	83	0.43	0.99	3.03
ZH201557	3.897	60	156	78	0.51	0.98	2.53
ZL20870	3.886	64	188	80	0.42	0.98	1.95
ZL20885	3.856	63	189	85	0.45	1.01	3.95
ZL20875	3.848	64	201	102	0.51	0.99	2.49
ZH201529	3.818	62	167	72	0.43	1.03	1.99
ZH201641	3.818	64	183	84	0.46	1.03	3.03
ZH201589	3.809	67	168	71	0.42	0.87	2.44
ZH201527	3.801	67	171	78	0.45	0.86	3.04
ZH201632	3.787	62	163	84	0.51	0.98	2.53
ZH201498	3.784	70	187	80	0.43	0.96	2.94
ZH201622	3.783	64	161	72	0.45	0.95	3.05
ZH201585	3.781	63	161	71	0.45	1.03	3.52
ZH201634	3.776	66	160	72	0.44	0.99	2.49
ZL20888	3.768	63	197	97	0.48	1.03	2.49
ZH201568	3.763	64	181	80	0.44	0.90	2.99
ZH201496	3.759	64	177	80	0.44	0.95	3.03
ZH201570	3.756	65	173	71	0.41	1.00	2.91
ZH201617	3.753	63	165	80	0.48	0.97	3.01
ZH201536	3.746	64	176	77	0.42	1.01	2.45
ZH201508	3.720	63	160	70	0.44	0.99	2.50
ZH201582	3.716	67	163	80	0.48	0.96	2.95
ZH201609	3.715	64	185	84	0.45	0.99	2.03
ZH201616	3.711	62	179	81	0.45	1.01	2.95
ZL20876	3.708	64	186	107	0.51	0.98	2.99
ZL20874	3.666	62	174	80	0.45	0.97	2.45
ZH201495	3.666	68	186	82	0.44	0.99	3.49
ZH201563	3.641	67	165	69	0.43	0.85	2.52
ZH201630	3.631	64	174	80	0.46	0.99	2.99
ZH201535	3.620	66	182	82	0.43	0.95	2.02
ZH201629	3.611	64	174	77	0.44	0.99	3.54
ZH201620	3.603	62	184	86	0.47	0.95	2.53

Genotypes	GY (t/ha)	DTT	PHT(cm)	EHT(cm)	EP	E/P	EA
ZH201533	3.601	64	173	75	0.41	0.95	2.41
ZH201636	3.598	62	177	88	0.50	0.94	3.49
ZH201621	3.593	63	164	70	0.43	0.98	2.49
ZH201626	3.561	68	180	92	0.51	0.99	1.99
ZH201628	3.556	62	189	95	0.50	0.95	2.41
ZH201605	3.534	66	165	83	0.50	0.98	2.53
ZH201594	3.520	64	187	83	0.44	0.99	2.06
ZH201561	3.502	63	175	78	0.44	0.96	3.00
ZH201639	3.485	63	182	83	0.46	0.93	2.50
ZH201614	3.481	64	185	78	0.42	0.99	3.02
ZL20879	3.477	63	210	97	0.46	0.86	2.91
ZH201503	3.475	66	177	80	0.45	0.99	3.00
ZH201606	3.472	63	200	97	0.49	1.01	2.91
ZH201507	3.446	64	169	79	0.47	0.96	3.02
ZL20882	3.423	67	174	74	0.42	0.84	4.03
ZH201591	3.420	67	172	73	0.42	0.87	3.00
ZH201510	3.419	64	175	79	0.44	0.97	2.51
ZH201501	3.403	63	169	71	0.42	0.93	2.49
ZL20880	3.398	63	166	75	0.45	0.94	2.03
ZH201611	3.388	64	204	89	0.44	1.03	1.99
ZH201494	3.380	71	167	75	0.43	0.74	3.02
ZH201537	3.374	65	187	77	0.40	0.96	2.44
ZH201505	3.372	65	188	78	0.42	0.92	2.43
ZH201601	3.364	67	175	83	0.47	0.98	2.53
ZH201520	3.362	71	170	73	0.42	0.72	2.41
ZH201607	3.358	68	167	83	0.50	0.94	3.55
ZH201593	3.345	65	194	88	0.45	0.99	2.50
ZH201610	3.310	64	177	79	0.45	0.96	3.53
ZH201631	3.304	62	189	99	0.53	0.89	2.94
ZH201553	3.300	65	161	70	0.43	0.98	3.52
ZH201560	3.275	67	186	78	0.42	0.95	3.02
ZH201627	3.274	62	159	76	0.48	0.99	3.51
ZH201578	3.268	65	187	77	0.41	0.86	3.03
ZH201579	3.216	68	179	78	0.44	0.89	2.52
ZH201619	3.186	62	182	85	0.47	1.00	3.41
ZL20873	3.173	64	175	78	0.45	0.73	2.49
ZL20873	3.143	66	173	70	0.40	1.03	2.03
ZH201524	3.123	65	177	77	0.43	0.98	3.05
ZH201515	3.120	70	159	64	0.40	0.99	2.49

Genotypes	GY (t/ha)	DTT	PHT(cm)	EHT(cm)	EP	E/P	EA
ZH201513	3.111	64	170	73	0.43	0.99	2.02
ZH201548	3.078	65	149	83	0.57	0.90	3.03
ZH201511	3.059	62	174	72	0.41	1.03	2.51
ZH201586	3.048	63	161	75	0.47	1.03	2.49
ZH201635	3.028	67	177	79	0.45	1.00	2.01
ZH201625	2.982	64	165	78	0.47	0.95	2.03
ZL20872	2.936	64	190	90	0.47	1.01	2.95
ZH201523	2.935	72	170	76	0.44	0.56	2.52
ZH201516	2.904	68	182	75	0.41	0.81	3.03
ZH201595	2.745	70	164	70	0.43	0.96	3.03
ZH201603	2.741	69	161	75	0.47	0.96	3.49
ZH201522	2.705	69	177	80	0.45	0.99	3.00
ZH201540	2.538	60	165	70	0.42	0.61	2.99
ZH201571	2.466	68	176	75	0.42	0.86	4.02
ZH201600	2.390	64	171	73	0.43	0.95	3.03
ZH201497	2.192	66	174	74	0.40	0.86	2.93
ZH201506	2.153	68	175	82	0.47	1.02	3.99
ZL20887	1.983	65	180	77	0.42	0.91	3.03
Mean	3.950	65	177	80	0.45	0.96	2.64
F test	*	***	ns	***	***	***	***
LSD (0.05)	2.34	6.64	34.09	24.89	0.09	na	1.79
CV, %	18.4	3.3	6.3	10.3	7.8	7.3	21.7
Phenotypic Variance	0.53	4.67	124.74	68.13	0.00	0.01	0.33
Genotypic Variance	0	0	0	0	0	na	0
Heritability	0	0	0	0	0	na	0

Evaluation of HY2111-17D at DoAR, Nepalgunj in spring season of 2021

The results of 72 genotypes evaluated in HY2111-17D in spring season of DoAR Nepalgunj is presented on the Table 129. The results showed the differences for grain yield, anthesis silking interval, ear per plant and ear aspect. Genotypes ZH21106 (6.85), ZH2164 (6.09), ZH2195 (5.95), ZH2157 (5.78), ZH2168 (5.65), ZH2156 (5.64), CAH153 (5.54), ZH21128 (5.52) produced relatively higher grain yield (t ha^{-1}) at par to local check-1 (5.40 t ha^{-1}), local check-2 (3.76 t ha^{-1}) and local check-3 (4.71 t ha^{-1}) with average yield of 4.03 t ha^{-1} for all 73 genotypes (Table 129). Almost 27%, 13% and 11% yield advantage were found for genotypes ZH21106, ZH2164, and ZH2195 respectively over high yielding local check-1. The minimum anthesis day was 56 while maximum was 66 days with mean anthesis day recorded of 61 days. The maximum plant height recorded was 205 cm and minimum were 131 cm having mean plant height was 165cm. Similarly maximum ear height recorded was 99 cm and minimum

were 41 cm having mean ear height was 70 cm. Considering all genotypes had at little below middle cob bearing character by showing the mean value of cob position of 0.42 indicates placement of ear was somewhat not satisfactory comparing in scale of 0 for very bottom position and 1 for very upper position. Almost all genotypes had good ear aspect character showing the mean value of ear aspect 2.65. Among the recorded character, higher heritability index was there for plant height with value 0.87 followed by ear height (0.76) and ear position (0.67).

Table 129: Evaluation of HY2111-17D at DoAR, Nepalgunj in spring season of 2021

Genotypes	GY(t/ha)	DTT	PHT(cm)	EHT(cm)	EP	E/P	EA
ZH21106	6.855	59	205	92	0.45	1.01	1.5
ZH2164	6.098	62	152	67	0.44	1.04	2.0
ZH2195	5.953	60	178	87	0.49	1.01	2.5
ZH2157	5.728	62	168	76	0.45	0.93	1.0
ZH2168	5.655	63	181	80	0.43	1.01	1.5
ZH2156	5.640	64	185	81	0.43	1.01	3.0
CAH153	5.540	62	185	77	0.40	1.00	2.0
ZH21128	5.521	61	158	74	0.46	1.11	3.0
Local check-1	5.406	59	189	77	0.42	1.00	2.0
ZH2199	5.332	64	202	90	0.44	0.95	1.5
ZH2182	5.266	60	171	82	0.49	1.02	3.0
ZH21125	5.189	60	167	65	0.40	1.06	1.0
ZH2166	5.112	63	172	80	0.47	1.00	3.0
ZH2138	4.977	59	171	70	0.41	0.87	2.0
ZH2136	4.900	58	154	58	0.38	0.95	2.0
ZH21121	4.848	61	176	64	0.36	1.02	2.5
ZH2162	4.840	59	138	55	0.39	0.96	2.5
ZH2131	4.789	59	174	71	0.41	1.00	3.5
ZH2129	4.739	64	170	80	0.47	1.00	2.5
Local check-3	4.710	59	187	64	0.34	1.01	2.5
ZH2110	4.703	62	162	61	0.38	0.88	3.0
ZH2159	4.659	62	175	71	0.40	0.95	4.0
ZH2188	4.476	57	152	68	0.45	0.92	3.0
ZH21104	4.434	63	190	99	0.53	1.01	1.0
ZH21112	4.340	62	172	80	0.46	0.98	1.0
ZH2150	4.333	60	173	68	0.39	0.94	2.5
ZH2128	4.327	63	198	89	0.45	0.94	2.5
ZH2139	4.323	62	161	76	0.46	0.99	3.0

Genotypes	GY(t/ha)	DTT	PHT(cm)	EHT(cm)	EP	E/P	EA
ZH2172	4.255	60	147	58	0.40	0.99	3.5
ZH2116	4.240	62	162	70	0.43	0.96	2.0
ZH2160	4.160	65	166	66	0.40	1.00	3.5
ZH2171	4.152	60	149	65	0.43	1.01	2.5
ZH2123	4.113	56	147	58	0.40	1.02	2.5
ZH21110	4.110	60	165	81	0.48	0.91	1.5
ZH2178	4.069	63	169	80	0.48	0.98	3.0
ZH2181	4.061	57	157	81	0.51	0.98	3.0
ZH2196	4.059	60	192	88	0.47	0.92	2.0
ZH2098	4.054	61	152	56	0.38	1.06	2.5
ZH21101	4.054	60	191	82	0.43	0.87	2.5
ZH2151	4.008	57	141	57	0.40	0.98	3.0
ZH2124	4.002	58	158	64	0.41	1.01	2.5
ZH2130	3.997	61	155	70	0.45	0.93	2.0
ZH2170	3.958	60	167	73	0.43	0.95	3.0
ZH2152	3.921	59	159	65	0.41	0.97	2.5
ZH2165	3.884	62	185	69	0.39	0.90	3.0
ZH21108	3.831	62	172	89	0.53	1.00	4.0
ZH2153	3.790	58	131	41	0.31	1.00	3.0
ZH2155	3.770	60	157	56	0.36	0.99	3.0
Local check-2	3.762	58	161	53	0.34	1.00	3.0
ZH2169	3.685	62	167	72	0.43	0.99	2.5
ZH2163	3.681	57	149	57	0.38	1.02	2.5
ZH2175	3.644	62	156	64	0.41	0.88	3.5
ZH2126	3.524	57	185	72	0.40	0.99	2.5
ZH2183	3.518	61	149	72	0.49	1.03	3.0
ZH2127	3.306	59	164	67	0.41	1.09	3.5
ZH2176	3.217	59	143	58	0.39	1.00	2.0
ZH2174	3.180	60	153	65	0.43	0.89	2.5
ZH2146	3.120	60	155	65	0.41	0.95	2.5
ZH2099	3.004	57	156	70	0.45	0.89	2.0
ZH2148	2.948	66	168	67	0.38	0.98	3.0
ZH2167	2.790	62	165	71	0.43	0.96	3.5
ZH2161	2.547	66	150	51	0.34	0.93	3.5
ZH2142	2.517	63	170	73	0.43	1.00	3.0
ZH2173	2.469	60	139	57	0.41	0.97	3.0
ZH2197	2.394	60	179	80	0.45	1.00	2.0

Genotypes	GY(t/ha)	DTT	PHT(cm)	EHT(cm)	EP	E/P	EA
ZH2134	2.388	60	172	78	0.43	0.93	1.0
ZH2125	2.222	60	140	45	0.32	0.92	4.0
ZH2158	1.992	64	149	58	0.38	1.00	3.0
ZH2111	1.959	65	167	73	0.44	0.70	4.0
ZH2112	1.814	66	166	70	0.42	1.02	4.0
ZH2144	1.681	65	151	63	0.43	1.00	4.0
ZH2137	1.665	58	135	56	0.41	0.98	4.0
Mean	4.031	61	165	70	0.42	0.97	2.65
F test	*	ns	ns	ns	ns	***	**
LSD (0.05)	2.00	4.08	16.30	14.91	0.00	0.13	1.56
CV, %	28.0	3.9	9.9	16.3	10.5	6.0	29.8
Phenotypic Variance	1.27	5.67	265	129	0.00	0.00	0.62
Genotypic Variance	0.59	2.95	205	84	0.00	0.00	0.27
Heritability	0.55	0.60	0.87	0.76	0.67	0.40	0.48

Evaluation of HY2005-119D in spring season of 2021 at NMRP, Rampur

A total of 400 genotypes along with four commercial checks and two internal checks were evaluated under HY2005-119D trial at NMRP, Rampur in the spring season of 2021. Genotypes internal check-1 (10.24 t ha^{-1}), ZH201196 (9.64 t ha^{-1}), ZH201012(9.32 t ha^{-1}), ZH201082 (8.80 t ha^{-1}) and were high yielding genotypes produced higher grain yield over to check i.e., commercial check-3 (7.83 t ha^{-1}) and commercial check-1 (7.28 t ha^{-1}) and commercial check-4 (6.16 t ha^{-1}) with average yield of 5.15 t ha^{-1} for all 400 genotypes (Table 30). Internal check-1 (10.24 t ha^{-1}) followed by ZH201196 (9.64 t ha^{-1}) and ZH201012 (9.32 t ha^{-1}) were found high yielding genotypes among the tested genotypes for Chitwan condition (Table 130).

Table 130: Evaluation of HY2005-119D in spring season of 2021 at NMRP, Rampur

Genotypes	GY(t/ha)	DTT	ASI	PHT(cm)	EHT(cm)	EP	E/P	EA
Internal check-1	10.241	58	0.9	215	105	0.49	0.82	1.9
ZH201196	9.642	56	1.7	209	128	0.62	0.98	2.3
ZH201012	9.324	57	2.4	213	127	0.60	1.03	2.3
ZH201082	8.808	62	2.4	194	115	0.60	1.11	3.7
Com check-3	7.838	50	2.0	190	107	0.57	1.21	3.2
ZH201005	7.621	62	2.0	187	93	0.50	1.02	3.7
ZH201160	7.540	63	2.9	202	127	0.63	1.13	3.7
ZH20916	7.335	63	2.9	178	98	0.57	0.96	4.0
Com check-1	7.286	55	1.4	204	119	0.59	0.89	4.2
ZH201038	7.211	60	1.5	204	111	0.54	0.95	3.5

Genotypes	GY(t/ha)	DTT	ASI	PHT(cm)	EHT(cm)	EP	E/P	EA
ZH201245	7.146	61	2.2	167	89	0.53	0.94	3.5
ZH20967	7.109	62	3.0	187	106	0.56	0.94	3.7
ZH20994	7.064	62	2.0	212	113	0.53	0.85	3.0
ZH20947	7.024	61	2.4	222	113	0.52	1.11	3.8
ZH20934	6.972	62	2.0	208	116	0.56	1.02	3.7
ZH201193	6.945	61	2.0	197	107	0.54	0.86	3.8
ZH201217	6.917	62	2.0	188	114	0.61	1.00	3.7
ZH20979	6.874	60	1.8	197	104	0.53	1.03	3.9
ZH201183	6.811	62	0.5	216	107	0.49	0.98	3.7
ZH20957	6.752	62	2.6	206	117	0.56	1.03	3.9
ZH201207	6.705	61	2.6	209	120	0.57	1.03	3.5
ZH201177	6.704	63	1.5	209	109	0.51	0.98	4.0
ZH201014	6.676	61	2.0	191	106	0.56	0.93	3.6
ZH201075	6.671	61	2.0	210	113	0.54	0.98	3.8
ZH20887	6.576	61	2.5	193	117	0.62	0.91	3.8
ZH201040	6.573	62	2.1	204	113	0.56	1.09	3.6
ZH201205	6.528	61	3.0	196	113	0.57	0.97	3.8
ZH20959	6.470	61	2.5	198	99	0.50	0.94	4.2
ZH201095	6.469	63	2.0	190	103	0.54	1.13	3.6
ZH201063	6.466	60	2.3	217	112	0.52	0.97	3.8
ZH201184	6.422	62	2.5	217	108	0.51	1.09	3.7
ZH20997	6.379	61	2.5	166	83	0.51	0.91	3.8
ZH201136	6.376	62	2.5	195	120	0.63	0.97	3.7
ZH201001	6.361	62	2.5	190	106	0.57	1.02	4.0
ZH20929	6.358	61	2.9	198	113	0.58	0.93	3.4
ZH201098	6.358	61	2.5	176	100	0.58	1.04	3.8
ZH201274	6.358	61	1.9	212	112	0.53	1.06	4.0
ZH201060	6.357	62	3.0	187	108	0.56	0.80	4.2
ZH201123	6.344	61	2.2	204	115	0.57	1.15	3.8
ZH201023	6.323	60	2.8	212	97	0.46	1.09	3.8
ZH201148	6.316	61	2.7	179	90	0.51	1.04	3.5
ZH20996	6.307	56	4.2	209	108	0.52	0.92	3.5
ZH20939	6.302	61	2.0	199	117	0.58	1.06	3.7
ZH201058	6.302	61	2.7	212	118	0.55	0.98	3.8
ZH201228	6.271	59	2.6	191	112	0.58	0.78	3.5
ZH201081	6.267	62	1.9	190	116	0.62	1.11	3.7
ZH20974	6.263	63	0.0	212	95	0.45	0.86	4.0
ZH201200	6.262	61	2.0	165	90	0.53	0.93	4.2
ZH201268	6.241	62	2.9	193	112	0.58	0.88	4.0
ZH201050	6.233	63	2.5	202	111	0.56	0.95	3.7
ZH201008	6.197	61	2.2	195	109	0.56	1.05	4.0

Genotypes	GY(t/ha)	DTT	ASI	PHT(cm)	EHT(cm)	EP	E/P	EA
ZH201080	6.193	62	3.1	206	108	0.53	0.89	3.6
ZH20968	6.188	62	2.7	201	103	0.51	0.99	3.7
Internal check-4	6.181	56	2.2	217	116	0.53	0.95	4.0
ZH201272	6.178	61	2.0	191	101	0.54	1.02	4.3
ZH201194	6.173	62	2.6	193	106	0.54	1.07	4.0
Com check-4	6.164	53	1.5	201	119	0.60	0.97	5.0
ZH201206	6.158	61	1.9	192	116	0.62	0.97	3.7
ZH20900	6.144	61	3.4	176	114	0.64	0.93	4.0
ZH201076	6.134	62	2.0	198	107	0.55	1.14	4.0
ZH20896	6.123	62	2.6	216	122	0.57	0.95	4.1
ZH201004	6.120	61	3.0	195	93	0.48	0.87	3.7
ZH20948	6.114	63	2.4	208	104	0.51	0.91	4.0
ZH201039	6.098	61	1.0	198	95	0.48	1.04	4.0
ZH20953	6.089	62	2.1	213	114	0.56	0.94	3.5
ZH201009	6.077	60	3.0	193	124	0.65	0.96	3.8
ZH201021	6.062	56	3.2	203	98	0.48	0.86	3.6
ZH201006	6.061	63	1.9	171	98	0.58	0.96	4.1
ZH201233	6.058	62	2.5	186	100	0.54	1.02	3.6
ZH201000	6.053	63	0.6	222	119	0.54	0.94	3.8
ZH20973	6.047	61	2.1	209	108	0.52	0.95	3.8
ZH201089	6.038	62	1.9	203	110	0.55	0.91	4.0
ZH201171	6.029	63	2.1	199	108	0.54	0.86	3.9
ZH201016	6.023	58	3.5	175	102	0.58	0.92	4.0
ZH201062	6.022	63	2.9	188	105	0.56	1.01	3.8
ZH201187	6.018	61	2.2	196	122	0.63	1.01	3.5
ZH201111	6.009	62	1.9	216	113	0.53	0.88	3.8
ZH201243	6.009	62	3.0	185	100	0.55	1.03	2.9
ZH201073	6.007	61	1.5	192	114	0.59	1.01	3.7
ZH20975	6.004	63	2.1	203	106	0.52	0.95	3.8
ZH201262	5.995	60	2.5	188	107	0.56	0.90	3.8
ZH201188	5.987	61	2.5	211	116	0.56	0.89	3.8
ZH20924	5.984	59	1.9	207	101	0.50	0.91	3.7
ZH201025	5.976	62	2.0	199	102	0.52	0.95	3.8
ZH201007	5.967	61	2.5	207	117	0.57	1.00	3.8
ZH201155	5.956	62	2.3	207	113	0.55	0.93	4.1
ZH201212	5.940	61	1.5	205	105	0.51	1.04	4.1
ZH201222	5.936	61	2.0	208	115	0.57	0.98	3.7
ZH20992	5.933	61	2.1	209	118	0.57	1.02	4.0
ZH20949	5.932	61	2.5	189	91	0.48	0.90	3.6
ZH20944	5.927	63	0.6	197	109	0.56	0.92	4.5
ZH201017	5.905	62	3.0	222	119	0.54	0.91	4.0

Genotypes	GY(t/ha)	DTT	ASI	PHT(cm)	EHT(cm)	EP	E/P	EA
ZH201087	5.890	62	0.9	176	99	0.55	1.02	4.0
ZH20958	5.841	62	2.8	194	98	0.50	0.93	4.2
ZH20937	5.832	60	3.0	213	113	0.53	0.92	4.0
ZH201229	5.800	61	2.0	186	101	0.54	0.87	3.7
ZH20990	5.797	60	2.4	212	107	0.50	0.96	4.2
ZH201209	5.796	61	2.1	197	117	0.59	1.01	3.7
ZH201146	5.779	62	2.1	216	121	0.57	0.89	4.3
ZH201151	5.774	61	2.0	198	112	0.56	0.88	3.7
ZH201218	5.774	62	1.8	202	115	0.57	0.85	3.5
ZH201231	5.759	63	1.8	183	101	0.56	0.87	4.0
ZH201202	5.747	61	1.7	199	110	0.55	0.87	3.4
ZH201065	5.745	61	2.5	179	113	0.64	1.19	3.8
ZH201247	5.731	62	2.6	202	121	0.61	0.96	4.2
ZH201174	5.699	62	2.2	188	104	0.56	0.94	4.1
ZH201178	5.699	61	0.6	203	120	0.59	0.85	3.7
ZH20920	5.697	61	2.6	199	120	0.60	0.98	3.6
ZH201055	5.696	59	1.9	188	113	0.60	1.00	4.0
ZH201057	5.696	62	2.3	205	104	0.51	1.07	3.5
ZH201166	5.695	61	2.1	194	108	0.56	0.92	3.8
ZH20986	5.687	62	-0.1	194	112	0.58	0.86	3.8
ZH20965	5.678	61	1.4	180	113	0.64	1.01	3.5
ZH201096	5.674	63	2.9	205	124	0.61	0.85	3.8
ZH201263	5.673	61	1.6	212	121	0.57	1.06	4.4
ZH201110	5.668	62	1.5	183	112	0.61	0.92	4.3
ZH20905	5.666	60	2.7	190	89	0.47	1.01	3.6
ZH20911	5.664	62	2.9	209	103	0.49	0.81	3.5
ZH201132	5.663	61	2.1	187	99	0.53	0.97	4.0
ZH201024	5.655	61	2.5	213	114	0.53	1.02	3.7
ZH201197	5.652	60	2.5	196	107	0.55	0.96	4.2
ZH201122	5.648	62	2.0	172	84	0.48	0.96	4.2
ZH20891	5.643	63	0.8	197	103	0.53	0.71	4.2
ZH20883	5.633	62	2.5	217	103	0.49	0.97	4.2
ZH201189	5.624	61	2.0	175	118	0.68	0.97	3.6
ZH20938	5.617	61	2.4	187	110	0.58	0.90	3.7
ZH201093	5.608	61	1.5	207	112	0.54	1.04	3.5
ZH20915	5.604	61	3.0	203	115	0.56	0.87	4.0
ZH201144	5.604	62	2.8	209	111	0.54	1.01	4.2
ZH20923	5.597	60	2.0	208	117	0.57	0.90	4.0
ZH201033	5.596	61	2.7	193	119	0.61	0.81	3.5
ZH201186	5.584	62	2.5	185	103	0.56	0.90	3.5
ZH20918	5.571	61	3.0	188	105	0.55	0.95	3.7

Genotypes	GY(t/ha)	DTT	ASI	PHT(cm)	EHT(cm)	EP	E/P	EA
ZH201125	5.539	62	1.9	168	98	0.59	0.98	3.2
ZH201157	5.532	63	3.0	192	110	0.57	0.87	3.8
ZH201147	5.513	61	2.4	176	111	0.63	1.06	3.7
ZH20960	5.507	61	2.9	230	100	0.45	0.90	3.7
ZH201051	5.507	62	2.1	189	115	0.61	0.89	3.7
ZH20980	5.498	60	4.0	201	99	0.49	0.84	3.5
ZH201248	5.494	63	2.6	214	113	0.53	0.87	4.0
ZH201053	5.489	62	2.9	181	94	0.52	0.99	4.0
ZH201182	5.485	62	2.2	199	107	0.53	1.00	3.5
ZH20927	5.480	62	1.6	206	105	0.51	0.90	4.3
ZH201162	5.471	62	0.6	194	112	0.58	1.01	4.0
ZH201118	5.464	62	2.6	183	111	0.62	0.87	4.4
ZH20936	5.458	62	2.1	203	110	0.55	0.94	4.1
ZH201143	5.455	62	2.0	203	108	0.53	1.05	4.0
ZH201204	5.453	63	2.9	170	101	0.59	0.90	4.0
ZH20970	5.445	61	2.3	179	99	0.55	0.99	3.8
ZH201176	5.442	63	2.6	191	102	0.53	1.04	4.3
ZH201085	5.439	61	2.2	178	110	0.64	0.91	4.0
ZH201019	5.433	62	1.0	162	77	0.47	1.04	3.9
ZH201152	5.431	61	2.6	177	97	0.56	0.94	3.5
ZH201265	5.430	62	2.7	195	99	0.51	0.89	3.8
ZH20989	5.423	59	2.4	207	91	0.44	0.95	3.7
ZH20919	5.409	61	2.5	191	103	0.54	1.10	4.0
ZH20954	5.384	58	4.1	207	104	0.51	0.91	4.0
ZH201141	5.368	61	2.1	229	111	0.49	0.87	3.5
ZH20917	5.364	62	2.5	179	93	0.52	0.92	4.3
ZH201086	5.340	63	1.6	185	95	0.52	0.97	4.2
ZH20903	5.332	63	2.0	199	104	0.52	0.98	4.3
ZH201185	5.330	61	2.6	190	110	0.58	0.94	3.7
ZH201210	5.328	62	2.1	184	100	0.56	0.95	4.0
ZH201156	5.320	62	3.1	185	113	0.62	1.07	3.7
ZH201158	5.318	62	3.2	203	118	0.59	0.94	3.8
ZH201044	5.298	62	3.0	192	103	0.54	0.88	4.2
ZH201031	5.297	63	2.4	191	117	0.61	0.93	3.6
ZH201117	5.289	60	1.6	179	95	0.52	0.87	4.0
ZH20951	5.275	60	1.6	178	107	0.60	0.92	3.7
ZH201112	5.271	64	-0.1	199	105	0.53	1.04	4.0
ZH201113	5.263	61	2.0	207	102	0.49	1.00	3.6
ZH201115	5.251	61	2.5	201	114	0.57	0.88	4.0
ZH201134	5.251	62	2.0	192	101	0.52	0.98	3.8
ZH20926	5.245	62	2.4	187	103	0.56	0.97	3.7

Genotypes	GY(t/ha)	DTT	ASI	PHT(cm)	EHT(cm)	EP	E/P	EA
ZH201238	5.243	59	3.0	180	105	0.59	0.91	4.2
ZH201079	5.236	63	3.0	196	117	0.60	0.93	4.0
ZH201142	5.228	62	3.4	197	120	0.63	0.95	3.9
ZH201099	5.215	59	1.3	206	112	0.55	0.96	3.7
ZH201084	5.212	61	2.3	198	118	0.59	0.95	3.7
ZH20978	5.209	62	2.5	198	102	0.52	0.90	4.3
ZH201192	5.204	61	1.4	177	105	0.61	0.89	3.9
ZH20943	5.203	61	1.9	193	105	0.55	0.98	3.9
ZH201170	5.191	61	2.9	208	115	0.56	0.89	4.0
ZH201036	5.179	61	3.8	206	118	0.58	0.97	3.7
ZH201061	5.167	60	1.0	212	115	0.54	0.88	4.0
ZH201253	5.167	62	2.5	188	114	0.61	0.89	3.3
ZH201011	5.162	59	2.9	226	117	0.53	0.87	4.2
ZH20884	5.160	59	2.0	188	114	0.62	0.90	4.2
ZH201094	5.149	62	2.6	198	101	0.51	0.97	3.8
ZH20993	5.134	61	3.0	194	102	0.52	1.05	4.2
ZH20895	5.116	61	2.8	214	113	0.53	1.01	4.3
ZH201120	5.103	61	3.6	176	88	0.50	0.90	3.5
ZH201214	5.102	62	3.0	177	104	0.59	1.02	3.7
ZH20998	5.100	61	2.9	197	108	0.55	0.95	3.8
ZH20910	5.086	61	2.4	228	112	0.49	0.91	3.7
ZH201159	5.081	62	2.2	212	116	0.54	0.83	3.8
ZH201195	5.080	62	2.3	184	104	0.56	0.94	3.8
ZH201260	5.080	60	2.1	196	103	0.51	0.83	3.7
ZH20928	5.070	62	2.1	195	108	0.56	0.95	3.9
ZH201092	5.059	61	3.0	195	118	0.61	0.93	4.2
ZH201126	5.059	62	2.4	204	104	0.53	0.97	4.3
ZH201149	5.036	61	2.0	192	94	0.50	0.97	3.7
ZH201131	5.029	62	2.9	165	92	0.57	1.01	3.8
ZH201043	5.027	61	2.0	195	109	0.56	0.92	4.0
ZH20977	5.026	62	2.5	208	100	0.49	1.08	3.8
ZH201030	5.015	62	2.5	189	101	0.54	0.87	4.0
ZH201059	5.010	62	2.1	185	103	0.56	0.98	4.1
ZH20941	5.008	62	2.5	197	105	0.54	0.86	3.5
ZH201190	5.007	61	2.5	187	98	0.52	0.86	4.0
ZH201256	5.006	62	2.0	195	106	0.55	0.88	4.0
ZH201169	5.004	63	1.8	200	105	0.53	0.87	3.8
ZH201234	5.004	63	2.0	178	102	0.58	0.85	3.4
ZH20991	4.996	60	2.9	202	104	0.52	0.91	3.5
ZH20961	4.987	62	2.8	209	114	0.54	0.99	4.0
ZH201097	4.985	62	2.6	190	102	0.54	0.98	4.0

Genotypes	GY(t/ha)	DTT	ASI	PHT(cm)	EHT(cm)	EP	E/P	EA
ZH20921	4.980	61	2.6	194	113	0.57	0.85	4.0
ZH20952	4.976	62	2.2	179	99	0.55	0.84	3.7
ZH201026	4.974	62	2.5	208	126	0.60	0.87	3.7
ZH20901	4.972	62	2.4	169	84	0.49	0.90	3.8
ZH201127	4.972	63	2.4	190	106	0.56	1.01	4.5
ZH201047	4.963	60	2.0	191	99	0.52	0.97	3.5
ZH201257	4.952	62	2.5	191	96	0.51	1.03	4.3
ZH20981	4.949	62	2.6	196	108	0.56	0.87	3.7
ZH20946	4.948	59	2.8	204	119	0.58	0.95	4.5
ZH201066	4.946	61	2.0	188	110	0.58	0.95	4.0
ZH201227	4.942	60	3.4	169	104	0.60	0.87	3.5
Com check-2	4.937	54	1.4	221	117	0.54	0.87	4.0
ZH20942	4.935	59	2.0	202	115	0.57	0.86	4.0
ZH20907	4.931	62	3.3	179	97	0.55	0.84	3.8
ZH201240	4.926	62	1.4	186	94	0.51	1.00	3.6
ZH201078	4.919	61	2.2	209	116	0.57	1.00	3.5
ZH20890	4.909	61	3.1	205	110	0.53	0.85	3.8
ZH201069	4.892	59	1.9	201	93	0.46	0.75	3.8
ZH201224	4.892	62	3.0	187	114	0.62	0.82	3.5
ZH201041	4.891	62	2.6	202	108	0.54	0.92	3.8
ZH20972	4.869	62	3.0	178	106	0.58	0.80	3.7
ZH201139	4.869	62	2.1	197	105	0.53	0.90	4.0
ZH20902	4.866	60	2.0	199	112	0.56	0.85	4.2
ZH20983	4.855	62	1.8	208	109	0.53	0.88	4.2
ZH201002	4.846	60	4.0	220	125	0.57	0.84	3.6
ZH201052	4.840	60	2.5	207	121	0.59	0.93	3.6
ZH20925	4.835	62	2.5	207	121	0.59	0.84	3.5
ZH20982	4.829	61	3.0	203	106	0.54	1.01	4.0
ZH20914	4.828	62	2.5	194	100	0.52	0.87	3.8
ZH20962	4.825	62	2.8	201	110	0.55	0.79	3.8
ZH201164	4.822	62	1.9	211	123	0.59	0.94	4.7
ZH20885	4.820	61	2.6	224	116	0.53	0.88	3.7
ZH20984	4.797	61	2.6	193	104	0.54	0.88	4.0
ZH201163	4.783	62	3.0	209	126	0.60	1.04	4.3
ZH201046	4.780	62	2.6	165	93	0.57	0.96	4.5
ZH201138	4.774	62	3.1	198	102	0.51	0.97	3.7
ZH20931	4.772	60	2.9	188	104	0.55	0.95	3.5
ZH20966	4.766	61	1.6	183	108	0.59	0.87	3.8
ZH201266	4.766	62	2.5	222	136	0.62	0.75	4.2
ZH201226	4.764	63	2.0	188	96	0.51	0.95	3.9
ZH201208	4.759	60	4.0	189	115	0.62	0.74	3.5

Genotypes	GY(t/ha)	DTT	ASI	PHT(cm)	EHT(cm)	EP	E/P	EA
ZH201090	4.756	62	3.1	209	110	0.53	1.02	3.9
ZH20889	4.752	60	2.4	195	117	0.61	0.84	4.2
ZH20995	4.729	61	3.0	215	117	0.55	0.95	4.2
ZH20913	4.727	62	2.0	214	113	0.53	0.97	4.0
ZH201102	4.723	63	2.4	202	111	0.55	1.06	3.8
ZH20930	4.711	62	2.7	202	96	0.47	0.96	3.7
ZH201180	4.711	62	2.9	188	109	0.58	0.85	4.0
ZH201215	4.708	60	0.6	209	105	0.50	0.85	3.7
ZH201042	4.696	62	1.5	191	109	0.58	1.12	4.0
ZH20897	4.693	61	3.0	188	98	0.53	0.88	4.3
ZH20882	4.691	62	2.5	187	92	0.49	0.88	3.8
ZH201129	4.678	61	2.0	202	109	0.54	1.01	4.0
ZH201264	4.678	60	3.8	185	110	0.59	0.80	4.2
ZH20932	4.676	61	2.4	189	119	0.62	0.97	4.5
ZH201045	4.663	62	3.0	208	111	0.54	0.99	4.2
ZH201232	4.641	61	2.1	167	88	0.52	1.02	4.3
ZH201013	4.635	63	2.4	195	104	0.53	0.88	4.0
ZH201003	4.631	62	2.5	170	100	0.58	0.91	4.0
ZH201255	4.628	62	2.2	187	106	0.58	0.87	3.5
ZH201029	4.616	61	3.6	202	94	0.46	0.79	4.2
ZH201074	4.608	64	-0.2	206	112	0.54	0.84	3.5
ZH201242	4.597	62	2.1	187	103	0.54	0.91	4.2
ZH201254	4.597	61	3.6	196	104	0.53	0.92	4.0
ZH201239	4.593	61	2.9	193	114	0.58	0.88	4.1
ZH201199	4.581	61	2.5	190	99	0.53	1.00	4.0
ZH201235	4.581	60	2.0	198	107	0.54	0.92	4.0
ZH201114	4.579	62	3.5	192	106	0.56	0.83	4.0
ZH201032	4.577	62	2.4	197	107	0.55	0.77	3.9
ZH20892	4.571	61	2.1	197	116	0.58	0.85	4.0
ZH20933	4.562	61	2.1	193	92	0.48	0.88	4.1
ZH201105	4.558	62	1.5	182	102	0.56	0.88	4.0
ZH201133	4.557	61	2.5	205	109	0.53	0.89	4.3
ZH201101	4.551	60	2.6	192	102	0.53	0.82	3.8
ZH201054	4.542	61	2.4	173	101	0.58	0.92	3.8
ZH201124	4.542	62	2.1	205	107	0.53	0.84	3.7
ZH201010	4.541	63	2.9	192	105	0.55	0.87	3.8
ZH201116	4.540	60	3.6	203	116	0.57	0.94	4.3
ZH201181	4.537	62	2.5	180	96	0.54	0.80	4.1
ZH201251	4.523	60	2.5	210	120	0.57	0.94	4.3
ZH201259	4.521	61	1.7	188	90	0.49	0.90	4.0
ZH201028	4.506	62	2.8	196	112	0.57	0.91	3.6

Genotypes	GY(t/ha)	DTT	ASI	PHT(cm)	EHT(cm)	EP	E/P	EA
ZH201221	4.505	61	1.9	168	112	0.67	0.94	3.7
ZH201168	4.500	63	2.6	186	110	0.60	1.04	4.1
ZH20955	4.495	62	3.0	182	106	0.58	0.89	4.0
ZH201258	4.494	62	2.1	182	105	0.57	0.92	4.1
ZH201128	4.488	63	3.0	185	105	0.57	0.89	4.3
ZH201145	4.478	61	0.5	184	104	0.56	0.70	4.0
ZH201269	4.459	63	2.0	203	112	0.56	1.01	4.3
ZH20940	4.455	60	2.0	202	104	0.52	0.88	4.3
ZH201091	4.451	63	1.5	199	99	0.49	0.79	4.0
ZH201153	4.445	62	2.4	172	86	0.50	0.61	4.2
ZH201261	4.439	62	3.0	185	104	0.56	0.94	4.4
ZH201018	4.434	62	2.5	215	123	0.58	0.96	4.2
ZH201034	4.426	61	2.0	184	109	0.60	0.81	3.9
ZH201140	4.415	61	3.0	192	110	0.58	0.88	3.7
ZH201273	4.410	60	2.4	202	108	0.53	0.82	4.3
ZH201219	4.407	62	1.4	191	108	0.58	0.89	3.9
ZH20988	4.395	62	2.6	176	107	0.61	0.86	4.0
ZH201135	4.391	59	3.1	179	97	0.56	0.76	4.2
ZH20893	4.365	61	2.4	209	107	0.52	0.85	4.0
ZH201172	4.358	62	2.0	171	97	0.56	0.87	3.5
ZH201271	4.340	61	2.4	194	105	0.55	0.77	3.9
ZH201103	4.339	60	2.6	176	99	0.56	0.94	3.8
ZH201137	4.338	62	3.0	177	101	0.57	0.88	4.0
ZH201027	4.335	61	2.1	200	105	0.53	0.88	4.1
ZH201088	4.329	62	2.5	184	102	0.55	0.79	3.8
ZH201130	4.308	63	1.9	178	97	0.55	0.84	4.2
ZH201173	4.307	62	2.5	198	93	0.47	0.94	4.2
ZH201070	4.303	62	2.0	182	105	0.57	0.91	4.0
ZH201121	4.303	61	2.6	177	103	0.57	0.97	3.7
ZH201071	4.293	62	3.5	198	106	0.54	1.00	4.1
ZH201150	4.286	61	2.1	208	112	0.54	0.72	4.0
ZH201270	4.284	61	1.7	196	105	0.54	0.82	4.3
ZH201067	4.272	62	2.6	197	92	0.47	1.02	3.8
ZH20987	4.267	61	2.0	184	84	0.45	0.92	3.8
ZH201072	4.267	62	2.0	215	95	0.44	0.90	4.2
ZH201035	4.257	61	2.5	197	102	0.52	0.85	4.5
ZH201241	4.243	60	4.6	187	109	0.58	0.77	3.8
ZH201223	4.240	58	2.9	190	86	0.45	0.90	4.0
ZH201198	4.237	62	2.9	174	98	0.56	0.87	4.1
ZH201179	4.232	60	2.5	180	96	0.53	0.93	4.2
ZH201068	4.226	62	2.4	192	99	0.50	0.90	4.0

Genotypes	GY(t/ha)	DTT	ASI	PHT(cm)	EHT(cm)	EP	E/P	EA
ZH20935	4.215	64	2.6	174	93	0.53	0.80	4.3
ZH201154	4.211	61	2.2	214	113	0.52	0.95	3.8
ZH20908	4.197	60	2.0	197	105	0.54	0.90	3.7
ZH201049	4.191	61	3.0	201	108	0.54	0.98	4.3
ZH201064	4.182	60	2.7	180	100	0.55	0.81	4.0
ZH201220	4.151	61	1.9	198	100	0.51	1.06	4.0
ZH201267	4.136	60	2.9	179	90	0.51	0.88	4.0
ZH201104	4.116	62	2.4	208	98	0.47	1.00	4.3
ZH20888	4.115	61	1.9	178	109	0.63	0.89	4.2
ZH201236	4.109	60	4.5	186	95	0.50	0.78	3.7
ZH20882	4.095	64	2.5	197	104	0.53	0.99	3.9
ZH20971	4.086	61	1.9	193	113	0.57	1.08	4.0
ZH201015	4.083	61	2.0	193	96	0.50	0.78	4.0
ZH20886	4.082	61	3.1	187	104	0.56	0.76	4.0
ZH20912	4.068	63	-0.4	201	103	0.50	0.91	4.5
ZH201077	4.059	60	4.0	191	109	0.58	0.78	4.0
ZH201175	4.046	61	3.1	194	102	0.54	0.82	4.0
ZH20999	4.038	61	3.5	208	108	0.53	0.74	4.3
ZH201161	4.009	62	2.9	172	98	0.56	0.97	4.2
ZH201246	3.964	62	2.5	202	107	0.54	0.87	3.7
ZH20956	3.937	61	2.5	166	96	0.57	0.75	4.1
ZH201022	3.931	61	2.5	191	111	0.58	0.68	4.6
ZH201108	3.910	62	3.2	182	110	0.60	0.84	4.1
ZH201225	3.893	62	2.9	202	110	0.55	0.88	4.0
ZH201249	3.870	62	2.4	203	112	0.56	0.77	3.9
ZH201213	3.828	62	2.5	181	110	0.61	0.92	4.3
ZH20899	3.786	63	3.0	175	107	0.63	0.83	4.0
ZH20894	3.784	61	2.9	167	109	0.66	0.75	4.0
ZH20950	3.784	66	0.0	207	120	0.58	0.86	4.3
ZH201203	3.772	63	2.5	185	99	0.53	0.93	3.8
ZH20963	3.764	62	2.6	188	103	0.56	0.87	4.1
ZH201252	3.750	62	2.6	206	107	0.52	0.93	4.3
ZH201216	3.744	59	2.3	197	108	0.55	0.95	3.9
ZH201230	3.726	62	3.0	191	96	0.50	0.94	4.3
ZH20976	3.703	60	2.5	188	112	0.58	0.76	3.8
ZH201056	3.703	61	1.5	200	110	0.55	0.88	5.0
ZH201244	3.667	61	3.6	193	111	0.58	0.86	4.3
ZH201083	3.664	58	3.6	201	107	0.54	0.80	4.2
ZH20904	3.663	62	2.0	200	119	0.61	0.73	4.2
ZH201020	3.630	62	2.6	215	115	0.53	0.91	4.0
ZH201250	3.625	62	1.1	189	110	0.58	0.88	4.2

Genotypes	GY(t/ha)	DTT	ASI	PHT(cm)	EHT(cm)	EP	E/P	EA
ZH201237	3.597	62	3.0	192	109	0.59	0.83	3.8
ZH201191	3.577	62	3.5	198	86	0.42	0.79	4.3
ZH201167	3.574	62	2.8	178	92	0.52	0.87	4.5
ZH201109	3.507	63	3.3	187	96	0.51	0.92	3.7
ZH20964	3.506	62	2.5	219	111	0.51	0.73	3.7
ZH201107	3.483	61	2.4	194	104	0.54	0.69	4.3
ZH20909	3.482	61	3.6	192	100	0.54	0.67	4.3
ZH201100	3.432	62	3.9	207	112	0.55	0.72	4.8
ZH20898	3.403	63	2.9	175	111	0.64	0.90	4.3
ZH201165	3.339	60	2.9	196	110	0.56	0.86	4.4
ZH20985	3.331	62	2.5	188	102	0.55	0.70	4.5
ZH201119	3.301	63	2.5	182	99	0.56	0.68	3.7
ZH20922	3.276	62	0.0	192	101	0.52	0.76	4.0
ZH20969	3.236	62	1.4	185	101	0.55	0.85	4.3
ZH20945	3.198	61	2.1	210	108	0.52	0.84	4.3
ZH201201	3.159	62	4.7	184	91	0.50	0.71	4.0
ZH201211	3.027	61	3.0	196	99	0.51	0.86	3.7
ZH201037	2.972	60	3.8	216	120	0.55	0.69	4.2
ZH201048	2.943	61	1.9	185	89	0.48	0.78	4.5
ZH20906	2.589	63	2.6	193	105	0.55	0.66	4.5
ZH201106	2.557	60	3.9	187	106	0.57	0.80	4.2
Mean	5.152	61	2.4	195	107	0.55	0.92	3.9
F test	***	***	***	ns	ns	ns	ns	***
LSD (0.05)	1.86	1.9	1.8	31.1	23.6	0.12	0.22	0.7
CV, %	19.92	2.4	30.7	6.7	8.3	7.47	10.15	8.4
Phenotypic Variance	1.05	2.2	0.5	169.6	78.2	0.00	0.01	0.1
Genotypic Variance	0.58	1.6	0.1	20.9	0.0	0.00	0.00	0.0
Heritability	0.56	0.8	0.2	0.1	0.0	0.00	0.35	0.3

Evaluation of HY2005-129D at NMRP, Rampur in spring season of 2021

A total of 225 genotypes along with three commercial checks and two internal checks were evaluation under the trails name HY2005-129D at NMRP, Rampur in the spring season of 2021 (Table 131). Genotypes ZH201405 (6.58 t ha^{-1}), ZH201281 (6.127 t ha^{-1}), ZH201334 (5.31 t ha^{-1}), ZH201289 (4.78 t ha^{-1}), ZH201375 (4.49 t ha^{-1}), ZH201294 (4.48 t ha^{-1}), ZH201322 (4.44 t ha^{-1}), ZH201348 (4.40 t ha^{-1}), ZH201421 (4.29 t ha^{-1}) and ZH201465 (4.26 t ha^{-1}) were the top ten high yielding genotypes produced relatively more grain yield over to best check i.e. commercial check-3 (3.23 t ha^{-1}), commercial check-1 (2.93 t ha^{-1}) and commercial check-2 (1.35 t ha^{-1}) and internal check-6 (2.28 t ha^{-1}) and internal check-5 (0.88 t ha^{-1}) with average yield of 2.481 t ha^{-1} for all 225 genotypes. Almost 104%, 90% and 65% yield Advantage were found

for the three genotypes ZH21106 ZH201405 (6.58 t ha^{-1}), ZH201281 (6.127 t ha^{-1}) and ZH201334 (5.31 t ha^{-1}) respectively over high yielding check used i.e., commercial check-3 (3.230 t ha^{-1}). The minimum anthesis day was 52 while maximum was 60 days with mean anthesis days recorded of 58. The plant height ranged from 207-272 cm with mean 243 cm. Similarly recorded maximum ear height was 184 cm and minimum were 105 cm with mean ear height of 155 cm. Three top yielder genotypes like ZH 201405, ZH 201281 and ZH 201334 showed greater than 0.66 E:P ratio. Among the recorded character, higher heritability index was there for days to anthesis with value 0.5 followed by grain yield (0.19).

Table 131: Evaluation of HY2005-129D at NMRP, Rampur in spring season of 2021

EN	Genotypes	GY(t/ha)	DTT	PHT(cm)	EHT(cm)	EP	E/P	EA
132	ZH201405	6.580	56	243	154	0.63	0.97	3.7
8	ZH201281	6.127	58	255	170	0.67	0.80	3.0
61	ZH201334	5.317	58	257	150	0.58	0.77	3.4
16	ZH201289	4.789	58	255	176	0.69	0.84	4.2
102	ZH201375	4.496	57	257	155	0.61	0.95	4.0
21	ZH201294	4.485	57	252	165	0.66	0.82	4.0
49	ZH201322	4.449	59	214	127	0.58	0.73	4.7
75	ZH201348	4.408	57	273	181	0.66	1.19	4.0
148	ZH201421	4.291	56	233	157	0.68	0.52	4.5
192	ZH201465	4.267	57	267	160	0.59	0.96	3.8
114	ZH201387	4.246	58	244	141	0.60	0.89	3.7
71	ZH201344	4.233	57	266	175	0.66	0.78	4.1
164	ZH201437	4.139	58	250	166	0.67	0.78	4.8
97	ZH201370	4.120	59	255	154	0.60	0.62	3.5
101	ZH201374	4.061	58	249	169	0.68	0.73	4.3
178	ZH201451	3.908	59	235	132	0.56	0.66	4.5
217	ZH201490	3.889	59	225	145	0.63	0.80	4.2
116	ZH201389	3.858	58	260	173	0.67	0.58	4.3
17	ZH201290	3.857	59	265	163	0.62	0.46	3.9
137	ZH201410	3.844	59	235	149	0.63	0.73	3.5
199	ZH201472	3.835	58	236	152	0.65	0.74	4.1
100	ZH201373	3.823	57	130	NA	NA	0.90	4.6
19	ZH201292	3.785	59	244	184	0.76	0.94	4.1
6	ZH201279	3.776	58	207	127	0.62	0.47	3.5
29	ZH201302	3.736	56	258	158	0.62	0.62	3.8
124	ZH201397	3.704	59	272	180	0.67	0.78	3.9

EN	Genotypes	GY(t/ha)	DTT	PHT(cm)	EHT(cm)	EP	E/P	EA
94	ZH201367	3.700	58	243	149	0.62	0.69	4.3
135	ZH201408	3.691	57	236	138	0.59	0.99	3.8
9	ZH201282	3.642	59	219	163	0.77	0.88	4.2
201	ZH201474	3.598	59	241	153	0.64	0.61	4.5
155	ZH201428	3.576	57	233	159	0.69	0.76	3.9
82	ZH201355	3.545	57	252	170	0.68	0.58	3.6
43	ZH201316	3.540	59	251	157	0.63	0.69	4.5
169	ZH201442	3.538	58	230	150	0.66	0.73	4.1
140	ZH201413	3.528	57	262	169	0.64	0.63	3.5
33	ZH201306	3.495	58	261	157	0.60	0.63	3.8
211	ZH201484	3.467	59	258	162	0.63	0.44	4.2
128	ZH201401	3.429	58	266	159	0.59	0.68	4.4
103	ZH201376	3.426	58	255	159	0.62	0.40	4.3
157	ZH201430	3.383	58	237	151	0.64	0.57	4.3
90	ZH201363	3.379	58	260	149	0.58	0.59	4.3
35	ZH201308	3.375	59	228	174	0.76	0.68	4.0
3	ZH201276	3.363	57	222	130	0.57	0.68	3.5
93	ZH201366	3.361	59	236	149	0.64	0.71	4.6
214	ZH201487	3.352	58	240	171	0.72	0.59	4.4
64	ZH201337	3.300	57	259	142	0.55	0.59	4.1
50	ZH201323	3.297	58	243	154	0.64	0.66	4.5
74	ZH201347	3.295	57	258	168	0.66	0.75	4.9
76	ZH201349	3.293	59	249	182	0.73	0.67	4.4
195	ZH201468	3.292	58	255	164	0.64	0.70	4.1
38	ZH201311	3.281	60	245	137	0.56	0.49	4.3
225	Com check-3	3.234	52	244	105	0.43	0.80	4.2
28	ZH201301	3.228	58	276	181	0.66	0.45	4.1
118	ZH201391	3.225	58	223	161	0.73	0.50	4.6
77	ZH201350	3.222	58	264	164	0.62	0.71	3.8
198	ZH201471	3.219	57	249	161	0.65	0.49	4.7
130	ZH201403	3.161	59	229	157	0.68	0.60	3.7
32	ZH201305	3.159	57	264	141	0.53	0.70	4.4
160	ZH201433	3.123	57	276	176	0.64	0.62	4.2
134	ZH201407	3.112	57	251	175	0.70	0.68	4.3
41	ZH201314	3.088	59	258	145	0.57	0.65	4.4
159	ZH201432	3.053	56	240	165	0.69	0.85	4.4
119	ZH201392	3.029	57	234	154	0.66	0.66	4.2

EN	Genotypes	GY(t/ha)	DTT	PHT(cm)	EHT(cm)	EP	E/P	EA
18	ZH201291	3.012	57	230	121	0.53	0.80	4.1
54	ZH201327	3.000	59	263	163	0.62	0.51	3.9
115	ZH201388	2.977	59	255	145	0.57	1.05	4.1
58	ZH201331	2.974	59	248	155	0.62	0.65	4.0
156	ZH201429	2.969	59	251	167	0.68	0.73	4.0
177	ZH201450	2.963	58	235	153	0.65	0.50	4.4
51	ZH201324	2.957	56	231	155	0.68	0.66	4.4
223	Com check-1	2.939	54	235	138	0.59	0.65	4.9
56	ZH201329	2.929	58	240	137	0.57	0.78	4.0
191	ZH201464	2.924	58	258	159	0.62	0.79	4.4
2	ZH201275	2.912	59	249	174	0.71	0.75	4.0
13	ZH201286	2.888	59	235	175	0.74	0.41	4.7
26	ZH201299	2.876	58	225	179	0.81	0.85	4.6
27	ZH201300	2.875	59	251	166	0.67	0.66	4.4
205	ZH201478	2.875	58	219	149	0.69	0.67	4.3
37	ZH201310	2.855	58	254	144	0.57	0.49	3.7
123	ZH201396	2.848	59	246	151	0.61	0.78	4.8
218	ZH201491	2.840	58	242	141	0.58	0.60	4.7
209	ZH201482	2.828	57	250	172	0.69	0.44	3.9
172	ZH201445	2.784	57	256	127	0.51	0.37	4.5
25	ZH201298	2.775	59	248	152	0.61	0.54	4.4
186	ZH201459	2.729	58	262	135	0.51	0.66	4.5
79	ZH201352	2.707	58	248	138	0.56	0.75	4.2
117	ZH201390	2.684	57	245	147	0.60	0.60	4.4
47	ZH201320	2.682	59	258	158	0.61	0.62	4.4
83	ZH201356	2.672	59	239	157	0.66	0.56	4.2
87	ZH201360	2.649	60	233	174	0.75	0.69	4.0
120	ZH201393	2.631	58	237	170	0.71	0.49	4.6
46	ZH201319	2.593	59	257	138	0.54	0.48	4.6
144	ZH201417	2.577	57	240	167	0.70	0.38	4.0
202	ZH201475	2.574	57	253	140	0.55	0.58	4.3
131	ZH201404	2.566	58	233	138	0.59	0.54	4.0
68	ZH201341	2.541	57	238	166	0.70	0.57	4.4
73	ZH201346	2.539	58	241	124	0.51	0.87	4.4
171	ZH201444	2.539	60	239	145	0.61	0.61	4.3
193	ZH201466	2.497	58	238	155	0.66	0.59	4.3
65	ZH201338	2.495	57	249	171	0.69	0.57	4.3

EN	Genotypes	GY(t/ha)	DTT	PHT(cm)	EHT(cm)	EP	E/P	EA
84	ZH201357	2.462	60	253	161	0.63	0.65	4.4
121	ZH201394	2.460	59	253	158	0.63	0.47	4.4
142	ZH201415	2.439	59	235	154	0.66	0.54	4.5
95	ZH201368	2.437	60	229	138	0.60	0.58	4.3
91	ZH201364	2.393	57	232	137	0.59	0.61	4.5
62	ZH201335	2.391	58	238	135	0.56	0.43	4.3
15	ZH201288	2.390	58	267	132	0.49	0.51	4.7
215	ZH201488	2.377	57	262	148	0.57	0.51	4.3
153	ZH201426	2.370	55	251	152	0.61	0.61	4.5
96	ZH201369	2.359	56	216	148	0.70	0.51	3.9
108	ZH201381	2.328	58	233	166	0.71	0.49	4.1
188	ZH201461	2.326	58	237	131	0.55	0.69	4.7
206	ZH201479	2.318	57	250	179	0.72	0.61	4.5
216	ZH201489	2.313	59	231	158	0.68	0.45	4.6
184	ZH201457	2.292	58	247	141	0.58	0.65	4.6
222	Internal check-6	2.281	59	249	145	0.59	0.40	4.6
220	ZH201493	2.250	58	262	138	0.52	0.66	4.4
48	ZH201321	2.249	59	256	157	0.61	0.68	3.9
162	ZH201435	2.244	60	280	158	0.56	0.54	4.2
23	ZH201296	2.241	58	229	175	0.78	0.56	3.9
127	ZH201400	2.218	59	226	159	0.71	0.68	4.7
175	ZH201448	2.212	58	244	176	0.72	0.71	4.5
1	ZH201275	2.200	58	266	153	0.57	0.61	4.6
166	ZH201439	2.175	58	258	169	0.66	0.61	4.5
197	ZH201470	2.168	60	258	174	0.68	0.62	4.2
165	ZH201438	2.165	59	261	187	0.72	0.52	4.4
187	ZH201460	2.142	59	250	183	0.73	0.59	4.3
30	ZH201303	2.140	58	229	135	0.59	0.45	4.2
149	ZH201422	2.086	58	237	145	0.62	0.57	4.9
194	ZH201467	2.079	56	263	163	0.62	0.64	4.6
179	ZH201452	2.068	60	219	135	0.62	0.41	4.2
182	ZH201455	2.051	59	246	162	0.66	0.37	4.6
78	ZH201351	2.049	59	221	156	0.71	0.52	4.4
107	ZH201380	2.046	58	225	151	0.67	0.55	4.8
60	ZH201333	2.045	57	249	176	0.71	0.60	4.3
55	ZH201328	2.041	60	249	149	0.58	0.53	4.2
69	ZH201342	2.028	57	263	167	0.64	0.92	4.4

EN	Genotypes	GY(t/ha)	DTT	PHT(cm)	EHT(cm)	EP	E/P	EA
126	ZH201399	2.028	58	238	158	0.67	0.54	3.6
86	ZH201359	2.017	58	238	169	0.71	0.54	4.3
203	ZH201476	2.009	58	244	185	0.76	0.45	4.6
31	ZH201304	2.007	59	228	138	0.61	0.45	4.5
136	ZH201409	2.003	59	231	116	0.50	0.49	4.2
12	ZH201285	1.990	59	243	123	0.51	0.56	4.4
141	ZH201414	1.982	60	242	164	0.68	0.54	4.9
80	ZH201353	1.975	58	250	159	0.63	0.46	4.5
104	ZH201377	1.970	59	231	135	0.57	0.36	4.3
170	ZH201443	1.959	58	253	179	0.70	0.45	4.5
40	ZH201313	1.949	59	232	173	0.77	0.45	4.6
183	ZH201456	1.941	58	229	150	0.65	0.47	3.8
212	ZH201485	1.932	59	227	162	0.71	0.58	4.4
70	ZH201343	1.931	59	227	143	0.63	0.53	4.3
112	ZH201385	1.930	58	241	140	0.59	0.29	4.4
122	ZH201395	1.928	59	250	165	0.67	0.57	4.2
66	ZH201339	1.922	57	245	161	0.65	0.37	4.5
36	ZH201309	1.913	60	238	165	0.70	0.71	4.5
67	ZH201340	1.893	58	232	161	0.70	0.46	4.1
109	ZH201382	1.879	58	223	154	0.69	0.40	4.2
150	ZH201423	1.874	59	241	169	0.71	0.52	4.9
145	ZH201418	1.855	56	258	172	0.67	0.40	4.5
10	ZH201283	1.849	62	226	148	0.66	0.39	4.4
105	ZH201378	1.849	60	258	160	0.62	0.37	4.5
72	ZH201345	1.839	59	236	146	0.62	0.57	4.7
189	ZH201462	1.837	59	231	134	0.58	0.52	4.6
154	ZH201427	1.829	58	246	157	0.64	0.44	4.5
143	ZH201416	1.825	57	239	148	0.62	0.42	4.3
185	ZH201458	1.812	58	236	157	0.69	0.46	4.2
7	ZH201280	1.808	58	260	118	0.46	0.51	4.1
45	ZH201318	1.808	59	236	141	0.60	0.46	4.6
129	ZH201402	1.805	59	234	137	0.59	0.45	4.3
151	ZH201424	1.795	58	236	164	0.70	0.30	4.6
147	ZH201420	1.791	62	268	168	0.63	0.45	4.6
152	ZH201425	1.774	58	261	176	0.67	0.47	4.4
88	ZH201361	1.767	58	241	145	0.61	0.41	4.7
168	ZH201441	1.750	58	252	169	0.68	0.75	4.1

EN	Genotypes	GY(t/ha)	DTT	PHT(cm)	EHT(cm)	EP	E/P	EA
99	ZH201372	1.747	58	248	148	0.60	0.53	4.1
14	ZH201287	1.729	60	256	182	0.71	0.51	4.4
57	ZH201330	1.720	58	243	153	0.63	0.46	4.5
92	ZH201365	1.705	59	224	147	0.66	0.18	4.6
139	ZH201412	1.703	61	223	166	0.74	0.42	4.1
53	ZH201326	1.683	58	237	128	0.54	0.36	4.4
163	ZH201436	1.647	60	219	153	0.70	0.59	4.8
174	ZH201447	1.638	59	244	152	0.62	0.36	4.1
24	ZH201297	1.622	58	240	155	0.65	0.46	4.1
181	ZH201454	1.622	58	238	166	0.69	0.39	4.0
219	ZH201492	1.613	59	238	140	0.59	0.34	4.1
63	ZH201336	1.609	59	233	152	0.66	0.41	4.5
44	ZH201317	1.602	61	242	156	0.66	0.46	4.4
158	ZH201431	1.601	58	248	166	0.67	0.50	4.7
207	ZH201480	1.595	59	232	140	0.60	0.38	4.2
200	ZH201473	1.562	59	254	190	0.75	0.33	4.3
81	ZH201354	1.560	59	254	163	0.63	0.36	2.5
98	ZH201371	1.550	58	266	181	0.69	0.40	4.6
111	ZH201384	1.495	57	225	149	0.68	0.25	4.4
204	ZH201477	1.458	58	242	164	0.68	0.43	4.4
176	ZH201449	1.445	59	139	90	0.63	0.25	4.1
213	ZH201486	1.407	58	275	163	0.60	0.60	4.2
85	ZH201358	1.386	58	215	138	0.64	0.54	4.7
113	ZH201386	1.379	59	211	154	0.72	0.27	4.2
208	ZH201481	1.363	60	232	154	0.66	0.36	5.1
224	Com check-2	1.356	54	259	131	0.50	0.56	4.4
138	ZH201411	1.340	58	252	147	0.59	0.39	4.5
52	ZH201325	1.322	58	255	182	0.71	0.35	4.6
11	ZH201284	1.307	59	218	130	0.60	0.28	4.6
5	ZH201278	1.302	60	247	148	0.60	0.35	4.5
133	ZH201406	1.298	56	241	148	0.62	0.39	4.5
190	ZH201463	1.290	59	239	156	0.65	0.39	4.2
89	ZH201362	1.230	59	238	154	0.65	0.36	4.4
20	ZH201293	1.197	57	257	151	0.59	0.29	4.3
173	ZH201446	1.195	58	200	129	0.64	0.40	4.4
146	ZH201419	1.194	57	258	157	0.61	0.35	4.2
125	ZH201398	1.176	60	232	166	0.72	0.46	4.6

EN	Genotypes	GY(t/ha)	DTT	PHT(cm)	EHT(cm)	EP	E/P	EA
161	ZH201434	1.151	58	231	158	0.68	0.27	4.4
22	ZH201295	1.087	59	263	170	0.64	0.30	4.3
196	ZH201469	1.087	60	252	161	0.64	0.54	4.7
110	ZH201383	1.037	59	224	164	0.74	0.32	4.2
34	ZH201307	1.032	60	252	182	0.73	0.36	4.3
39	ZH201312	0.890	60	238	173	0.72	0.28	4.2
221	Internal check-5	0.887	58	239	165	0.69	0.33	4.6
59	ZH201332	0.860	58	238	152	0.64	0.39	4.9
210	ZH201483	0.818	58	225	159	0.71	0.32	4.5
167	ZH201440	0.788	58	242	128	0.54	0.32	4.5
42	ZH201315	0.675	58	254	161	0.63	0.12	4.9
4	ZH201277	0.651	61	226	140	0.62	0.27	4.9
106	ZH201379	0.553	56	237	101	0.43	0.24	4.2
180	ZH201453	0.405	59	246	158	0.65	0.23	4.7
	Mean	2.481	58	243	155	0.64	0.56	4.3
	F test	***	***	***	**	ns	+	***
	LSD (0.05)	2.28	2.2	38.7	40.1	0.18	0.43	0.8
	CV, %	40.39	2.0	7.2	10.5	10.02	31.71	8.0
	Phenotypic Variance	1.00	1.4	306.5	265.9	0.00	0.03	0.1
	Genotypic Variance	0.15	0.6	0.0	1.9	0.00	0.00	0.0
	Heritability	0.19	0.5	0.0	0.0	0.00	0.00	0.2

Evaluation of HY2111-16D in spring season of 2021 at NMRP, Rampur

A total of 72 genotypes along with three commercial checks and one internal check were evaluation under the trails name HY2111-16D at NMRP, Rampur in spring season of 2021. Genotypes ZH21106 (8.28 t ha^{-1}), ZH21104 (7.63 t ha^{-1}), ZH 21121(7.07 t ha^{-1}), ZH21101 (6.77 t ha^{-1}), ZH2195 (6.74 t ha^{-1}) and ZH2182 (6.65 t ha^{-1}) were the top six high yielding genotypes produced relatively more grain yield over to best check i.e., commercial check-3 (6.63 t ha-1), commercial check-2 (5.43 t ha^{-1}) and commercial check-1 (4.78 t ha^{-1}) and internal check (4.14 t ha^{-1}) with average yield of 3.614 t ha^{-1} for all 72 genotypes (Table 132). Almost 25%, 15% and 7% yield Advantage were found for genotypes ZH21106 (8.28 t ha^{-1}), ZH21104 (7.63 t ha^{-1}) and ZH 21121 (7.07 t ha^{-1}) respectively over high yielding check used i.e., commercial check-3 (6.63 t ha^{-1}). Some genotypes were comparatively taller having plant height of 256 cm while some genotypes were comparatively shorter having plant height. Among the recorded characters, higher heritability index was there grain yield (0.74) and ear aspect (0.7).

Table 132: Evaluation of HY2111-16D in spring season of 2021 at NMRP, Rampur

Genotypes	GY(t/ha)	DTT	PHT(cm)	EHT(cm)	EP	E/P	EA
ZH21106	8.285	53	234	137	0.58	0.88	2.5
ZH21104	7.638	55	237	135	0.57	0.99	3.0
ZH21121	7.078	57	230	140	0.61	1.00	3.0
ZH21101	6.772	54	256	142	0.56	1.16	3.5
ZH2195	6.744	56	229	142	0.62	0.98	3.5
ZH2182	6.659	57	216	127	0.60	0.83	4.5
Com check-3	6.639	52	220	100	0.46	1.06	3.0
ZH2188	6.469	52	197	112	0.57	0.85	3.5
ZH21110	6.241	56	216	143	0.66	0.96	4.0
ZH2157	5.504	57	245	150	0.62	0.76	4.7
ZH2110	5.492	58	218	114	0.53	0.88	3.5
Com check-2	5.430	54	210	111	0.53	0.90	4.5
ZH2166	5.395	59	236	146	0.62	0.79	3.5
ZH2116	5.276	55	240	141	0.59	0.93	3.8
ZH21125	5.033	56	225	119	0.53	0.78	4.5
ZH2139	4.960	57	257	135	0.52	0.83	4.0
ZH21108	4.889	54	227	136	0.60	0.84	4.0
Com check-1	4.780	54	240	143	0.60	0.66	4.5
ZH21112	4.774	53	234	159	0.69	0.79	4.2
ZH2197	4.706	53	230	134	0.59	0.86	3.7
ZH2162	4.660	52	208	127	0.61	0.75	4.5
ZH2112	4.595	58	260	147	0.57	1.29	4.2
ZH2183	4.514	52	199	117	0.59	0.77	3.8
ZH21128	4.428	61	235	130	0.55	0.98	3.5
ZH2181	4.153	51	229	125	0.55	0.73	4.0
Internal check	4.149	57	207	130	0.63	0.51	4.2
ZH2176	3.966	53	216	138	0.65	0.65	4.5
ZH2151	3.777	53	205	101	0.49	0.45	4.5
ZH2123	3.685	53	200	120	0.60	0.86	4.5
ZH2161	3.671	59	198	121	0.61	0.65	4.0
ZH2134	3.588	55	235	134	0.58	0.66	4.5
ZH2165	3.551	57	230	134	0.58	0.55	4.0
ZH2196	3.530	56	238	116	0.49	0.64	4.5
ZH2150	3.477	56	208	92	0.44	0.77	4.5
ZH2129	3.388	58	207	129	0.62	0.66	4.8
ZH2137	3.347	55	202	119	0.59	0.72	4.3

Genotypes	GY(t/ha)	DTT	PHT(cm)	EHT(cm)	EP	E/P	EA
ZH2130	3.051	55	208	114	0.55	0.59	4.5
ZH2199	3.013	58	224	137	0.62	0.55	4.7
ZH2160	2.982	56	236	139	0.59	0.37	4.5
ZH2138	2.909	58	220	127	0.58	0.48	4.5
ZH2164	2.905	51	226	105	0.46	0.65	4.8
ZH2178	2.860	54	214	107	0.50	0.61	4.5
ZH2153	2.830	54	206	125	0.61	0.79	4.0
ZH2155	2.830	51	220	121	0.56	0.43	4.5
ZH2136	2.650	53	229	119	0.52	0.43	4.7
ZH2125	2.543	53	198	95	0.48	0.53	4.0
ZH2168	2.489	57	237	112	0.48	0.50	4.8
ZH2175	2.443	58	229	125	0.55	0.69	4.3
ZH2098	2.434	54	226	154	0.68	0.40	4.5
ZH2148	2.431	58	209	124	0.59	0.45	4.5
ZH2169	2.421	54	223	135	0.61	0.47	4.8
ZH2131	2.397	56	194	106	0.55	0.37	5.0
ZH2124	2.390	53	229	151	0.66	0.51	5.0
ZH2158	2.334	54	217	140	0.65	0.70	4.3
ZH2127	2.316	53	216	143	0.66	0.38	4.2
ZH2171	2.266	54	198	119	0.60	0.53	4.5
ZH2126	2.200	53	236	127	0.53	0.37	5.0
ZH2146	2.195	51	235	118	0.50	0.35	5.0
ZH2144	2.194	54	185	110	0.60	0.40	4.7
ZH2111	2.045	59	225	131	0.59	0.51	4.8
ZH2172	2.042	58	185	111	0.60	0.43	4.5
ZH2142	1.977	56	207	134	0.65	0.32	4.8
ZH2156	1.959	57	240	129	0.54	0.19	4.8
ZH2174	1.772	57	220	133	0.61	0.62	4.5
ZH2163	1.749	52	196	111	0.57	0.40	4.7
ZH2173	1.621	54	237	124	0.52	0.14	5.0
ZH2099	1.466	52	220	101	0.46	0.22	4.7
ZH2159	1.273	55	240	131	0.55	0.15	4.6
ZH2167	1.238	57	227	117	0.52	0.08	4.5
ZH2128	1.159	58	214	116	0.54	0.18	4.5
ZH2152	1.025	56	214	125	0.58	0.20	5.0
ZH2170	0.529	57	205	115	0.56	0.40	5.0
Mean	3.614	55	221	126	0.57	0.62	4.3

Genotypes	GY(t/ha)	DTT	PHT(cm)	EHT(cm)	EP	E/P	EA
F test	**	+	ns	ns	ns	ns	***
LSD (0.05)	2.54	2.7	31.2	28.4	0.13	0.46	0.9
CV, %	48.64	4.3	7.4	11.5	9.79	41.87	12.5
Phenotypic Variance	3.09	5.6	271.2	209.8	0.00	0.07	0.3
Genotypic Variance	2.18	4.5	150.4	86.6	0.00	0.04	0.2
Heritability	0.74	0.8	0.6	0.5	0.00	0.62	0.7

Evaluation of HY21104-1117D at NMRP, Rampur in spring season of 2021

A total of 26 genotypes along with two commercial checks and two internal checks were evaluation under the trails name HY21104-117D in spring season of 2021 at NMRP, Rampur. Genotypes ZH203 (5.51 t ha^{-1}), ZH20265 (5.48 t ha^{-1}), ZH 2153252(5.42 t ha^{-1}), ZH18580 (5.28 t ha^{-1}), ZH152560 (5.24 t ha^{-1}) and ZH1862 (5.03 t ha^{-1}) were high yielding genotypes produced grain yield at par to best check (Table 133) i.e., internal check-2 (6.31 t ha^{-1}), internal check-1 (4.40 t ha^{-1}) and commercial check-1 (3.89 t ha^{-1}) and commercial check-2 (3.63 t ha^{-1}) with average yield of 4.30 t ha^{-1} for all 26 genotypes. Internal check-2 was found high yielding genotypes among the tested genotypes for Chitwan condition.

Table 133: Evaluation of HY21104-117D in spring season of 2021 at NMRP, Rampur

Entry	Name	GY(t/ha)	DTT	ASI	PHT(cm)	EHT(cm)	EP	E/P
24	Internal check-2	6.312	59	2.5	240	140	0.59	1.00
1	ZH203	5.517	55	3.5	193	118	0.61	0.97
3	ZH20265	5.488	58	1.5	227	117	0.52	1.17
22	VH153252	5.423	55	1.5	215	120	0.55	0.85
6	ZH18580	5.282	57	2.0	239	119	0.50	0.83
12	VH152560	5.248	58	2.5	217	121	0.56	1.09
13	VH1862	5.032	58	3.0	250	162	0.65	0.90
19	VH18574	4.823	58	1.5	247	156	0.63	0.63
20	VH19488	4.778	58	3.0	217	137	0.64	0.80
11	ZH18335	4.698	60	3.5	213	131	0.62	0.88
8	ZH182079	4.628	57	4.0	237	151	0.64	0.90
15	VH1910	4.562	59	6.5	236	134	0.57	0.69
17	VH199	4.432	59	3.5	228	132	0.57	0.87
23	Internal check-1	4.407	58	2.5	211	119	0.56	0.72
5	ZH20378	4.398	57	3.0	236	131	0.56	0.78
4	ZH20375	4.337	58	2.0	249	145	0.59	0.73
9	ZH191077	4.327	58	2.5	223	139	0.63	0.75

Entry	Name	GY(t/ha)	DTT	ASI	PHT(cm)	EHT(cm)	EP	E/P
21	KH15486	4.233	57	2.5	230	130	0.56	0.90
25	Commercial check-1	3.897	56	2.0	222	120	0.54	0.82
7	ZH191074	3.672	58	2.0	242	152	0.63	0.89
26	Commercial check-2	3.633	52	2.0	208	107	0.52	0.82
18	VH151399	3.163	58	3.5	220	128	0.58	0.55
2	ZH2081	2.787	54	3.0	218	122	0.56	1.06
14	VH153228	2.477	58	2.5	225	132	0.58	0.54
10	ZH181050	2.283	58	3.0	231	122	0.53	0.80
16	VH153227	2.158	58	2.5	225	135	0.60	0.61
	Mean	4.308	57	2.8	227	131	0.58	0.83
	F test	ns	**	***	ns	ns	ns	ns
	LSD (0.05)	1.98	2.0	na	34.8	28.2	0.09	0.34
	CV, %	24.6	3.0	37.2	6.1	10.3	7.08	18.84
	Phenotypic Variance	1.12	3.0	1.0	189.5	182.0	0.00	0.02
	Genotypic Variance	0.63	2.5	na	45.4	84.5	0.00	0.01
	Heritability	0.59	0.8	na	0.2	0.5	0.50	0.48

Evaluation of HY21104-114D at USC, Dhangadi in spring season of 2021

The results of 26 genotypes evaluated in HY21104-114D at Unique Seed Company, Dhangadi in the spring season of 2021 (Table 134). The results showed the differences for grain yield, anthesis silking interval, root and shoot lodging, plant and ear aspect. Out of 26 genotypes evaluated VH1910 (7.87 t ha^{-1}) and VH 1862 (7.771 t ha^{-1}) are the highest yielding genotypes at USC, Dhangadi (Table:). The grain yield performance of theses genotypes is even higher than best check i.e., internal check-1 (7.27 t ha^{-1}). Among the four-check used highest yield was obtained for internal check-1 (7.27 t ha^{-1}). Almost 9% and 7 % yield Advantage were found for genotypes VH1910 (7.87 t ha^{-1}) and VH 1862 (7.771 t ha^{-1}) respectively over high yielding best check used i.e., internal check-1 (7.27 t ha^{-1}). The anthesis days ranged from 50 to 67 days with recorded mean days of 57. Plant height ranged from 206 to 259 with mean 234 cm. Similarly, ear height ranged from 99 to 139 with mean 118 cm. Almost all genotypes had good ear aspect character showing the mean value of ear aspect 2.65. Among the recorded character, higher heritability index was there for anthesis days with value 0.79, plant height (0.69) and ear height (0.68).

Table 134: Evaluation of HY21104-114D at USC, Dhangadi in spring season of 2021

Genotypes	GY(t/ha)	DTT	ASI	PHT(cm)	EHT(cm)	EP	E/P	EA
VH1910	7.873	57	1.4	206	99	0.48	0.85	2.5
VH1862	7.771	58	2.0	251	138	0.55	0.77	3.0

Genotypes	GY(t/ha)	DTT	ASI	PHT(cm)	EHT(cm)	EP	E/P	EA
Internal check-1	7.271	56	1.0	253	130	0.52	0.90	2.3
ZH20378	7.197	58	2.1	245	135	0.55	1.07	2.3
KH15486	7.193	56	0.9	209	110	0.53	0.98	2.8
ZH20265	6.786	57	1.5	234	111	0.48	0.90	2.3
VH18574	6.674	60	2.0	253	123	0.48	0.97	2.8
VH19488	6.651	57	1.5	247	137	0.56	0.81	2.8
ZH2081	6.437	50	1.6	227	109	0.48	0.89	4.0
ZH203	6.289	56	1.0	222	111	0.50	0.96	3.5
ZH18580	6.189	60	1.5	235	107	0.46	0.91	2.5
ZH18335	5.966	62	2.0	221	119	0.54	0.84	3.3
Com check-1	5.926	52	2.0	217	101	0.47	0.66	4.0
ZH182079	5.878	58	1.4	246	125	0.51	0.91	3.0
ZH191077	5.807	57	2.1	259	130	0.51	1.13	2.8
VH152560	5.593	55	1.4	237	123	0.52	0.89	2.8
VH153227	5.368	56	1.4	248	123	0.57	0.91	3.3
Com check-2	4.739	51	2.5	214	99	0.46	0.77	4.0
Internal check-2	4.524	67	2.0	215	106	0.49	0.90	2.5
VH153252	4.438	54	2.4	220	100	0.46	0.68	2.8
VH153228	4.367	59	2.1	236	103	0.44	0.73	2.5
VH151399	4.227	56	1.6	216	108	0.50	0.57	3.3
ZH191074	4.197	60	2.1	246	139	0.57	0.91	3.5
ZH181050	3.976	63	2.0	242	128	0.54	0.85	3.5
ZH20375	3.949	59	2.5	259	131	0.50	0.89	2.8
VH199	3.754	61	1.5	233	122	0.52	0.70	2.3
Mean	5.732	57	1.8	234	118	0.51	0.86	2.9
F test	ns	ns	*	ns	+	ns	ns	*
LSD0.05	3.32	5.2	1.20	26.6	21.9	0.10	0.42	1.72
CV, %	22.2	6.6	25.2	6.9	11.3	7.3	14.6	18.7
Phenotypic Variance	1.61	14.22	0.19	257.63	175.84	0.00	0.02	0.30
Genotypic Variance	0.29	11.19	0.02	176.88	113.56	0.00	0.00	0.00
Heritability	0.19	0.79	0.13	0.69	0.68	0.00	0.00	0.00

Evaluation of HY2113-118D in spring season of 2021 at Gokulwesor, Baitadi

A total of 26 genotypes including three commercial checks were evaluated in HY2113-118D at Gokulwesor, Baitadi. The results showed the significant differences for root and shoot lodging, ear aspect whereas non-significant difference among tested genotypes for grain yield, days to anthesis, anthesis

silking interval, plant height, ear height, number of plant and ear position indicating the similar performance of the tested genotypes (Table 135). Out of 26 genotypes evaluated Z1524-1 (13.75 t ha^{-1}), Z1524-18 (11.93 t ha^{-1}) and Z1524-17 (10.84 t ha^{-1}) produced relatively higher grain yield at par to best commercial check i.e., commercial check-1 (12.72 t ha^{-1}). Among the three commercial check used highest yield was obtained for commercial check-1 (12.72 t ha^{-1}). The 8% yield advantage was found for genotypes Z1524-1 (13.75 t ha^{-1}) respectively over high yielding best check used i.e., commercial check-1 (12.72 t ha^{-1}). The flowering behavior of those genotypes seems medium as well as short anthesis silking interval.

Table 135: Evaluation of HY2113-118D in spring season of 2021 at Gokulwesor, Baitadi

Genotypes	GY(t/ha)	DTT	ASI	PHT(cm)	EHT(cm)	EP	E/P	NOP	EA
Z1524-1	13.752	64	0.5	279	160	0.58	1.52	32	2.1
Com check 1	12.723	59	2.0	256	118	0.47	1.16	37	2.5
Z1524-18	11.938	63	2.0	287	139	0.49	0.94	32	1.7
Z1524-17	10.84	59	1.5	264	129	0.48	1.02	32	1.9
Z1515-15	10.573	60	2.5	294	155	0.53	1.36	35	2.0
Z1524-34	10.553	62	2.5	288	169	0.59	1.53	33	1.7
Z1515-28	10.206	61	3.0	262	160	0.61	1.38	35	2.0
Com check 2	9.995	58	1.0	260	147	0.58	1.10	38	2.5
Z1524-35	9.599	63	3.5	307	184	0.60	1.56	36	1.5
Z1515-51	9.369	60	1.5	272	151	0.56	1.66	32	2.5
Z1515-10	9.301	63	2.5	276	155	0.57	1.21	31	2.2
Z1524-42	8.935	63	1.5	254	159	0.63	1.49	35	2.0
Z1514-14	8.909	62	4.5	254	133	0.53	1.05	33	1.8
Z1524-33	8.889	61	1.0	247	145	0.59	1.24	34	2.5
Z1515-22	8.208	62	3.0	255	143	0.56	0.96	31	1.9
Com check 3	8.168	64	1.0	299	148	0.49	0.96	34	1.7
Z1515-77	7.995	65	1.5	283	148	0.53	1.01	34	1.9
Z1514-13	7.762	65	1.5	228	99	0.44	1.44	31	1.7
Z1524-6	7.685	57	1.5	249	138	0.56	1.08	34	1.6
Z1524-39	6.779	63	1.0	262	155	0.59	1.54	29	2.6
Z1515-37	6.21	66	2.0	249	135	0.55	1.01	28	2.6
Z1514-2	5.818	66	2.5	261	125	0.50	1.41	24	1.8
Z1514-12	5.15	68	1.5	275	144	0.53	1.47	25	1.6
Z1514-9	4.259	64	3.5	292	144	0.49	1.04	31	2.2
Z1515-66	4.199	65	2.5	268	163	0.61	1.21	29	1.6

Genotypes	GY(t/ha)	DTT	ASI	PHT(cm)	EHT(cm)	EP	E/P	NOP	EA
Z1515-78	3.851	64	1.5	255	137	0.53	1.23	24	2.5
Mean	8.526	63	2.0	268	146	0.54	1.25	32	2.0
F test	ns	ns	+	ns	ns	ns	+	ns	*
LSD (0.05)	3.00	1	1.8	16	19	0.09	0.35	8	0.5
CV, %	30.2	4.4	46.7	7.0	11.8	9.2	18.1	11.6	18.0
Phenotypic Variance	6.634	7	0.9	355	294	0.00	0.05	14	0.1
Genotypic Variance	1.894	7	0.5	307	246	0.00	0.04	6	0.0
Heritability	0.65	0.97	0.60	0.92	0.85	0.67	0.72	0.47	0.58

Evaluation of HY21113-115D in spring season of 2021 at USC, Dhangadi

A total of 26 genotypes along with three commercial checks were evaluation under the trails name HY21113-115D in spring season of 2021 at USC, Dhangadi. Genotypes ZH 19961 (7.77 t ha^{-1}), ZH191096 (7.14 t ha^{-1}), ZH192127 (6.90 t ha^{-1}) and ZH19940 (6.86 t ha^{-1}) were high yielding genotypes produced grain yield at par to best commercial check i.e., CAH153 (9.10 t ha^{-1}), P1844 (8.77 t ha^{-1}) and DKC9108 (6.09 t ha^{-1}) with average yield of 5.27 t ha^{-1} for all 26 genotypes (Table 136). Commercial checks genotypes CAH153, P1844 and DKC9108 were found high yielding genotypes among the tested genotypes at USC, Dhangadi. The flowering behavior of those genotypes seems medium as well as short anthesis silking interval showing perfect synchronization between male and female flower.

Table 136: Evaluation of HY21113-115D in spring season of 2021 at USC, Dhangadi

Genotypes	GY(t/ha)	DTT	ASI	PHT(cm)	EHT(cm)	EP	E/P	EA	PA
CAH153	9.102	58	1.5	232	127	0.55	0.96	1.8	2.7
P1844	8.774	51	2.0	238	102	0.43	0.82	2.8	3.8
ZH19961	7.778	56	1.5	241	115	0.47	0.84	1.8	2.6
ZH191096	7.146	58	1.5	245	126	0.52	0.79	1.8	3.5
ZH192127	6.903	55	1.0	231	132	0.57	0.70	3.0	2.6
ZH19940	6.865	54	2.0	228	111	0.49	0.78	3.5	2.0
DKC9108	6.090	57	1.5	222	92	0.41	0.84	3.8	2.8
ZH191065	5.840	61	2.0	248	135	0.54	0.86	3.0	3.3
ZH191953	5.637	55	1.5	228	117	0.52	0.71	2.5	2.4
ZH19814	5.613	52	2.0	227	115	0.51	0.91	3.0	3.1
ZH192050	5.454	62	2.5	223	123	0.55	0.66	2.5	2.3
ZH191063	5.351	64	2.0	233	126	0.54	0.78	3.8	3.4
ZH192030	5.253	60	1.0	224	131	0.58	0.75	3.0	3.0
ZH191037	5.135	60	1.0	238	131	0.56	0.69	2.3	3.2
ZH191046	4.955	54	1.0	239	123	0.52	0.59	2.5	3.2

Genotypes	GY(t/ha)	DTT	ASI	PHT(cm)	EHT(cm)	EP	E/P	EA	PA
ZH191100	4.934	59	1.5	247	112	0.46	0.89	3.8	2.8
ZH192246	4.840	64	1.0	250	123	0.48	0.82	3.8	3.9
ZH19782	4.787	58	1.5	240	136	0.56	0.96	4.0	3.1
ZH191179	4.548	64	1.0	237	112	0.47	0.76	2.8	2.6
ZH192201	4.537	58	2.0	236	129	0.54	0.71	3.5	3.4
ZH192252	3.849	58	1.0	239	121	0.51	0.55	3.5	3.1
ZH191158	3.219	61	1.5	241	115	0.48	0.80	3.3	2.8
ZH192010	3.188	62	1.5	212	116	0.55	0.60	3.8	2.7
ZH191061	3.007	56	1.5	235	133	0.58	0.53	2.8	2.5
ZH191965	2.657	56	1.0	234	124	0.54	0.72	3.3	3.4
ZH191155	1.554	66	2.0	230	112	0.48	0.61	4.0	3.4
Mean	5.270	58	1.5	235	121	0.51	0.75	3.0	3.0
F test	ns	ns	**	ns	ns	ns	ns	+	ns
LSD (0.05)	2.08	7.0	1.5	25.6	19.0	0.00	0.23	1.1	1.0
CV, %	34.21	6.5	28.6	3.8	8.8	8.95	15.82	22.6	15.6
Phenotypic Variance	3.25	14.5	0.2	80.5	112.5	0.00	0.01	0.5	0.2
Genotypic Variance	2.53	3.4	0.0	0.0	63.9	0.00	0.01	0.3	0.1
Heritability	0.84	0.4	0.0	0.0	0.6	0.80	0.55	0.7	0.3

4.2 Nepal Seed and Fertilizer (NSAF)

Evaluation of Regional Early Multiple Stress Tolerant Pro-Vitamin A (REMST Pro A) enriched maize hybrids in winter season of 2020-21 at NMRP, Rampur

With the objective of developing multiple stress tolerant pro-vitamin A enriched early maize hybrids, evaluation trial was conducted during winter season of 2020-21 at NMRP, Rampur. This trial consisted of altogether 27 genotypes, out of which 25 were stress tolerant pro vitamin A enriched genotypes and two were check variety. Rampur hybrid-10 and Rajkumar variety were used as check variety. This research was laid out in alpha lattice design having the plot size of 2 rows of 4 meter long with net plot area of 6 m^2. Among the evaluated traits, grain yield, anthesis days and silking days found statistically highly significantly different among those varieties having the mean value of 4.6 t ha^{-1}, 102 days and 104 days respectively. While, traits like plant height, ear height and ear aspect found statistically significantly different among the genotypes having the mean value of 171 cm, 88 cm and 2.9 respectively. Unlikely, there was non-significant difference for the traits like number of plants per hectare and number of ears per hectare (Table 137). Among those evaluated genotypes, top 10 high yielding genotypes were PVAQEH-1 (7.41 t ha^{-1}), Rampur Hybrid-10 (7.05 t ha^{-1}), Rajkumar (6.73 t ha^{-1}), PVAEHT-15 (5.65 t ha^{-1}), PVAQEH-3 (5.33 t ha^{-1}), PVAQEH-2 (5.21 t ha^{-1}), PVAEHT-30 (5.07 t ha^{-1}), PVAEHT-24

(5 t ha^{-1}), PVAQEH-29 (4.98 t ha^{-1}) and PVAQEH-4 (4.86 t ha^{-1}). There was perfect flowering synchronization among those evaluated varieties having the mean ASI of only 2 days. Despite being the stress tolerant and early genotypes, top most high yielding genotypes PVAQEH-1 had the almost 5.3% and 10.1% higher yield than check varieties RH-10 and Rajkumar respectively. Details on evaluated multiple stress tolerant pro vitamin A enriched early maize hybrids is presented in the table 137.

Table 137: Evaluation of regional early multiple stress tolerant hybrids in winter season of 2020/21 at NMRP, Rampur

Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP	NOE	EA
PVAQEH-1	7.417	102	106	195	100	53333	59167	1.8
Rampur Hybrid-10	7.058	108	108	173	70	54167	54167	2.5
RAJKUMAR	6.739	101	103	208	100	55833	58333	1.8
PVAEHT-15	5.654	100	101	170	83	55833	62500	3.3
PVAQEH-3	5.332	98	99	193	108	54167	55833	3.0
PVAQEH-2	5.211	101	103	155	90	55833	54167	2.5
PVAEHT-30	5.078	101	102	160	75	55833	59167	2.5
PVAEHT-24	5.002	102	104	183	95	55833	57500	2.8
PVAQEH-29	4.982	102	105	175	90	56667	56667	3.0
PVAQEH-4	4.863	104	105	185	103	45000	57500	2.5
PVAEH-29	4.689	101	104	175	85	51667	58333	3.0
PVAEH-21	4.584	105	107	180	103	51667	55833	3.3
PVAEH-18	4.405	101	103	168	88	57500	60000	3.3
PVAEQH-27	4.403	103	106	185	105	50000	46667	3.0
PVAEH-23	4.386	102	104	163	73	50000	52500	3.3
PVAEH-22	4.283	106	109	175	95	55000	55833	3.3
PVAEH-16	4.153	101	103	153	73	51667	53333	3.0
PVAQEH-5	4.072	103	104	160	95	54167	60000	3.5
PVAEH-27	4.007	101	102	185	110	55000	43333	2.5
PVAEH-17	3.916	100	103	168	90	57500	56667	3.0
PVAEH-28	3.905	102	103	170	85	51667	51667	3.3
PVAEH-14	3.757	104	107	150	75	50000	51667	3.8
PVAEH-20	3.683	102	106	175	88	50000	52500	3.3
PVAQEH-6	3.571	101	101	175	88	33333	39167	3.3
PVAEH-26	3.519	102	104	165	90	49167	57500	2.5
PVAEH-19	3.034	101	103	155	80	36667	45000	3.3
PVAEH-25	2.486	101	104	130	68	43333	47500	3.3
Mean	4.606	102	104	171	88	51367	54400	2.9
F test	**	**	**	*	*	ns	ns	*
LSD (0.05)	1.04	2.73	1.68	17.89	14.92	-	-	0.534
CV, %	16.79	1.26	1.2	7.82	12.62	14.65	11.31	13.6

4.2.2.1 Evaluation of pro-vitamin A enriched bio-fortified maize hybrids (Yellow and Orange) in winter season at NMRP, Rampur

Collaborative research between the National Maize Research Program (NMRP) and CIMMYT was conducted at Rampur, Nepal under the Nepal Seed and Fertilizer (NSAF) project with the objective of developing high yielding pro vitamin A enriched bio-fortified maize hybrids suitable for Rampur like environment. Under this trial, altogether 36 genotypes were evaluated and RH-10 was used as check variety. Research was laid out in alpha lattice design having the plot size of 2 rows of 4-m length replicated thrice. Among the evaluated traits, except plant height, all traits were found statistically highly significant difference among the genotypes. For plant height, difference among the genotypes was statistically significant (Table 6). Mean value for evaluated traits like grain yield, DTT, DTS, PHT, EHT, NOP ha^{-1}, NOE ha^{-1} and ear aspect were 4.66 t ha^{-1}, 109 days, 112 days, 177 cm, 93 cm, 42731, 40864 and 3.3 respectively. Among those 36 genotypes, top 10 high yielding genotypes were A1804-14 (8.05 t ha^{-1}), RH-10 (7.78 t ha^{-1}), LY1501-9 (7.24 t ha^{-1}), A1804-15 (7.21 t ha^{-1}), A1804-67 (6.75 t ha^{-1}), LY1001-23 (6.70 t ha^{-1}), LY1501-1 (6.69 t ha^{-1}), A1804-66 (6.60 t ha^{-1}), LY1409-61 (6.48 t ha^{-1}) and LY1501-5 (6.42 t ha^{-1}). Among the evaluated varieties, perfect synchronization between anthesis and silking was there with mean ASI of 3 days and maximum ASI of 4 days. Detail information about those evaluated pro vitamin A enriched bio-fortified yellow and orange maize hybrids is presented in the table 138.

Table 138: Evaluation of pro-vitamin A enriched bio-fortified maize hybrids (yellow and orange) in winter season of 2020/21 at NMRP, Rampur

Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP ha^{-1}	NOE ha^{-1}	EA
A1804-14	8.05	108	109	177	93	56111	46667	2.8
Rampur Hybrid-10	7.78	108	109	182	92	56111	60000	2.8
LY1501-9	7.24	107	111	190	97	57778	55556	3.0
A1804-15	7.21	110	112	163	92	56667	57778	3.0
A1804-67	6.75	106	109	167	80	56667	58333	3.0
LY1001-23	6.70	109	112	185	100	57778	52778	2.8
LY1501-1	6.69	107	110	198	103	53333	55556	2.8
A1804-66	6.60	109	111	187	103	58333	55000	3.2
LY1409-61	6.48	107	109	197	107	54444	55556	2.8
LY1501-5	6.42	109	111	182	88	43333	43889	2.7
LY1409-14	6.23	108	110	178	102	53333	44444	2.8
A1802-4	5.46	110	114	168	78	50556	30556	3.0
LY1312-11	5.38	110	114	188	100	55000	55000	3.3
LY1501-8	5.34	109	112	208	113	44444	45556	3.2
LY1501-6	5.20	109	111	192	93	43333	47222	3.0
A1802-16	5.04	108	110	175	102	52778	54444	3.3

Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	NOP ha^{-1}	NOE ha^{-1}	EA
LY1001-18	4.69	107	110	167	87	49444	38889	3.0
LFE Hybrid-3	4.61	107	109	172	102	40000	27222	3.2
M1124-31	4.61	106	110	150	78	44444	38333	3.2
LY1501-7	4.59	112	114	183	93	34444	38889	3.0
A1702-28	4.49	108	109	175	92	30000	35556	2.8
LFE Hybrid-4	4.29	111	114	185	95	48889	47778	3.0
A1706-2	4.25	109	112	198	102	30556	31111	3.5
LY1409-21	4.09	109	113	163	97	33333	34444	3.0
A1801-44	3.97	108	110	172	93	40000	45000	3.5
A1736-12	3.63	112	113	168	80	27222	29444	3.2
A1736-6	3.49	108	109	175	85	24444	23333	2.7
A1312-4	3.33	111	113	188	92	45000	42778	3.8
A1736-13	2.59	109	110	175	93	16667	19444	3.5
LY1312-12	2.52	112	115	180	98	41667	39444	4.0
A1801-43	2.46	110	111	153	82	22778	26111	3.5
A1702-53	2.11	113	117	185	85	36111	38333	4.2
A1702-49	1.78	113	115	153	77	27778	27222	4.2
LY1312-4	1.43	111	113	172	93	27222	20000	4.0
LY1501-3	1.36	113	115	177	93	27222	24444	4.8
LY1302-9	0.92	117	120	150	75	41111	25000	4.7
Mean	4.66	109	112	177	93	42731	40864	3.3
F test	***	***	***	*	**	***	***	***
LSD, 0.05	2.1	4.1	4.6	43.8	31.1	13404.7	16894.8	0.57
CV, %	26.4	2.3	2.5	15.2	20.6	19.2	25.4	10.7

4.3 Multi-National Company Hybrid (MNCH)

4.3.1 Evaluation of Multi-national Company's hybrid (MNCH)

The multinational company hybrid maize trial consisted of 88 hybrids including Rampur hybrid-10 as check was laid out in Random complete block design in 15 m^2 (4 rows of 5m length) with three replication having 75 and 25 cm row to row and plant to plant spacing respectively during winter season of 2020/21 at NMRP Rampur. Two seeds per hill were planted and later thinned at single plant per hill. The fertilizer dose of 180:60:40 NPK kg/ha was applied. Full dose of DAP and MoP was applied at the time of sowing while half of nitrogen was applied at pre-planting and rest was applied when plants were knee high stage. Observation was taken from two central rows. Grain shelled from five randomly selected ears to recorded percent of grain moisture at harvest from each plot. Grain yield was converted into t ha^{-1}.

Experiment showed that, for all genotypes, male flowering was initiated 101 days after planting and it was continued till 117 days with averages anthesis day of 111 while female flowering was initiated 104 days of planting and was extended till 119 days with average anthesis days of 113 (Table 139). There was highly significant difference between anthesis days and significant difference between silking days among the hybrids. There were highly significant difference between hybrids for plant height having minimum value of 141cm and maximum value of 251cm with average of 201cm.There were highly significant difference between hybrids for ear height having minimum value 50cm and maximum value of 160cm with average of 99cm.There were highly significant difference between hybrids for number of plant per hectare having minimum population 31111 and maximum population 59556 with average of 49631.Similiarly for number of ear per hectare having minimum ear 33333 and maximum ear 66222 with average ear was 50422.There were highly significant difference between hybrids for cob length having minimum value of 12 cm and maximum value of 18cm with average of 15cm.There were highly significant difference between cob diameter between hybrids having minimum value of 4cm and maximum value of 5cm with average value of 4cm.There were highly significant difference between number of kernel row between hybrids having minimum value of 12 and maximum value of19 with average value of 14. There was highly significant difference between number of kernel row per ear between hybrids having minimum value of 24 and maximum value of 39 with average value of 31.

There was highly significant difference for grain yield among the tested hybrid we have varietal selection options to choose best hybrids for particular domains conducted at NMRP Rampur. Top yielding hybrids among 88 was MRM4065 (9.422t/ha) followed by 4118 (9.018t/ha), DTTV757 (8.908t/ha), RMH-567 (8.655t/ha), MRM4062 (8.576t/ha), MM2122 (8.276t/ha) and NK6702 (8.208t/ha) with average value of 6.662t/ha. Therefore, they were potential hybrids for releases/registration in the future after combined analysis of multi-year and location data analysis.

Table 139 Grain yield and other traits of multi-national company hybrids at NMRP,Rampur, 2020/21.

EN	Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	RE	HC	PA	EA	TUR	MA	CL	CD	KRN	NKPR	TKW
1	MBS-1122	5.810	112	114	234	129	2	2	2	3	2	2	14	4	14	30	370
2	MBS-1144	5.534	112	115	203	99	6	2	2	3	2	2	15	5	19	31	350
3	MBS1155	6.908	109	112	210	85	3	2	2	2	2	2	15	4	13	34	330
4	MBS1188	4.617	114	117	158	83	3	2	3	3	2	2	13	4	14	28	301
5	MBS5622	7.058	115	119	141	67	2	2	3	3	2	2	12	4	14	27	285
6	NONGKEDA 8	6.997	102	105	191	69	3	2	2	2	2	2	15	4	16	27	315
7	DUNYU12	7.008	105	108	157	50	1	2	2	2	2	2	14	4	16	29	280
8	DUNYU13	6.033	101	104	181	61	2	2	2	2	2	2	14	4	16	26	327
9	DUNYU15	6.453	103	105	173	61	2	2	2	2	2	2	15	4	15	24	312
10	DUNYU16	6.817	106	108	176	70	3	2	2	2	2	2	13	4	13	24	403
11	SUPER6778	4.088	107	110	167	68	2	2	2	2	2	2	15	4	13	32	339
12	SUPER 22	6.448	110	112	242	134	3	2	3	3	2	2	15	4	14	31	373
13	SUPER 55	6.992	112	113	220	79	6	2	2	2	2	2	16	4	13	34	332
14	SUPER 9090	7.167	111	114	179	88	3	2	2	2	2	2	16	5	15	31	412
15	SUPER 9396	4.086	114	115	160	84	1	2	2	3	2	2	15	5	14	29	371
16	VNR3099	7.077	109	112	188	90	2	2	2	3	2	1	13	5	17	28	330
17	VNR 4226	7.034	110	113	186	88	1	2	2	2	2	2	15	4	14	34	335
18	VNR4550	7.398	111	111	206	94	2	2	2	2	2	2	14	4	14	32	330
19	VNR4361	7.499	117	118	204	95	3	2	2	2	1	2	14	5	15	31	388
20	VNR4343	7.425	113	115	223	120	1	1	2	2	2	2	15	5	15	33	393
21	MM9440	5.284	113	114	203	114	7	2	2	3	2	2	16	5	16	35	385
22	MM9442	7.468	112	113	215	115	4	2	2	3	2	2	16	4	14	31	366
23	MM9488	6.828	112	114	206	104	1	1	2	3	2	2	15	5	16	31	425

EN	Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	RE	HC	PA	EA	TUR	MA	CL	CD	KRN	NKPR	TKW
24	MM9443	7.109	113	113	225	98	7	2	2	2	2	2	14	5	15	32	325
25	SHREE RAM 9696	5.129	115	117	200	115	5	2	2	3	2	2	13	5	15	29	375
26	SHREE RAM 5511	6.333	109	111	183	87	5	1	2	2	2	2	15	5	14	31	408
27	SHREE RAM Rajkumar gold	6.754	112	114	184	104	1	2	2	2	2	2	15	4	12	35	355
28	shree ram 605	6.751	107	110	211	113	3	2	2	3	2	2	17	5	15	33	369
29	shree ram 9861	6.273	115	117	199	112	1	2	2	3	1	1	15	4	13	35	1483
30	GK3203	6.640	113	115	181	84	2	1	2	2	2	2	16	5	16	31	407
31	GK3226	5.848	112	113	231	131	1	2	2	3	2	2	17	5	13	35	419
32	GK3155	7.537	111	114	224	137	3	2	2	3	2	2	15	4	14	31	389
33	GK3254	6.761	115	113	193	101	4	2	2	2	1	1	16	5	14	36	358
34	GK3255	7.757	112	113	207	107	1	2	2	2	1	1	16	4	14	34	414
35	TMMH2858	6.700	109	112	223	86	4	2	2	2	2	2	15	4	14	32	354
36	TMMH812	6.258	113	115	181	96	1	1	2	3	2	2	16	5	14	34	413
37	TMMH826	7.085	110	114	194	95	2	2	2	2	2	2	14	4	14	32	324
38	TMMH846	7.582	114	117	184	100	1	1	2	2	1	1	15	5	14	32	409
39	TMMH 844	5.654	112	114	186	92	3	2	2	2	2	2	15	4	13	32	349
40	DTTV9293	6.913	117	119	194	102	1	2	2	2	1	1	16	5	16	35	406
41	DTTV757	8.908	116	117	193	110	4	2	2	2	1	1	16	5	15	37	422
42	DTTV759	7.399	112	114	207	101	2	2	2	2	1	1	16	5	14	34	407
43	PAC741	6.519	110	112	214	104	2	2	2	3	2	2	16	4	13	33	416
44	PAC745 GOLD	7.845	109	111	208	111	2	2	2	3	2	2	16	4	13	31	345
45	MRM4066	6.421	108	110	196	93	1	2	2	2	2	2	15	5	14	32	394
46	MRM4010	4.642	106	108	172	85	0	2	2	3	2	2	15	4	12	31	379
47	MRM4050	6.891	110	112	183	107	3	2	2	3	2	2	15	4	13	33	371

EN	Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	RE	HC	PA	EA	TUR	MA	CL	CD	KRN	NKPR	TKW
48	MRM4065	9.422	117	115	200	102	4	1	2	2	1	1	18	5	14	38	400
49	MRM4062	8.576	118	119	192	108	2	2	2	2	1	1	18	5	15	39	436
50	DELTA 22	5.853	111	113	185	97	5	2	2	3	2	2	15	5	16	29	346
51	DELTA3333	5.837	111	113	179	104	4	2	2	3	2	2	15	4	13	31	405
52	DELTA5555	5.662	108	112	189	88	4	2	2	3	2	2	14	4	14	31	360
53	DELTA9999	6.753	107	109	197	90	5	2	2	2	2	1	15	5	14	30	417
54	DELTA90V90 GOLD	6.924	113	115	223	119	3	2	2	3	2	2	16	5	14	34	362
55	HERO NO 1	5.797	106	109	160	72	3	2	2	2	2	2	15	4	13	29	351
56	SHAAN111	7.281	111	113	245	146	4	2	3	3	2	2	14	4	13	29	1592
57	MAN131	6.394	110	112	216	72	4	2	2	2	2	2	16	4	14	33	358
58	UTTAM-121	5.180	111	111	187	74	3	2	2	3	2	2	14	4	13	29	363
59	SWEETY -1	6.131	112	114	216	109	8	2	2	3	2	2	15	5	14	33	392
60	STARX-6	6.555	112	112	233	129	3	2	2	3	2	2	15	4	14	32	389
61	STARX-55	5.886	110	113	207	78	7	2	2	2	2	2	15	4	13	31	351
62	STAR X-55	7.316	109	112	212	70	7	2	2	2	2	2	16	4	14	35	345
63	HERO-202	6.479	109	111	229	77	8	2	2	2	2	2	16	4	13	33	345
64	RMH-9999	6.023	110	111	218	85	5	2	2	2	2	2	15	4	13	33	371
65	RMH-666	6.154	111	113	213	91	5	2	2	2	1	1	15	5	13	33	425
66	RMH-1899super	6.853	112	114	175	99	2	2	2	3	2	2	15	4	13	30	379
67	RMH-1818	6.634	107	110	202	117	1	2	2	3	2	2	15	4	13	31	392
68	RMH-567	8.655	110	112	200	110	1	2	2	3	2	2	15	4	14	31	361
69	NK7884	6.681	108	110	206	75	1	2	2	2	2	2	15	4	13	30	401
70	NK7660	6.040	112	114	195	95	7	2	2	2	2	2	14	5	14	32	360
71	NK6702	8.208	110	111	225	110	2	2	2	2	2	2	14	4	14	29	371

EN	Genotypes	GY(t/ha)	DTT	DTS	PHT(cm)	EHT(cm)	RE	HC	PA	EA	TUR	MA	CL	CD	KRN	NKPR	TKW
72	NK6607	7.614	112	114	225	100	2	2	2	2	2	2	15	5	15	31	424
73	NK7720	7.208	113	115	190	84	8	2	2	2	2	2	14	5	13	31	1806
74	4118	9.018	113	115	237	138	4	2	2	3	2	2	14	5	14	34	379
75	3499	6.468	113	116	184	99	0	2	2	3	2	2	14	5	17	32	344
76	5454	7.241	112	113	186	99	2	2	2	2	2	2	15	5	14	32	403
77	4558	5.986	110	111	184	103	2	2	2	3	2	2	13	5	14	29	404
78	NMH 1255	5.947	108	111	227	81	4	2	2	2	2	2	15	4	13	33	347
79	NMH1258	5.955	111	113	187	101	1	2	2	2	2	2	14	4	15	29	335
80	NMH8392	8.664	111	111	238	137	5	2	2	3	2	2	15	5	15	30	397
81	NMH4040	6.098	115	115	219	127	2	2	3	3	2	2	15	4	13	31	460
82	MM2929	7.907	112	113	251	160	6	2	2	3	2	2	15	4	14	30	366
83	MM2033	6.270	111	113	221	116	12	2	2	3	2	2	15	5	14	32	353
84	MM2424	7.621	110	112	223	114	5	2	2	3	2	2	14	5	13	31	435
85	MM2050	4.730	111	113	217	109	7	2	2	3	2	2	15	5	15	31	384
86	MM2122	8.276	111	112	234	118	2	2	2	3	2	2	13	4	14	28	410
87	RML-86/RML-96	5.615	115	114	220	113	1	2	2	2	2	2	15	4	12	32	377
88	RAMPUR HYB 10	4.570	113	113	168	76	2	2	2	2	2	2	14	4	13	27	403
	Grand Mean	6.662	111	113	201	99	3	2	2	2	2	2	15	4	14	31	416
	P value	0.00	0.00	0.00	0.00	0.00	0.001	0.00	0.008	0.001	0	0	0	0	0	0	0.378
	LSD (0.05)	1.71	3.95	4.12	19.37	15.79	4.68	0.46	0.42	0.45	0.48	0.45	1.36	0.27	1.73	3.37	633.25
	CV,%	15.95	2.21	2.26	5.96	9.89	89.39	16.01	12.14	11.67	17.22	15.99	5.65	3.75	7.62	6.63	94.22

GY=Grain yield,DTT=Days to anthesis,DTS=Days to silking,PHT=Plant height,EHT=ear height,PN=plant number,EN=ear number,RE=Rotten ear,HC-Husk cover,PA=plant aspect,EA=Ear aspect,TUR-Turcicum,MA=Maydis,CL=Cob length,CD=Cob diameter,KRN=Kernel row number,NKPR=Number of kernel per row.

4.4 Prime Minister Agriculture Modernization Project (PMAMP)

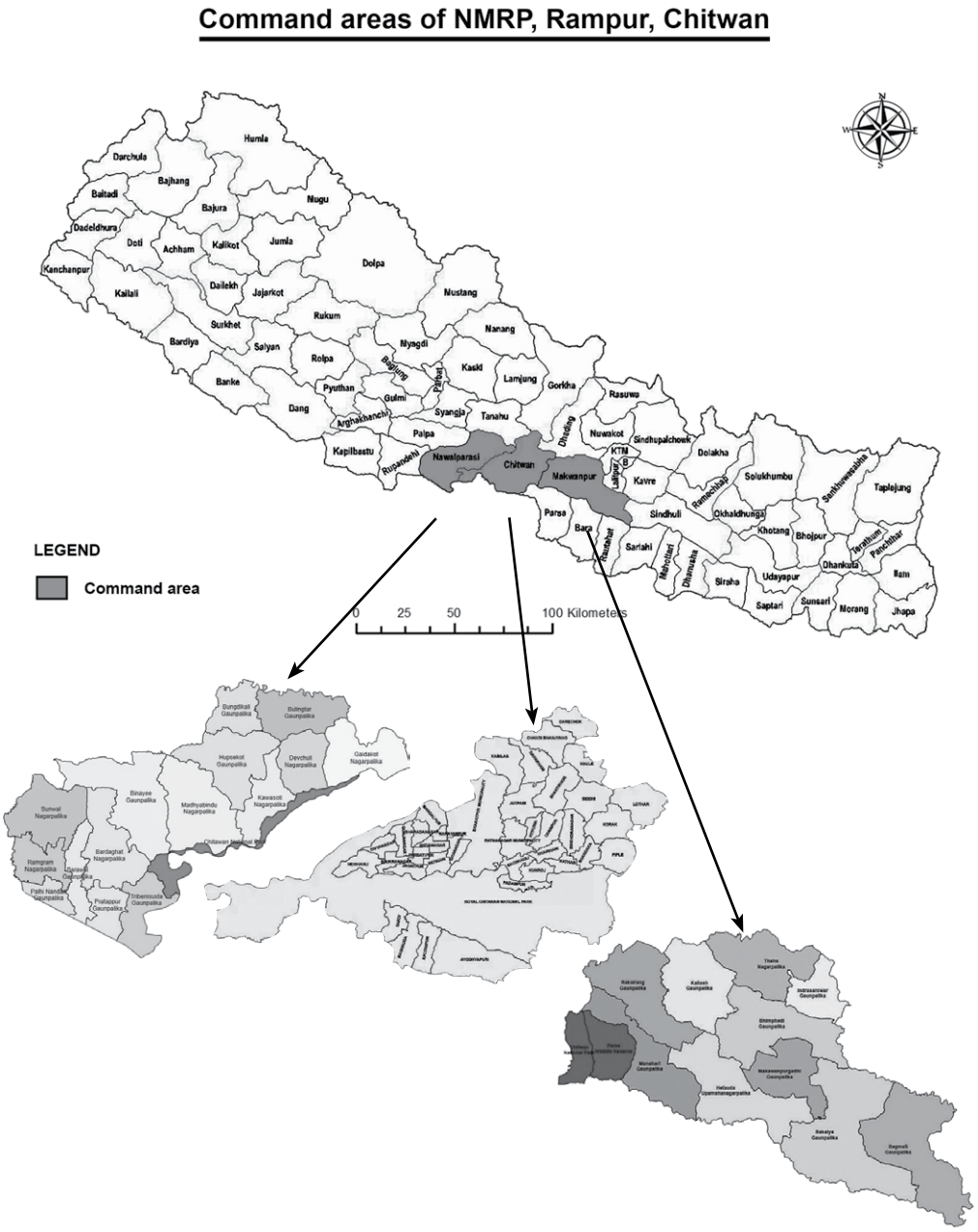
Under this project source seed production of maize was conducted at NMRP Rampur, PMAMP-Dang, Gorkha Seed Company Dang and Pabitra Cooperatives Surkhet. F1 seed of 4.0 t was jointly produced by PMAMP-Dang and Gorkha Seed Company Dang. Similarly, 2.0 t F1 seed of Rampur Hybrid 10 was produced at NMRP, Rampur. In addition, seed production of Rampur Composite was conducted by Pabitra Cooperatives Surkhet in 5.0 ha land. The expected foundation seed production of this variety is 5.0 t. Seed grader (multi-crop) having 1.5 t hr^{-1} was purchased and installed at seed processing comlex of NMRP, Rampur. Two cold stores having capacity of 12 t and 2.0 t have been installed at Rampur.

4.5 Feed the Future Nepal: Integrated Pest Management (FTFNIPM)

4.5.1 Rearing of fall armyworm and its parasitoids (*Trichogramma chilonis* and *Telenomus remus*) at NMRP Laboratory

Egg masses and larvae of fall armyworm were collected for identification of parasitoids associated with them. We have found three parasitoids namely *Telenomus* and *Chelonis* in the egg and larvae of fall armyworm and *Cotesia* was found in stem borer larvae in maize field at NMRP during 2077/78. We are still searching these parasitoids in the larvae of fall armyworm. Similarly, Rearing of Rice meal moth (*Corcyra cephalonica)* for the production of egg parasitoid *(Trichogramma chilonis)* and rearing of fall armyworm (*Spodoptera frugiperda*) for the production of egg parasitoid (*Telenomus remus*) is continue at NMRP Laboratory and now, could able to supply seed of parasitoids as a Tricho-card throughout the year to the government and private laboratories if they will demand it.

Annex 1.1 Map of the Command Area of NMRP



Annex 1.2 Annex Monthly Agro-meteorological Data of the NMRP, Rampur 2077/78

Month/Year	Max. Temp (°C)	Min. Temp (°C)	Precipitation (mm)	Humidity (%)
July,2020	32.80	25.16	1064.7	84
August,2020	31.00	25.90	288.7	88
September,2020	32.69	24.71	843.79	85
October,2020	33.30	21.05		82
November,2020	29.09	12.03		82
December,2020	24.04	8.73		82
January,2021	24.04	9.43		62
February,2021	26.95	9.08		59
March,2021	31.59	14.12		59
April,2021	35.42	16.62	33.8	50
May,2021	31.76	21.67	339.5	77
June,2021	33.29	24.60	564.2	83
July,2020	32.80	25.16	1064.7	84

Annex 1.3 Province wise maize Area (ha), production (ton) and yield(t/ha) 2076/77

Provinces	Area (ha)	Production (ton)	Yield (t/ha)
1	290,304	867,718	2.99
2	52,391	175,684	3.35
Bagmati	191,268	617,760	3.23
Gandaki	139,421	433,560	3.11
Lumbini	143,178	398,462	2.78
Karnali	91,689	225,227	2.46
Sudurpaschim	49,399	117,296	2.37
NEPAL	957,650	2,835,674	2.96

Source: Statistical information on Neplease agriculture, 2076/77(2019/20), MOALD, Kathmandu, Nepal.

Annex 2.1 Map of the Office/Station

Annex 2.2 List of Laboratory Facilities

SN	Name of laboratory	Major instruments	Manpower in laboratory	Testing facilities
1.	Pathology Laboratory	Autoclave, Laminar flow, Microscopes, Air condition, Incubator, Oven, Water bath, Fridge, grinder, micropipette, digital balance etc.	Scientist (S1), Technical assistant (T4)	Fungi and bacteria isolation, culture inoculation, disease diagnosis, pathological experiments
2.	Entomology laboratory	Insect rearing and preservation tools, insect monitoring tools, fridge, centrifuge, grinder, oven, laminar flow etc	Senior scientist (S3), Scientist (S1), Technical officer(T6 Technical Assistant (T4)	Trichogramma production, Identification and preservation of major maize insect pests
3.	Agronomy, plant breeding and soil science laboratory	Seed storage refrigerator, moisture meter, Digital balance, seed counter, pH meter, light meter, leaf area meter, chlorophyll meter, micro volt meter, crossing tools, petriplates, soil kit box etc	Senior Scientist (S4,S3), Scientist (S1), Technical officer (T6), Technical Assistant (T5,T4)	Germplasm seed storage, soil analysis, agronomical experiments, crossing of genetic lines

Annex 2.3 Human Resource of NMRP, Rampur in 2077/78

S.N	Name	Position	Qualification	Specialization/Working area	Remarks
1.	Dr. Keshab Babu Koirala	Coordinator Senior Scientist S4	Ph.D.	Plant Breeding	Deputed from ARS Pakhribas
2.	Mr. Chitra Bahadur Kunwar	Senior Scientist S4	M.Sc. Ag.	Agronomy/Plant Breeding	
3.	Mr. Bhim Nath Adhikari	Senior Scientist S3	M.Sc. Ag.	Plant Breeding	
4.	Dr. Subash Subedi	Senior Scientist S3	Ph.D.	Plant Pathology	Deputed to HCRP
5.	Dr. Saraswati Neupane	Senior Scientist S3	Ph.D.	Entomology	
6.	Mr. Balram Bhandari	Scientist S1	M.Sc. Ag.	Plant Breeding	
7.	Dr. Ghanashyam Bhandari	Scientist S1	Ph.D.	Entomology	Deputed from NERC, Khumaltar
8.	Dr. Mahendra Prasad Tripathi	Scientist S1	PhD	Plant Breeding	
9	Mr. Jagat Bandhu Adhikari	Scientist S1	M. Sc. Ag	Agronomy	Transferred to HCRP
10.	Mr. Devraj Chalise	Scientist S1	M.Sc. Ag.	Soil Science	On study leave
11.	Mrs. Reena Sharma	Scientist S1	M.Sc. Ag	Soil Science	Transferred to NPRC
12.	Mr. Suk Bahadur Gurung	Scientist S1	M.Sc. Ag	Plant Pathology	Deputed from NSRP
13.	Mr. Madhusudhan Bhattarai	Senior Account Officer	MBA	Financial Administration	Deputed from NARC
14.	Mr. Govinda Bahadur Hamal	Technical Officer T6	B.Com	Outreach	
15.	Mr. Shailendra Thapa	Technical Officer T6	I.Sc. Ag.	Agronomy	Deputed from NORP, Sarlahi
16.	Mr. Buddhi Bahadur Achhami	Technical Officer T6	M.Sc. Ag.	Entomology	On study leave
17.	Mrs. Parbati Adhikari	Technical Officer T6	M.Sc. Ag.	Soil Science	
18.	Mr. Ramesh Kumar Shrestha	Technical Officer T6	B.Sc. Ag.	Entomology	Deputed form HRS Dailekh
19.	Mr. Gopal Bhandari	Technical Officer T6	B.Sc.Ag	Agronomy	Deputed form NATIC, Khumaltar
20.	Mr. Manoj Kandel	Technical Officer T6	M..Sc.Ag	Plant Breeding	Deputed form HCRP, Dolakha
21.	Mrs. Dipika Timsina	Technical Officer T6	M.Sc. Ag.	Agronomy	
22.	Mr. Damodar Gautam	Technical Officer T6	B.Sc. Ag.	Plant breeding	NSAF staff

S.N	Name	Position	Qualification	Specialization/Working area	Remarks
23.	Mr. Chetnath Lamichhane	Account Officer A6	B.Com	Account	Transferred MARI, Jumla
24.	Mrs. Laxmi Devi Parajuli	Account Officer A6	B.Com	Account	Transferred to NCRP, Rampur
25.	Mrs. Puspa Prava Bhandari	Admin. Officer A6	IA	Administration	Transferred to NCRP, Rampur
26.	Mr. Raju Subedi	Admin. Officer A6	IA	Administration	Transferred to NCRP, Rampur
27.	Mr. Rajendra Shrestha	Account Officer A6	I.Com	Account	
28.	Mr. Shyam Prasad Ghimire	Chief Admin. Assistant A5	IA	Administration	Deputed from NSGRP, Jumla
29.	Mr. Bhim Bahadur Parajuli	Technician T5	Literate	Workshop/Driver	
30.	Mr. Dil Bahadur Gurung	Technician T5	Literate	Workshop	Retired on Mansir
31.	Mr. Anjan Pathak	Technician T5	I.Sc. Ag.	Entomology	On study leave
32.	Mrs. Mira Shrestha	Technician T5	SLC	Plant Breeding	
33.	Mr. Tirtha Subedi	Technician T5	B.Sc. Ag	Plant Breeding	
34.	Mrs. Jharana Upadhyaya	Technician T5	M.Sc. Ag	Plant Breeding	Deputed to DOAR, Khajura
35.	Mr. Dhruba Regmi	Technician T5	M.Sc. Ag	Agronomy	
36.	Miss. Krishna Khatri	Technician T5	ISc. Ag	Agronomy	Deputed from DOAR, Lumle
37.	Mr. Pragya Pokharel	Technician T5	B.Sc. Ag	Plant Breeding	Deputed from HCRP, Dolakha
38.	Mrs. Laxmi Khadka	Typist, A5	IA	Administration	Deputed to MOALD, Kathmandu
39.	Mrs. Maiya Giri	Technician Assistant T4	SLC	Plant Breeding	
40.	Mr. Sunaram Titung	Technician Assistant T4	I.Sc.Ag.	Seed production	
41.	Mr. Binod Prasad Acharya	Technician Assistant T4	SLC	Soil Science	Deputed to ARS, Rasuwa
42.	Mrs. Debumaya Bhandari	Technician Assistant T4	JTA	Plant Breeding	
43.	Mrs. Mina Karki	Technician Assistant T4	SLC	Plant Breeding	Transferred to NARC, Khumaltar
44.	Mr. Kham Bahadur Praja	Technician Assistant T4	SLC	Agronomy	Deputed to NGRP, Bandipur
45.	Mr. Lokendra Oli	Technician Assistant T4	JTA	Plant pathology	Deputed to ARS, Jumla

S.N	Name	Position	Qualification	Specialization/Working area	Remarks
46.	Mr. Pramod Kumar Mishra	Technician Assistant T4	I. Sc. Ag.	Seed production	Deputed to NGRP, Bandipur
47.	Mrs. Tara Sahi	Technician Assistant T4	JTA	Agronomy	
48.	Mr. Narendra Bahadur Gurung	Driver	Literate	Workshop	Deputed from DOAR, Lumle
49.	Mr. Budha Bahadur Rana	Driver	Literate	Workshop	Deputed from NCRP, Rampur
50.	Mr. Hari Bahadur Khadka	Technician 5th	Literate	Agronomy	
51.	Mr. Bishnu Prasad Devkota	Technician 5th	Literate	Outreach	Retired from Bhadra
52.	Mr. Bidur KC	Technician 5th	Literate	Breeding	Transferred to HCRP
53.	Mr. Purna Bahadur Tamang	Admin. Assistant 5th	Literate	Workshop	Retired on Mansir
54.	Mr. Bal Krishna Ghimire	Admin. Assistant 5th	Literate	Workshop	Deputed from NGLRP, Khajura
55.	Mrs. Sunmaya Tamang	Technician 5th	Literate	Seed Production	Deputed from NGLRP, Khajura
56.	Mr. Jit Bahadur Ale	Technician 5th	Literate	Seed Production	Deputed from NGLRP, Khajura
57.	Mr. Shambhu Prasad Bhatta	Technician 4th	Literate	Soil science	Retired from Bhadra
58.	Mr. Krishna Prasad Dawadi	Technician 4th	Literate	Workshop	
59.	Mrs. Tara Ghimire	Technician 4th	Literate	Breeding	
60.	Mr. Gagan Bahadur Kathayat	Admin. Assistant 3rd	Literate	Administration	
61.	Mrs. Nanu Karki	Technician 1st	Literate	Seed production	
62.	Mr. Aash Bahadur Darai	Technician 1st	Literate	Workshop	Transferred to NCRP, Rampur

Annex 3.1 Summary Progress of NARC Research Projects and Activities of NMRP in 2077/78

Project code no.	Name of project/ activity	Project	End year	Budget (000)	Major progress/ achievements
340	Maize Research and development in Nepal	CB Kunwar	OG	3137	In CVT full season hill set BGBYPOP produced the highest yield (6.057 t/ha) followed by Manakamana-7 (5.763 t/ha) and RAMPUR S13F01 (5.687 t/ha) respectively over locations. Combined analysis of CFFT full season hill set showed that KSYNF10 produced the highest yield (4.295 t/ha) followed by farmers' variety (4.069 t/ha) and TLBRS07F16 (4.050 t/ha) respectively. Combined analysis of CVT full season terai set showed that RAMPUR S03F08 produced the highest yield (5.103 t/ha) followed by RAMPUR S13F24 (4.686 t/ha) and CEL-OHGYA×CEL-OHGYB (4.414 t/ha) respectively. Likewise in CVT-E combined analysis over locations indicated that genotype SO3TEY-LN/PP (4.400 t/ha) produced relatively more yield as compared to Arun-2 (4.327t/ha). In CFFT, genotypes EEYC1 (5.225t/ha) at Rampur; S03TEY-LN (6.980 t/ha) and Across-99402 (6.850 t/ha) at Dolakha; Across-99402 (4.507 t/ha) and S03TEY-LN (4.443 t/ha) at Dailekh. Based on overall performances, genotypes Pool-16 (5.466t/ha) occupied the first position followed by Across-99402 (5.306t/ha) in FFT. Popping maize genotypes Australia thulo dana Y (6.794t/ha), Pop45/pool 17 (4.089t/ha) and Popcorn-2 (3.519 t/ha) and sweet corn genotypes ID-8007 R (13.62t/ha), ID-8002 W (13.35t/ha) and ID-8004 Y (W) (12.84t/ha) produced higher grain yield at Rampur. QPM genotypes namely RampurS13FQ-06, RampurS13FQ-08, S00TYLQ_AB, Rampur S13FQ-02, S99TLYQ-AB and S01SIYQ were found promising for Terai and mid hills of Nepal. Effect of combinations of organic and inorganic sources was studied on Manakamana-9 during 2020/21 winter at NMRP, Rampur. Differences were observed in days to silking, ear height, no. of kernels per row, grain yield and thousand grain weight. Maximum grain yield (7.734 t ha^{-1}) was obtained from 120:60:40 kg NPK with 5 t poultry manure ha^{-1}. In another experiment two promising maize hybrids RML-86/RML-96 and CAH 1715 were evaluated under twelve treatment combinations of different fertilizers level. Variations were observed on different parameters due to treatments. Maximum grain yield of RML-86/RML-96 was 9.283 t ha^{-1} (210:80:40 kg ha^{-1}) followed by 9.120 t ha^{-1} (210:80:60 kg ha^{-1}) and maximum grain yield 9.930 t ha^{-1} (150:80:60 kg ha^{-1}) was recorded in CAH 1715 followed by 9.643 t ha^{-1} (180:80:40 kg ha^{-1}). In similar experiments on promising early maize variety EECY-1 during spring 2021 significant difference was observed in plant and ear height, no. of kernels per row and thousand grain weight. Maximum grain yield (5.994 t ha^{-1}) was obtained from the application of 150:80:60 kg NPK ha^{-1} followed by 5.974 t ha^{-1} with the application of 90:80:40 kg NPK ha^{-1}. Such experiment was also conducted at the NMRP's agronomy farm during spring of 2021 in maize inbred i.e. RML-18 and RML-150. Significant differences were observed for majority of observed paraments due to variety. Maximum grain yield of RML-18 was 2.762 t ha^{-1} (90:60:60 kg ha^{-1}) followed by 2.716 t ha^{-1} (150:60:40 kg ha^{-1}). Similarly, maximum grain yield 1.203 t ha^{-1} (90:60:40 kg ha^{-1}) was recorded in RML-150 followed by 1.101 t ha^{-1} (150:60:60 kg ha^{-1}).

Project code no.	Name of project/ activity	Project	End year	Budget (000)	Major progress/ achievements
					Similarly in farmers field of maize outreach research sites (Devchuli area of Nawalpur and Madi area of Chitwan), two maize hybrids RH-10 and CAH1715 were compared in spinosad (0.3 ml/l of water) sprayed and non-sprayed plots. Similarly, the higher percent infested borer plant (12.23 %) and no. of dead hearts (6.5) was recorded in non-sprayed plots compared to sprayed plots i.e. percent infested borer plant (5 %) and no. of dead hearts (3.7).
341	Development of conventional and non-conventional hybrids for different production environments in Nepal	MP Tripathi	OG	1731	Among 110 NMRP developed single cross hybrids, high yielding genotypes at Rampur were RL232/RL111 (14.778 t ha^{-1}), RML85/ RML146 (12.798 t ha^{-1}), RML145/RML98 (12.749 t ha^{-1}), RML11-1/RML298 (12.508 t ha^{-1}), RML86/RML146 (12.446 t ha^{-1}), RL296/RML170 (12.010 t ha^{-1}), RML117/RL111 (11.952 t ha^{-1}), RML76/RL105 (11.175 t ha^{-1}), RML94/RL298 (11.031 t ha^{-1}) and RL294/RML170 (10.878 t ha^{-1}). In CVT, at Rampur, high yielding genotypes were RML-294/ RML-170 (7.095 t ha^{-1}), RL-36/ RML-105 (5.760 t ha^{-1}), RML-76/RML-146 (5.733 t ha^{-1}) while at Tarahara DMK 2 (6.106 t ha^{-1}), RL-236/RML-96 (5.679 t ha^{-1}), RML-4/RML-111 (5.584 t ha^{-1} were the high yielding genotypes. Single cross hybrids namely RML-236/ RML-96 (5.818 t ha^{-1}), RML-85/RML-146 (5.700 t ha^{-1}), RML-4/RML-111 (5.401 t ha^{-1}) were among the higher yielders at Parwanipur while RML-191/RML-17 (7.953 t ha^{-1}) and RML-294/RML-170 (6.484 t ha^{-1}) found superior at Belachapi. At Nepalgunj, DMK 2 (6.152 t ha^{-1}), RML-4/RL-111 (5.734 t ha^{-1}), CAH 196 (5.669 t ha^{-1}) were found high yielders. Similarly, at Kabre, high yielding single cross hybrids were CAH 1715 (9.297 t ha^{-1}), RML-145/RML-98 (8.826 t ha^{-1}) and RML-145/RML-111 (8.712 t ha^{-1}) whereas at Surkhet, hybrid genotypes RML-145/RML-98 (8.509 t ha^{-1}), RML-145/RL-105 (7.168 t ha^{-1}), RML-145/RML-111 (6.941 t ha^{-1}). Likewise, RML-145/RML-98 (13.389 t ha^{-1}), RML-145/RML-111 (12.431 t ha^{-1}), RML-95/ RML-105 (11.695 t/ha^{-1}) were observed high yielders at Dailekh however, none of the tested hybrids were found high yielder than Rampur hybrid-10 at Lumle. Similarly, a total of eight single cross hybrids were evaluated in coordinated farmer's field trial in terai, inner terai. Among those genotypes, CAH 1715 and CAH 196 at Rampur; VH 1886 and CAH 119 at Tarahara; VH 3729, VH 1846, CAH 196 at Belachapi; VH 1846 and VH 13729 at Parwanipur; RL-36/RL-105 and RML-76/RL105 at Dolakha; and VH 1846 and CAH 196 found high yielders under farmers field condition at Nepalgunj. A field experiment was conducted at Rampur during spring 2021 to study the response of fertilizers and growth hormones in yield and flowering of maize inbreds. Three different maize inbreds RML-86, RML-96 and RML-95 were selected for field experimentation. Maximum grain yield (1.950 t ha^{-1}) was observed in RML-86 with the application of 120:60:60 kg NPK ha^{-1} and the highest grain yield (2.930 t ha^{-1}) in RML-96 was found with the application of 120:60:60 NPK ha^{-1}. Similarly, the difference was observed in RML-95 for days to anthesis and grain yield. Maximum grain yield (3.325 t ha^{-1}) was recorded in RML-95 with the application of 120:90:40 kg ha^{-1}.

Project code no.	Name of project/ activity	Project	End year	Budget (000)	Major progress/ achievements
3	Participatory Technology Development and Verification at Outreach Sites	BN Adhikari	OG	761	Hybrid maize CAH1715 (5.034 t ha^{-1}) and CAH196 (4.645 t ha^{-1}) found promising as compared to Rajkumar (4.633 t ha^{-1}) and Rampur Hybrid-10 (4.558 t ha^{-1}) at Madi and Suping. Full season maize manakamana-7 showed better performance produced 6.035 t/ha which is followed by RAMPUR S13F28 and KSYNF10 which produced 5.875 t/ha and 5.080 t/ha respectively in FFT. In CFFT terai set, genotype HGA produced the highest yield (5.354t/ ha) followed by S0128 (4.939t/ha) and Farmer's variety (4.610 t/ ha). Likewise, in CFFT-Q, genotypes S99TLYQ-AB (6.914t/ha) produced highest grain yield in comparison to Poshilo Makai-1 (6.071 t/ha) and local check (6.688t/ha). In CFFT-E, genotypes EEYC1 (4.995 t/ha) produced highest yield. In CFFT on rice conducted at Madi, higher yielding rainfed normal rice were TP-30617 (4.55 t/ha) and TP-26777 (4.05 t/ha), fine and aromatic rice NR-2191-1-6-2-1-2-1 (3.79 t/ha) and early rice was HHZ26-DT1-L11-L11 (4.24 t/ha). Likewise, in CFFT wheat, higher grain yield was obtained from Bandganga (3.46t/ha).
2	Source seed/Breed production	B. Bhandari	OG	3678	National Maize Research Program produced 21,368 kg of maize breeder and foundation seed, 17,079 kg of rice foundation seed, 200 kg of sun hemp foundation seed and 350 kg of sesbania foundation seed in the fiscal year of 2077/78.Under MASS project twelve thousand nine hundred kilogram of maize foundation seed was produced in the CBSP of Gorkha, Gulmi, Arghakhachi, Pyuthan and Rolpa. Grid selection was completed in Rampur Composite and Deuti. Half sib family selection was completed in Arun-2, Manakamana-3 and Poshilo Makai-1 and 2.5 kg, 3.0 kg and 2.0 kg nucleus seed was produced in those varieties respectively.
342	Enhancing maize productivity through improvement and agronomic management practices in Terai and inner Terai of Nepal	D Timsina	TB	942	In the experiment conducted for determining the optimum density and fertilizer level for hybrid maize, among the tested genotypes recorded higher grain yield in RML-86/RM-96 (6.693 t/ha). In the same way among the different level of nitrogen recorded higher grain yield (6.437 t/ha) in 260 t/ha Nitrogen level. Further higher grain yield (6.698 t/ha) was record in 100000 plant population. In the experiment of identification of best sowing dates of pipeline genotypes ZM-401 and RML-86/RML-96. Tasseling and silking ranged from 46 to 129 and 48 to 131 days after sowing in ZM-401 and RML-86/RML-96 respectively. Minimum days were required for tasseling/ silking for ZM-401 and RML-86/RML-96 when crop was planted 25th Jestha, 3rd Ashad and 4th Shrawan in ZM-401 and in case of RML-86/RML-96, minimum days were required for tasseling (55 days) and silking (57 days)at 25th Jestha ,3rd Ashad ,15th Ashad, 4th Shrawan ,15th Shrawan planting. In case of grain production, the higher grain yield (6.121 t/ha) of ZM-401 was recorded when sown on 30th Ashwin and maximum yield (8971 t/ ha) of RML-86/RML-96 was observed when sown on 10th Kartik.
345	Management of maize storage pest in Rampur condition	G. Bhandari	TB	305	The lowest maize grain damage (1.02%) was observed in the treatment of bojho rhizome dust @ 10 g/kg of seed followed by 8 gm/kg seed (2.3%) and @ 6g/kg seeds having (3.40%) respectively after 6 month in storage condition. The germination percentage was not lost by using the Celphos on storage. The lowest grain damage (1.54%) with higher germination percentage (91.0%) was observed after fourth application of celphos in monthly interval.
1	Farm and office management project	KB Koirala	OG	4388	Office, guest house, residential areas cleaned and maintained. Soil fertility, farm security, beautification enhanced.

Project code no.	Name of project/ activity	Project	End year	Budget (000)	Major progress/ achievements
4	Multi-location project	BN Adhikari	OG	1244	In CVT normal, genotypes NR-2189-11-4-1-2-1 (5.420 t/ha) followed by NR-2187-25-2-4-3-1 (4.900 t/ha), SVIN 323 (4.430 t/ha) and NR-2184-20-2-1-7-1 (4.42t/ha) produced highest grain yield. Likewise high yielding fine rice was SVIN-054 (4.770 t/ha) followed by NR-2195-22-1-1-2-1 (3.780 t/ha) which gave relatively higher yield over check varieties Samba masuli sub-1 (3.660 t/ha) and Sugandhit dhan-1 (3.620 t/ha). High yielding early rice genotype was TP-30535 (5.170 t/ha), IR 15L1717 (4.960 t/ha) and TP 30529 (4.490 t/ha produced higher yield over check varieties Radha-4 (4.420 t/ha) and Hardinath-3 (4.260 t/ha). In wheat, genotypes BL-5066 (4.310 t/ha) produced highest grain yield followed by NL-1499 (4.180 t/ha) over to standard check Bhrikuti (3.710 t/ha) and Gautam (3.570 t/ha) in initial yield trial. Similarly genotypes namely, NL-1452 (3.860 t/ha), NL-1423 (3.780) and NL-1437 (3.750 t/ha) produced better yield in comparison with standard check Gautam (3.220 t/ha) and Bhirkuti (2.780 t/ha) in in coordinated varietal trial. Based on AUDPC value, top 10 resistant varieties were Triticale-23, BL-4818, Khajura Durum-1, NL-971, Khajura Durum-2, Chyakhura (NL-1164), NL-1094 (danphe), NL-1278, Gaura and NL-1179 with AUDPC value less than 380.
343	Integrated Management of Major Disease of Maize	SB Gurung	TB	660	Disease monitoring have been done for nineteen times at Chitwan, Makawanpur, Lamjung, Jhapa, Dang, Rupandehi, Dhangadi and Banke. Major disease observed during the season was northern leaf blight. Highest score of northern leaf blight was observed in inbred lines at Rampur whereas inbred lines RML 150 and RML 18 were disease free at stem elongation stage in western terai regions (Dhangadhi, Nepalgunj, Dang,) of Nepal. One hundred and twenty-five maize genotypes screened for northern leaf blight resistance at Rampur. Twenty-three genotypes were found free for northern leaf blight on the basis of leaf lesion and 10 genotypes were infected on only one leaf. Mean AUDPC value was 866. Fifty-nine genotypes had AUDPC value above average whereas RML-62 (133), RL-232 (154) and Rampur composite (182) were top most resistant genotypes among all. Thirty-two maize hybrids were tested to assess stalk rot resistance in field condition at Surkhet during summer of 2077/78. Trial average for disease score was 0.9. Disease incidence was low during the season. Most of the hybrids were found least affected by the disease. Among all, RML-191/CML-444, RML-150/RL-105, RML-117/RL-111, RML-191/RML-18, RML-150/RML-96 and RL-294/RML-170 were found immune.
348	Assessment of climate change effect on maize insect diversity and development of IPM technology for maize stem borer (Chilopartellus, Swinhoe) in Nepal	G Bhandari	TB	489	Lower percentage damage (4.84%) by stem borer complex with highest crop yield (4.80 t/ha) was observed in plot sprayed with Spinosad 45%SC @ 0.5 ml/liter followed by released of egg parasitoids; Trichogramma chilonis @ 100000 eggs/ha which recorded 11.1% damage in leaf with 4.49 t/ha grain yield.

Project code no.	Name of project/ activity	Project	End year	Budget (000)	Major progress/ achievements
10	Maize self sufficiency project (MASS)	KB Koirala	TB	13478	During 2021, NMRP developed 145 single cross hybrids were evaluated at Rampur, Tarahara, Parwanipur and Nepalgunj. Among those evaluated genotypes, high yielding genotypes across locations were VH1846 (6.395 t ha^{-1}), RL21-1/RML140 (6.285 t ha^{-1}), RML89/RML140 (5.825 t ha^{-1}), RML150/RML98 (5.595 t ha^{-1}), RML4/RL111 (5.535 t ha^{-1}), RL232/RML18 (5.494 t ha^{-1}), RML76/RL105 (5.483 t ha^{-1}), RML58/RL111 (5.475 t ha^{-1}), RML107/RL111 (5.434 t ha^{-1}) and RL236/RML96 (5.322 t ha^{-1}). Likewise, NMRP developed 195 genotypes of single cross hybrids of maize were also evaluated in spring season of 2021 at NMRP, Rampur. Among those high yielding genotypes were RL272/RML96 (8.082 t ha^{-1}), RML242/RL105 (7.700 t ha^{-1}), RL244/RML140 (7.677 t ha^{-1}), RL242/RML84 (7.028 t ha^{-1}), RL21-1/RL101 (6.621 t ha^{-1}), RML95/RML140 (6.415 t ha^{-1}), RL249/RML96 (5.994 t ha^{-1}), RL249/RML17 (5.984 t ha^{-1}), RML150/RML140 (5.965 t ha^{-1}), and RL269/RL174 (5.843 t ha^{-1}). Under the MASS project an experiment was conducted for determining the maize inbreeds optimum density and appropriate planting date, significantly difference was observed in grain yield of inbreeds. Recorded highest grain yield in inbreed RML-95(2.713 t/ha). Plant density significantly affects the grain yield. The result showed that the higher grain yield (2.559 t/ha) was achieved when plant density maintained at 50cm x 20cm. Similarly, significantly highest thousand grain weight (293 g) recorded in RML-96. Different date of sowing affect thousand grain weight. Fifty tons of hybrid seed of different varieties were produced under this project by different seed producing companies and NMRP Rampur. Further twelve thousand nine hundred kilogram of maize foundation seed of different open pollinated varieties (Arun-2, Rampur composite, Manakamana-7, Manakamana-3) was produced in the CBSP of Gorkha, Gulmi, Arghakhachi, Pyuthan and Rolpa. Fall armyworm (Spodoptera frugiperda) is an invasive insect pest of maize in Nepal. The S. frugiperda had been reported for the first time in Nepal from Gaindakot of Nawalpur district (N 27°42'16.67", E 084°22'50.61") in May 2019. None of the genotypes were found resistant/tolerant against fall armyworm out of 38 testing genotypes from the study. However, Arun-3, EEYC-1, SPPTLYQ-A, CORRALJOS002SIYQ, Mankamana-3, Rampur-4, Deuti, BGBYPOP, 05SAVDI, R-POP-2, KSYNF10, S0128, Rampur hybrid-10, CAH 1715 were found less susceptible by the fall armyworm. The lower plant infestation (10.4%) due to fall armyworm was found in Spinosad 45% SC treated plot followed by Chlorantraniliprole 18.5% SC (11.3%) and Spinetoram 11.7% SC (19.1%) and in visual observation as compared to untreated control (76.7%). Similarly, the highest grain yield (5.198 t/ha) was found in Spinosad 45% SC treated plot followed by Spinetoram treated plot (4.807 t/ha) and Novaluron 10% EC (4.635 t/ha) as compared to untreated control (1.007 t/ha). The severity of plant infestation was found lower on Napier and Desmodium (13.3%) intercropping followed by Bracheria+ Desmodium (15.9%) with compared to mono-cropped maize (62.8%). The study revealed that FAW incidence was high (61.7% and 55.0%) in the month of September in both hybrid and OP genotypes respectively followed by May (58.8% and 52.3%) in the same genotypes. The rearing of T. chilonis in our station is continuous and be able to supply the master card as per the demand of other laboratories.

Project code no.	Name of project/ activity	Project	End year	Budget (000)	Major progress/ achievements
510	Integrated management of major insect pest of maize	S Neupane	TB	721	An experiment comprised sixty hybrid maize genotypes was conducted at NMRP, Rampur during 2077/78 spring season to find out the resistance source of maize stem borer (ChilopartellusSwinhoe). Out of 60 maize hybrids, the top five maize hybrids having lower percentage of stem borer infestation were RML-57/RL-174 (4.79 %), RML-88/RML-18 (5.33 %), RL-153/RL-105 (5.76 %), RL-208/RL-174 (5.94 %) and RML-57/RML-17 (6.69 %).The higher grain yield were recorded on RML-4/RL-111 (9.583 t/ha), RL-242/RL-105 (9.276 t/ha), RH-10 (8.476 t/ha), TX369 (8.307 t/ha), RML-83/RML-146 (8.285 t/ha), RL-107/RML-84 (8.038 t/ha) and RML-98/RML-17 (8.023 t/ha). For the management of stem borer, field experiment with 6 treatments including control was conducted at NMRP Rampur during spring season of 2077/78 BS. The lower number of percent dead heart (2.08%) and lesser percent of borer damage (3.70%) at pre tasseling stage was observed at the plot sprayed with Delegate Spinetoram 11.7% SC@ 0.4ml/l of water with higher yieldd of (11.760 t/ha). The highest number dead heart (9.51 %) and higher percent of borer infestation was observed in the control plot with lower yield (6.148 t/ha).The variety was RH-10. In yield loss experiment, a total of 10 released and promising maize genotypes were compared in Spinosad (0.3 ml/l of water) sprayed and non-sprayed plots. Maize yield was found 14.3 % higher in spinosad sprayed plots compared to non-sprayed plots. Similarly, the higher percent infested borer plant (>5%) and no. of dead hearts (4.37) was recorded in non-sprayed plots compared to sprayed plots i.e. percent infested borer plant (<1%) and no. of dead hearts (1.13).
560	Hybrid seed production program	MP Tripathi	TB	2566	Two ton hybrid seed of Rampur hybrid 10 was produced at NMRP Rampur.

Annex 3.2 Summary Progress of Special Research Projects and Activities of NMRP in 2077/78

Name of project/ activity	Project/ Activity leader	Budget allocated for this year ('000)	Major progress/ achievements
Multinational company hybrid (MNCH)	CB Kuwar	3620	Among the 88 tested hybrids, MRM4065 (9.422t/ha) followed by 4118 (9.018t/ha), ADV757 (8.908t/ha), RMH-567 (8.655t/ha), MRM4062 (8.576t/ha), MM2122 (8.276t/ha) and NK6702 (8.208t/ha) were observed high yielding with respect to Rampur hybrid 10 (4.570t/ha) at NMRP, Rampur.
Nepal Seed and Fertilizer Project (NSAF)	KB Koirala	1036	Early multiple stress tolerant pro vitamin A enriched maize hybrids trial conducted at Rampur genotypes PVAQEH-1 (7.410 t ha^{-1}) produced higher yield than RH-10 (7.050 t ha^{-1}) and Rajkumar. In addition, from pro vitamin A enriched bio-fortified maize hybrids (Yellow and Orange) trial genotype A1804-14 (8.050 t ha^{-1}) produced high yield than Rampur Hybrid-10.
Heat tolerant maize for Asia (HTMA)	KB Koirala	848	The result obtained from drought tolerant hybrid maize conducted at Rampur showed genotypes VH18687, VH1846, VH171143 and CAH196 produced high yield as compared to Rampur hybrid 10 and Rajkumar under natural condition. Twenty seven ton F1 seed of different varieties were produced through seed production company and cooperatives in collaboration with NMRP.
Prime Minister Agriculture Modernization Project (PMAMP)	KB Koirala	5560	Four tons F1 seed of Rampur Hybrid-10 was jointly produced at Dang and NMRP, Rampur. Rampur composite was planted at 5 ha by Pabitra Cooperatives Surkhet to produce 5 tons foundation seed. Seed grader (multicrop) having 1.5 t hr^{-1} installed at seed processing complex of MRP, Rampur. Two cold stores having capacity of 12 ton and 2 ton have been installed at Rampur.

Name of project/ activity	Project/ Activity leader	Budget allocated for this year ('000)	Major progress/ achievements
FTF-Entomology	GS Bhandari	716	Rearing of Rice meal moth (Corcyra cephalonica) for the production of egg parasitoid (Trichogramma chilonis) and rearing of fall armyworm (Spodoptera frugiperda) for the production of another egg parasitoid of (Telenomus remus) have been done in both artificial and natural diet conditions at NMRP Laboratory. Both reared wasps are egg parasitoids of fall armyworm.

Annex 4.1 Production of maize, rice and wheat at NMRP in FY 2077/78

S.N	Commodities (Varieties)	Target (BS and FS) Total (ton)	Production (BS and FS) Total (ton)
1	Maize (Rampur Composite, Arun-2, Arun-4, Deuti, Manakamana-3, Poshilo makai 1, RH 4, RH 9, RH 8, RH 10)	40	28.52
2	Rice (Ramdhan, Saba masuli)	21	17.1
	Grand Total	62.0	46.12

Annex 4.2 Distribution of maize, rice and wheat seed from NMRP in FY 2077/78

SN	Commodity/ product	Type (Breeder/ Foundation)	Quantity (Kg)	Major stakehold-er(s)	Distributed districts
1	Maize	Breeder	7022	NARC stations, cooperatives, seed company, seed increase groups	Most of the districts from mid hills and Terai
		Foundation	10819	cooperatives, seed company, farmers, AKC	Most of the districts from mid hills and Terai
2	Rice	Foundation	16441	DOAR, ARS, cooperatives, Seed Companies. NGOS, farmers, AKC	Doti, Dailekh, Surkhet, Tanahu, Kaski, Rupande-hi, Makwanpur, Chitwan, Nawalparasi, Kathmandu, Banke

Annex 5.1 Training/Workshop/Seminar Organized in FY 2077/78

SN	Name of Training/ Workshop/ Seminar	Duration	Target group	Location	No. of participants
1.	Village level planning and review workshop	1 Day	Farmers, local leaders	Madi, Chitwan	
2.	Farmer's Training on hybrid seed production and cultivation practices	1 Day	Farmers	Madi, Chitwan	30
3.	Farmer's Training on hybrid seed production and cultivation practices	1Day	Farmers	Suping, Makawanpur	25
4.	Residential Training on Hybrid seed production and cultivation practices	7Days	Seed producing farmers	Rampur	30
5	Mass rearing of egg parasitoid (*Trichogramma chilonis*) and its application in field level	3 Days	Plant protection officer/technician from government laboratory and NARC	NMRP	14

Annex 5.2 Services Provided in FY 2077/78

SN	Laboratory/field test/ Counseling services provided	Numbers	Major clients
1	Laboratory diagnostic services of maize, rice and wheat disease, pests and counseling of management practices	43	Farmers (Chitwan, Nawalparasi, Makwanpur)
2	Field diagnostic services of maize disease and counseling of management practices	315	Farmers (Chitwan, Makwanpur, Nawalparasi, Dang, Surkhet, Bara, Parsa, Jhapa, Dhangadi)
3	Counseling services of Integrated Nutrient management practices in maize	1470	Farmers (Chitwan, Nawalparasi, Makwanpur, Dang, Surkhet, Bara, Jhapa)
4.	On the Job Training for JT/JTA level students		Students
5.	Thesis research guidance for M.Sc., PhD students		Students
6	Counseling services of seed production of different cereals	187	Farmers of mid hills and terai region

Annex 5.3 Publications in FY 2077/78

SN	Name of publications	Type *	Language	Authors	No. of copies
1	Annual Report 2075/76	Books	English	NMRP	100 copies
2.	Fall armyworm in Nepal and its integrated pest management.	Booklet	Nepali	Dr. GS Bhandari Dr. KB Koirala Mrs. DM Bhandari	100

**Books, leaflet, brochure, manuals, pamphlets, audio visual etc*

Annex 5.4 Information Disseminated Through Media in FY 2077/78

SN	Information disseminated/Media coverage	Type*	Name/ Type of media#	Date/Time
1	Interview about major maize pest management	Interview	FM	20 times
2	Maize Development activities by NMRP	Discussion	TV	2 times
3	Maize research activities and FAW management at NMRP, Rampur	Video	Facebook (by GS Bhandari)	20 times
4	News about farmers training on hybrid maize seed production	Print media		3 times

**news, interview, feature article, feature story, case story etc. #specifies print/radio/ TV etc.*

Annex 5.5 Visits of the NMRP, Rampur by Farmers, Extension Officials / Technicians, Entrepreneurs, Cooperatives, Farmer Groups, NGO/CBO Officials during 2077/78

SN	Category	Number	Country / Districts	Area of major interest
1	Farmer	640	Lalitpur, Doti, Baglung, Rolpa , Parbat, Kailali, Kaski, Makwanpur, Bhojpur, Dang, Kapilbastu, Bardiya Dhankuta, Ilam, Mahottari, Sunsari, Myagdi,	Improved maize technology study and visit tour
2	Student	1000	Jhapa, Tanahu, Kaski, Rupandehi, Dang, Chitwan, Nawalparasi, Dailekh, Doti, Gorkha, Rolpa, Bardiya ,	Improved maize technology study and observation visit tour
3	Extension worker	50	Rupandehi, Bardiya, Lalitpur, Jhapa, Bara, Parsa, Dailekh, Rukum, Rolpa, Baglung, Kailali, Doti,	Improved maize technology study and observation visit tour
4	Staff	125	Kathmandu, Lalitpur, Bara, Dolakha, Kaski, Parsa, Kailali, Doti, Dailekh, Rukum, Rolpa, Bardiya Tanahu, Gorkha,	Maize Program monitoring and visit
5	Multinational company Hybrid entrepreneurs	20	Nepal/India	Multinational hybrids evaluation and registration

Annex 6.1 Training/Workshop/Seminar Attended by Staff in FY 2077/78

S. N.	Name of staff	Position	Name of training/ seminar/workshop	Duration	Place/ Country	Organizer
1.	Dr. Keshab Babu Koirala	S4	International webinar on Nutritious Maize: Technologies, Development and Availability in South Asia	3 Days	Online	CIMMYT
2.	Chitra Bahadur Kunwar	S4	,,	,,	,,	,,
3.	Bhim Nath Adhikari	S3	,,	,,	,,	,,
4.	Dr. Saraswoti Neupane	S3	,,	,,	,,	,,
5.	Dr.Mahendra Prasad Tripathi	S1	,,	,,	,,	,,
6.	Dr.Ghanshyam Bhandari	S1	,,	,,	,,	,,
7.	Balaram Bhandari	S1	,,	,,	,,	,,
8.	Damodar Gautam	T6	,,	,,	,,	,,
9.	Dr. Keshab Babu Koirala	S4	30th National Summer Crops Workshop	3 Days	Lumle, Kaski	NARC
10.	Chitra Bahadur Kunwar	S4	,,	,,	,,	,,
11.	Dr. Saraswoti Neupane	S3	,,	,,	,,	,,
12.	Dr.Mahendra Prasad Tripathi	S3	,,	,,	,,	,,
13.	Dr.Ghanshyam Bhandari	S1	,,	,,	,,	,,
14.	Balaram Bhandari	S1	,,	,,	,,	,,
15	Parbati Adhikari	T6	,,	,,	,,	,,
16.	Gopal Bhandari	T6	,,	,,	,,	,,
17.	Suk Bahadur Gurung	S1	,,	,,	,,	,,
18..	Dr. K.B. Koirala	S4	Annual Review and Planning Workshop. Heat Tolerant Maize for Asia (HTMA)	2 days	,,	CIMMYT
19	Dr. M.P. Tripathi	S1	,,	,,	,,	,,

Annex 6.2 Paper Published in FY 2077/78

SN	Title of paper	Authors	Name of proceedings, journal etc.
1.	Performance evaluation of maize hybrids under rainfed environments across the middle hills of Nepal.	Koirala, Keshab Babu, Tirtha Raj Rijal, Govind KC, Ram Bahadur Katuwal, Narayan Bahadur Dhami, Ramesh Acharya, Shashi Ram Sharma, Bhim Nath Adhikari, Mahendra Prasad Tripathi.	Tropical Agroecosystems (TAEC) 1(1): 43–49. DOI: http://doi.org/10.26480/taec.01.2020.43.49
2.	Maize research for food, feed, and nutritional security in Nepal.	KB Koirala	Proceedings of the 29th Summer Crops Workshop 2020. Nepal Agricultural Research Council, pp. 7–19.
3.	Evaluation of maize hybrids in Terai and Inner Terai Ecological belt..	Koirala, KB, TR Rijal, KC G, S Khan, DN Mahato, S Manandhar, K Pokhrel, BN Adhikari, and MP Tripathi.	Proceedings of the 29th Summer Crops Workshop 2020. Nepal Agricultural Research Council, pp. 230–256.
4.	Performance of maize hybrids in rainfed hill environments.	Koirala, KB, TR Rijal, KC G, RB Katuwal, NB Dhami, R Acharya, SR Sharma, and MP Tripathi.	Proceedings of the 29th Summer Crops Workshop 2020. Nepal Agricultural Research Council, pp. 257–68.
5.	Evaluation of maize hybrids in Terai and inner Terai ecological belt of Nepal.	Koirala, KB, TR Rijal, G KC, S Khan, DN Mahato, S Manandhar, S Subedi and M. P. Tripathi.	Journal of Agriculture and Forestry University 2020, Vol (4): 109–116.
6.	Maize (*Zea mays* L.) hybrids for Terai ecological belt of Nepal.	Koirala, Keshab Babu, Bhim Nath Adhikari and Mahendra Prasad Tripathi.	Journal of Agricultural Research Advances, 2021. 3(1): 21–28.
7.	Current status and strategies for hybrid maize development and deployment in Nepal.	Koirala, Keshab Babu and Mahendra Prasad Tripathi.	Proceedings of the Stakeholders Workshop on Hybrid Variety Development in Nepal,2020. Nepal Agricultural Research Council, Singdarbar Plaza, Kathmandu.
8.	Field evaluation of heat stress-resilient maize hybrids for improved and stable maize production in Nepal.	Koirala, Keshab Babu, Mahendra Prasad Tripathi, Kaliyamoorthy Seetharam, MT Vinayan and Pervez Haider Zaidi.	SAARC Journal of Agriculture

SN	Title of paper	Authors	Name of proceedings, journal etc.
9.	Exploration of sources of genetic resistance in elite maize germplasms against stem borer (chilo partellus swinhoe) under glass house condition.	S.Neupane, S. Subedi	BARI journal of Agriculture
10.	Field screening of lentil,genotypes against aphid infestation in inner terai of Nepal	S.NeupaneS. Subedi, R. Darai	Journal of Nepal Agriculture Research council
11.	Evaluation of full season maize genotypes across the mid hills of Nepal	Balram Bhandari , Keshab Babu Koirala , Ram Bahadur Katuwal , Narayan Bahadur Dhami , Ramesh Acharya , Amrit Poudel , Khem Raj Sharma , Bisheshwor Prasad Pandey , Binod Luitel and Bishnu Prasad Ghimire	Agriculture Development Journal Volume 15 ISSN:2091-0738(Print)2091-0746(Online) July 2021
12.	Field efficacy of eco-friendly management practices against maize stem borers in spring maize at Rampur, Chitwan	Ghanashyam Bhandari, Resham Bahadur Thapa, Yagya Prasad Giri, Hira Kaji Manandhar, Pramod Kumar Jha	Azarian Journal of Agriculture
13	Field performance of three-way cross yellow and white maize hybrids in Nepal.	Tripathi, Mahendra Prasad, Keshab Babu Koirala, Damodar Gautam, Subash Subedi, Jharana Upadhyay, Hari Kumar Shrestha and Abdu Rahman Beshir ISSA.	Asian Journal of Advances in Agricultural Research, 2021 15(1): 24–33. DOI: 10.9734/AJAAR/2021/v15i130144
14	Performance of single cross maize (Zea mays L.) hybrids under rainfed middle hill environments of Nepal.	Koirala, Keshab Babu, Subash Subedi and Mahendra Prasad Tripathi.	Azarian Journal of Agriculture, 2020, 7(4): 102–111. http://dx.doi.org/10.29252/azarinj.035
15	On-farm evaluation of hybrid maize in different ecologies of Nepal.	Koirala, Keshab Babu, Jagat Bandhu Adhikari and Mahendra Prasad Tripathi.	Azarian Journal of Agriculture, 2020, 7(3): 84–92. http://dx.doi.org/10.29252/azarinj.033
16.	. Evaluation of hermetic bags and indigenous plant materials for storage insect pests at farmers' level in the western hills of Nepal.	Bhandari, G, S Neupane, KB Koirala, and D Bhandari.	Proceedings of the 29th Summer Crops Workshop 17–18 June 2018, Regional Agricultural Research Station, Lumle, Kaski, Nepal. Nepal Agricultural Research Council, pp. 438–448.

Annex 7.1 Regular Annual Budget and Expenditure Record of FY 2077/78

(in 000 Nepalese Rupees)

Budget Heads	Annual budget released	Expenses	Balance	Progress %
Operational expenses				
Staff expenses	32848	24847	8001	75.6
Operational expenses	34100	33628	472	98.6
Administrative expenses	7918	7403	515	93.5
Sub total	74866	65878	8988	88.0
Capital expenses	12747	10722	2025	84.1
Grand Total	87613	76600	11013	87.4

Annex 7.2 Special Project Budget and Expenditure Record of FY 2077/78

(in '000' Nepalese Rupees)

Name of the Project	Funding source	Annual Budget	Expenses	Expenses %
NSAF	CIMMYT	1036	874	84.4
PMAMP	GON	5560	5056	90.9
FTF	USAID	716	510	71.2
HTMA	CIMMYT	848	678	80.0
MNCH	Companies	3620	3152	87.1
Total		11780	10270	**87.2**

Annex 7.3 Revenue Status of FY 2077/78

(in Nepalese Rupees)

Source	Amount	Remarks
Crops	3216442	
Others	1534105	
Total	4750547	

Annex 7.4 Beruju Status of FY 2077/78

Beruju	Amount	Remarks
Total beruju	3600	
Beruju clearance	906	
Remaining beruju	2694	
Cleared beruju percentage	25.16%	

Annex 8.1 Maize hybrids released in 2018

Description	Released Hybrids	
	Rampur Hybrid-8	Rampur Hybrid-10
Parentage	ZL 26632/ CML-451	ZL 109126/ CML-451
Plant height (cm)	183.08	181.7
Ear bearing height (cm)	85.5	72.15
Tasseling days	111 (winter)/ 62 (Rainy)	109 (winter)/ 77 (rainy)
Silking days	115(winter)/ 64(Rainy)	113(winter)/ 68 (rainy)
Number of leaf below ear/cob	8	8
Number of lead above ear/ cob	4	5
Grain color	Turmeric yellow	Pink
Yield potential (t/ha)	7.8	8.05
Recommendation domain	Inner/ Inner Terai	Inner/ Inner Terai
Specialty	Stay green, moderately resistant to borer, resistant to NLB and SLB and heat stress resilient	Stay green, moderately resistant to borer, resistant to NLB and SLB and heat stress resilient

Annex 8.2 Cultivation practices for newly released hybrids of maize (Rampur hybrid 8 and Rampur hybrid 10)

Practices	Description
Planting time	Winter, spring
Spacing	60 cm x 25 cm
Fertilizer dose	180:60:40 kg NPK/ha along with 10-15 ton FYM/ ha, Nitrogen splited into three i.e. ½ at basal , ¼ at knee height stage and ¼ th at pre tasseling stage
Irrigation	Three times: at knee height, at tasseling/silking and at grain filling stage
Weed control	Weeding/hoeing at 20-25 days after sowing (DAS) and earthing up at 40-45 DAS, Atrazine @ 1.5-2 kg a.i./ha (50 WP) within 48 hours of planting
Insect control	Two times spray of spinosad (45%EC) 0.3ml/lt of water first during after 20 days of seed sowing and subsequent spray at 15 days of interval is recommended
Disease control	Dithane M-45 (2.5 g/l of water), propiconazole (tilt) (1.5ml/lof water for foliar spray, Bavistin (2g/kg of seed) treatment
Harvesting	Black layer formation at base/tip of kernel, at physiological maturity

Maintenance/seed increase of testing genotypes

Dissemination of maize technologies through mass media

Hybrid seed production of maize by private sector