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# Evaluation of Single Cross Maize Hybrids for Yield and Agronomical Advantage

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## ABSTRACT

Grain yield for the maize genotypes is an important goal in maize breeding programs. The objective of this study was to evaluate the single cross maize hybrids for growth, yield, and traits associated with yield. Maize hybrids, RH-14 and RH-16 as standard checks, RAJKUMAR, JKMH502 and TX369 as commercial checks and CAH1511 and RH-10 as local checks variety along with other 112 single cross maize hybrids were evaluated in alpha lattice design with two replications at research field of National Maize Research Program (NMRP), Rampur, Chitwan, Nepal from November, 2022 to April, 2023. Agro-morphological and phenology based traits, yield and yield attributing traits as well as husk cover, lodging, stay green and disease were evaluated. Analysis of variance revealed that the significant differences among the tested genotypes for most of the traits that indicated the presence of genotypic differences. In present study, among all evaluated genotypes, RML142/CML581 produced the highest grain yield of 11373 kg ha$^{-1}$ and showed economic heterosis of 11.59% followed by commercial check JKMH502 (10191 kg ha$^{-1}$). Correlation revealed that grain yield had a positive and highly significant relation with number of ear ha$^{-1}$ (r= 0.796$^{**}$), plant height (r= 0.401$^{**}$), ear height (r=0.411$^{**}$) and ear position (r=0.275$^{**}$). The variability shown by the different genotypes can be used for the evaluation of high yielding and better performing variety. The study illustrated the existence of wide ranges of variation for most of the traits. Hence, selection of hybrids based on key traits performance would be of great importance in maize breeding research.

**Keywords**: Maize hybrids, grain yield, performance, correlation

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## INTRODUCTION

Maize (*Zea mays* L.) ranks as second most important staple crop in Nepal based on both area and production. Currently, in Nepal the maize is sown in an area of 916,044 ha, with a total production of 3,193,869 t and production efficiency of 3.49 t ha$^{-1}$ (MoALD 2025). It contributes 28.28% to total cereal production and accounts for 6.64% of the Agricultural Gross Domestic Product (AGDP) (MoALD 2025). In Nepal, it is widely grown in all agro-ecological zones. Nepal's maize production remains low when compared to industrialized countries such as the United States, China, and Brazil, and must be raised (FAOSTAT 2025). The demand of hybrids seeds has increased because of their higher yield potential (Tripathi et al 2016). In Nepal only 17% of farmers grow hybrid maize varieties, while the remaining 83% continue to grow open-pollinated varieties (OPVs), mainly due to limited availability and accessibility of hybrid seed (Gairhe et al 2021).

Single cross hybrid seeds, developed by crossing male and female inbred lines, despite requiring greater technical diligence and more resources in its production, are generally known to establish vigorous crop and yield more. Despite hybrid seeds suffering from low production, when equivalent amounts of finance are utilized in producing one of either hybrid or open pollinated crops, hybrid seed production justify their production costs due to the premium seed price they fetch. Since hybrids are highly standardized and evaluated against all or several reigning seeds, new recommendation or market ready hybrids are expected to be highly competitive in yield. Further, known for their maximum heterotic gains, single-cross hybrids are widely favored in established seed markets, globally. Even for Nepal, Hybrid maize holds significant potential for boosting maize productivity in the terai and mid-hill regions when grown under high-input conditions.

Despite growing demand for hybrids, Nepal continues to lag in hybrid research and development (Thapa 2013). Every year, the dependence on imported hybrid maize seed is due to the country's limited availability of competitive hybrid cultivars and an underdeveloped seed industry. To accelerate the development of hybrid maize, the National Maize Research Program (NMRP) is researching and registering hybrid seeds from multinational firms (Kandel and Shrestha 2020). While the commercialization of hybrid maize seed continues to rise annually, only a limited number of commercial hybrids are suitable for cultivation due to the country's varied agro-ecological conditions.

Nepalese maize farmers imported hybrid maize seed from other countries but many hybrids do not perform well under local agro-climatic conditions. Demand for maize in South Asian region including Nepal is increasing due to the rapid expansion of the poultry and livestock sectors. Therefore, rigorous testing, evaluation and release of maize hybrids specifically adapted to the Terai and inner Terai regions can improve productivity, profitability and national food and feed security and help to strengthen the national seed system (Dhakal 2025). Current study aims to discern important measurement-based traits that best characterize growth behavior of promising hybrids. Ultimately, pairwise association among yield and yield components will be explored to infer on possible presence of any patterns relevant for breeding programs.

## MATERIALS AND METHODS

This study was carried out during winter season of 2022-23 at research field of NMRP, Rampur, Chitwan. Its geographical location is at 27°40' north latitude and 84°19' east longitude, 228 meters above sea level. It consists of humid subtropical climate. The field is sandy loam with slightly acidic reaction. The trial consisted of 119 genotypes, including 7 check (local, standard and commercial) genotypes. All genotypes were acquired through National Maize Research Program, Rampur; the institution is an authoritative government body that maintains and updates genetic stocks of maize varieties and purelines, initially obtained through introduction, development or selection.

Experiment was laid in alpha-lattice design with two replicates each of all genotypes. The trial field was set by deep ploughing with a tractor 15 days prior to sowing seed. Ridge were prepared by using tractor and manually sown the seed in well prepared ridge. Recommended agronomic practices were followed to ensure sufficient nutrition to growing crop and the plots were kept disease free. Farm yard manure was applied at a rate of 6.0 t $ha^{-1}$ during land preparation. Fertilizer was administered at the rate of 180:60:40 NPK (Urea, DAP and MOP) kg $ha^{-1}$. The basal dose consisted of half of N and the full doses of $P_2O_2$ and $K_2O$. The other half of the N was applied in two parts, at knee-high and pre-tasseling/silking stages. Earthing up and first weeding were done concurrently at during the knee-high stage. Second weeding was done at pre-tasseling stage. Plots were flooded twice, at knee-high and tasseling stages, for irrigation. Harvesting was done when plants were completely dried. Ears from whole row were collected. De-husking and shelling of the collected ears was done manually. Each plot comprised of two rows, each 4 meters in length, with an inter and intra row plant spacing of 0.75 m × 0.20 m. The months of November to April coincide with late winter and spring season with minimal natural rainfall that occurred once during April at intensity of 21.7 mm. In terms of relative humidity, months of March and April saw a drop of 15 and 10% from February values with average humidity of 80.5%.

Data for the plant height, number of plants $plot^{-1}$, number of ears $plot^{-1}$, ear height, grain yield $plot^{-1}$, plant aspect, ear aspect, disease scoring, root lodging, shoot lodging and stay green attribute, husk cover of the maize hybrids were taken from two rows of both replications. Data for maturity traits like days to 50% anthesis and days to 50% silk emergence were collected. Five samples' plants were randomly selected from both rows of each plot and measurement for plant height, ear height, cob diameter, cob length, number of kernel rows $ear^{-1}$, number of kernels $row^{-1}$ and thousand kernel weight (g). These data were recorded based on the CIMMYT protocol used by NMRP, Rampur. All plot basis measurements were converted to represent performance per hectare for ease of comparison and grain yield at harvest was transformed after adjustment of the grain moisture content to 12.5%.

Data entry was accomplished in MS-Excel and LibreCalc softwares and statistical analysis (regression modeling, ANOVA and computation of variances) were conducted using R (R Core Team, 2025) and its associated agricolae (de Mendiburu 2023) package.

## RESULTS AND DISCUSSION

Estimated mean values and their variability statistics (variance estimates, SEM, CV) for yield and yield-related traits of genotypes were computed using linear statistical model. Significant differences were found for traits including days to 50% anthesis, days to 50% silking, anthesis-silking interval, plant height, ear height, ear position, cob length, cob diameter, number of kernel rows $ear^{-1}$, number of kernel $row^{-1}$, number of plant $ha^{-1}$, number of ear $ha^{-1}$, thousand kernel weight, grain yield $ha^{-1}$, plant aspect and ear aspect.

**Agro-morphological and phenology based traits**

Summary of major agro-morphological and phenology-based traits of 10 top ranking genotypes (based on yield) along with that of 7 checks is demonstrated in Table 1.

**Table 1. Agro-morphological and phenology-based traits of 10 selected hybrids (based on yield) and 7 checks**

| Maize hybrids | AD | SiD | ASI | PH | EH | Ear Position |
|---|---|---|---|---|---|---|
| RML142/CML581 | 105 | 107 | 2 | 197 | 101 | 0.51 |
| RML134/CML613 | 109 | 109 | 0 | 192 | 97 | 0.50 |
| RL160/RML18 | 105 | 106 | 1 | 199 | 92 | 0.46 |
| RL223/RML17 | 105 | 107 | 2 | 195 | 101 | 0.51 |
| RML129/RML17 | 106 | 105 | -1 | 198 | 101 | 0.51 |
| RML124/RML76 | 105 | 106 | 1 | 204 | 96 | 0.47 |
| RL287/RML96 | 105 | 106 | 1 | 195 | 95 | 0.49 |
| RL252/RML76 | 103 | 103 | 0 | 194 | 87 | 0.44 |
| RL219/RML96 | 107 | 109 | 2 | 189 | 93 | 0.49 |
| RML142/RML17 | 109 | 108 | -1 | 185 | 97 | 0.52 |
| CAH1511 | 102 | 104 | 2 | 209 | 78 | 0.37 |
| RH-10 | 104 | 107 | 3 | 183 | 64 | 0.34 |
| RH-14 | 107 | 106 | -1 | 195 | 98 | 0.50 |
| RH-16 | 106 | 107 | 1 | 191 | 94 | 0.49 |
| TX369 | 105 | 111 | 6 | 184 | 73 | 0.39 |
| JKMH502 | 109 | 109 | 0 | 202 | 92 | 0.45 |
| RAJKUMAR | 106 | 107 | 1 | 197 | 89 | 0.45 |
| Overall Mean | 106 | 107 | 1.22 | 189 | 88 | 0.46 |
| Range | 102-110 | 101-114 | -2-6 | 165-222 | 64-115 | 0.34-0.54 |
| SD | 2.56 | 2.83 | 1.60 | 12.85 | 11.12 | 0.04 |
| CV% | 2.39 | 2.64 | 131.14 | 6.79 | 12.63 | 8.69 |
| LSD (0.05) | 1.88 | 1.84 | 1.34 | 9.62 | 7.65 | 0.03 |
| F-test | *** | *** | *** | *** | *** | *** |
| Heritability | 0.66 | 0.76 | 0.47 | 0.62 | 0.68 | 0.59 |

AD= 50% anthesis days, SiD= 50% silking days, ASI= Anthesis- silking interval, PH= Plant height (cm), EH= Ear height (cm), ***= significant at the 0.001 level, **= significant at the 0.01 level, *= significant at the 0.05 level, SD=Standard deviation, LSD=Least significant difference, CV=Coefficient of variation

There was significant difference observed among the hybrid maize for days to 50% anthesis and for days to 50% silking. The mean values of days to 50% anthesis and silking were, respectively, 106 and 107 days (Table 2). Mean performance of hybrid maize showed that genotypes RL143/RML18, RML14/RML17, RL294/CML613, RL291/RML17 and RML5/RML18 recorded delayed anthesis (110 days) while earlier anthesis were recorded in the maize hybrids RL240/RML96, RML35/RML18, RL160/RML76, RL240/RML17 and CAH1511 (102 days). Likewise, longest silking period (114 days) was required for the genotype RML5/RML18 followed by RL143/RML18 (113 days) the hybrid RL143/CML613 exhibited silking the earliest (101 days).

In line with our findings, significant difference among Nepalese hybrids were reported for both number of days to 50% anthesis and silking (Kafle et al 2020, Neupane et al 2020). Hybrid genotypes also differed significantly for plant height. The mean value of plant height was found to be 189 cm (Table 2). Maximum plant height observed was 222 cm for maize hybrid CAL14137/CML613 followed by RML87/RML96 (218 cm) while the least plant height was observed for the maize hybrids RML14/RML18 and RL187/RML96 (165 cm). There was a difference of 57 cm between the two extreme values. Presence of variation in agro-morphological and phenology-based traits among hybrid genotypes suggests diverse parental background of those genotypes and possibility of selection from among the panel of distinct genotypes for a range of environments.

**Yield and yield-attributing traits**

Summary of yield and yield attributing traits of 10 top ranking genotypes (based on yield) along with that of 7 checks is demonstrated in Table 2. Significant differences were observed among the hybrid maize in cob length, cob diameter, number of kernel rows per ear, number of kernels per rows, thousand kernel weight and the grain yield. The maximum cob length was recorded for the maize hybrid RML177/RML76 (19.0 cm) while the minimum was recorded for the genotype RL177/RML96 (10.7 cm). The maximum number of kernel rows ear$^{-1}$ was recorded for the maize hybrid RL254/CML613 of 16.5 rows while the least number of kernel rows ear$^{-1}$

was found for the genotypes RL211/CML613 and RL143/CML613 of 10.5 rows. The maximum number of kernel rows⁻¹ was recorded for the maize hybrid RL186/RML76 of 38.7 while the least number of kernels rows⁻¹ recorded was for the genotype RL RL177/RML96 of 13.8.

The maximum thousand kernel weight was found in the maize hybrid RL290/RML18 of 429 g followed by hybrid maize RML14/RML18 of 428 g while the least thousand kernel weight was recorded for the genotype RL245/RML18 of 297 g. Yield of check group (8560 kg ha$^{-1}$) genotypes was noticeably greater when compared to the yield of test group (6473 kg ha$^{-1}$) genotypes. Hybrid RML142/CML581 was the only genotype with the yield out-competing recently released national hybrids (RH-10 and RH-14). The hybrid showed economic heterosis (compared with best commercial hybrid check: JKMH502) of 11.59% whereas other hybrids showed negative heterosis. Interestingly, there were only 6 test genotypes that gave yields above the levels of check averages. Several top-ranking hybrids with respect to yield had RML-17 line as a parent in constituting the cross. The result agrees with the findings of Gautam (2013) where they report high mid-parent heterosis (351% to 880%) in lines involving RML-17 as one of the parents.

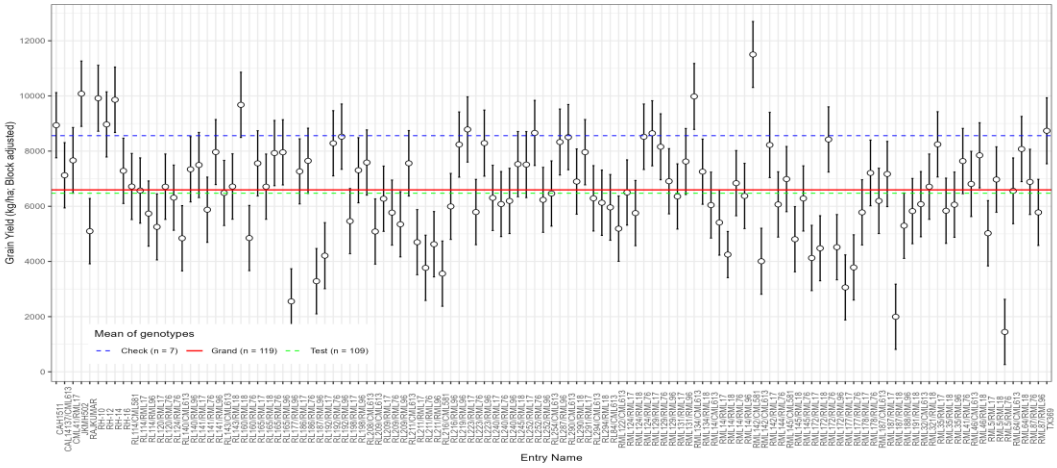


**Fig. 1. Mean yields of hybrid genotypes included in experimental trial at Rampur, Chitwan during 2022/23**

Horizontal lines (colored dashed or solid, as indicated in legend guide) represent average yield of various groups of genotypes. Circular points denote mean values with equidistant vertical lines extending above and below each point represent standard error of mean (SEM) of the block adjusted mean values (Fig. 1).

**Table 2. Yield and yield attributing traits of 10 selected promising hybrids and 7 checks**

| Maize hybrids | CL | CD | NoKR | NoKPR | TKW | GY |
|---|---|---|---|---|---|---|
| RML142/CML581 | 16.2 | 4.5 | 15 | 28.3 | 323 | 11373 |
| RML134/CML613 | 14.4 | 4.3 | 14 | 26.2 | 341 | 9444 |
| RL160/RML18 | 15.8 | 4.3 | 13 | 29 | 383 | 9378 |
| RL223/RML17 | 16.3 | 4.4 | 12.7 | 29.2 | 380 | 9087 |
| RML129/RML17 | 14.0 | 4.3 | 13.7 | 24.8 | 359 | 9073 |
| RML124/RML76 | 16.2 | 4.5 | 13.2 | 30.5 | 336 | 8575 |
| RL287/RML96 | 14.6 | 4.4 | 13.5 | 28.7 | 340 | 8537 |
| RL252/RML76 | 15.2 | 4.3 | 13.2 | 27.6 | 409 | 8507 |
| RL219/RML96 | 12.9 | 4.3 | 13.5 | 23.5 | 358 | 8507 |
| RML142/RML17 | 15.5 | 4.4 | 14 | 30.1 | 342 | 8419 |
| CAH1511 | 16.5 | 4.4 | 12.7 | 31.3 | 415 | 9349 |
| RH-10 | 15.3 | 4.2 | 12.5 | 27.2 | 399 | 10008 |
| RH-14 | 15.0 | 4.5 | 13.7 | 29.7 | 329 | 9815 |
| RH-16 | 13.2 | 4.3 | 13 | 25 | 346 | 6851 |
| TX369 | 14.0 | 4.6 | 15 | 25.2 | 322 | 3962 |
| JKMH502 | 17.0 | 4.7 | 14.5 | 33 | 351 | 10191 |
| RAJKUMAR | 15.8 | 4.6 | 15.7 | 32 | 326 | 4657 |
| Overall Mean | 15.5 | 4.4 | 13.5 | 29.5 | 354.2 | 6665.2 |
| Range | 10.7-19 | 4.03-4.8 | 10.5-16.5 | 13.8-38.7 | 297-429 | 1549-11373 |
| SD | 1.59 | 0.18 | 1.12 | 4.37 | 33.73 | 2087.43 |
| CV% | 10.25 | 4.09 | 8.29 | 14.81 | 9.52 | 31.31 |
| LSD (0.05) | 1.00 | 0.13 | 0.89 | 2.69 | 24.47 | 1604.02 |
| F- test | *** | *** | *** | *** | *** | *** |
| Heritability | 0.77 | 0.65 | 0.57 | 0.78 | 0.67 | 0.63 |

CL= Cob length (cm), CD= Cob diameter (cm), NoKR= Number of kernel rows, NoKPR= Number of kernel row⁻¹, TKW= 1000 kernel weight (g), GY= Grain yield (kg ha⁻¹), ***= significant at the 0.001 level, **= significant at the 0.01 level, *= significant at the 0.05 level, SD=Standard deviation, LSD=Least significant difference, CV=Coefficient of variation

Maximum grain yield $ha^{-1}$ was recorded for the maize hybrid RML142/CML581 of 11373 kg $ha^{-1}$ followed by JKMH502 and RH-10 with grain yield of 10191 kg $ha^{-1}$ and 10008 kg $ha^{-1}$ respectively while the least grain yield was recorded for the maize hybrid RML187/RML18 with 1549 kg $ha^{-1}$. The grain yield and yield attributing traits were found significant for maize genotypes as noted by previous researchers (Maruthi and Rani 2015, Bastola et al 2021, Khan et al 2019, Sesay et al 2016, Tripathi et al 2016, Hussain et al 2004, Ajala et al 2020, Elmyhun et al 2020).

In terms of other visually ranked traits (Table 3), top yielding genotypes had mixed responses. For example, although RML142/CML581 (rank 1 hybrid) has good husk coverage on ears, hybrids RL287/RML96, TX369 and JKMH502 have clear advantage when stay green feature is merited.

**Table 3. Husk cover, lodging, stay green and disease score of 10 selected promising hybrids and 7 checks**

| Maize hybrids | HC | RL (%) | SL (%) | NLB | SG (%) |
|---|---|---|---|---|---|
| RML142/CML581 | 3.0 | 0 | 0 | 1 | 20 |
| RML134/CML613 | 1.0 | 0 | 0 | 1 | 10 |
| RL160/RML18 | 2.5 | 0 | 1.38 | 1 | 35 |
| RL223/RML17 | 1.5 | 0 | 1.85 | 1 | 10 |
| RML129/RML17 | 1.0 | 0 | 0 | 1 | 20 |
| RML124/RML76 | 2.0 | 0 | 0 | 1 | 25 |
| RL287/RML96 | 1.5 | 0 | 0 | 1 | 45 |
| RL252/RML76 | 2.0 | 0 | 0 | 1 | 10 |
| RL219/RML96 | 1.0 | 0 | 0 | 1 | 10 |
| RML142/RML17 | 1.5 | 0 | 0 | 1 | 35 |
| CAH1511 | 2.5 | 0 | 0 | 1 | 0 |
| RH-10 | 2.0 | 0 | 0 | 1 | 25 |
| RH-14 | 1.5 | 0 | 0 | 1 | 15 |
| RH-16 | 1.5 | 21.8 | 0 | 1 | 15 |
| TX369 | 1.0 | 0 | 0 | 1 | 40 |
| JKMH502 | 2.0 | 0 | 0 | 1.25 | 40 |
| RAJKUMAR | 1.0 | 1.5 | 0 | 1 | 0 |
| Mean | 1.49 | 1.63 | 0.13 | 1.03 | 17.80 |
| Range | 1-3 | 0-21.8 | 0-2.85 | 1-1.5 | 0-70 |
| SD | 0.67 | 5.25 | 0.75 | 0.13 | 20.20 |
| Heritability | 0.35 | 0 | 0 | 0 | 0.59 |

HC= Husk cover, RL= Root lodging, SL= Shoot lodging, NLB= Northern leaf blight, SG= Stay green

**Correlation coefficient**

Significant correlations between phenological, morphological, and yield traits were revealed by the Pearson correlation study at NMRP, Rampur. There was a high and positive correlation (r = 0.827**) between the days to 50% anthesis and the days to 50% silking, suggesting synchronized flowering. Ear height and plant height had a positive correlation (r = 0.708**). Plant height (r = 0.401**), ear height (r = 0.411**), and number of kernels per row (r = 0.160*) have significant and positive correlation with grain yield, indicating that those traits are crucial selection criteria for yield enhancement. Cob diameter was associated positively with the number of kernel rows (r = 0.588**) and thousand kernel weight (r = 0.255**), whereas cob length was significantly correlated with the number of kernels per row (r = 0.800**) (Table 4).

According to earlier research by Ogunniyan and Olakojo (2014), Bhusal et al (2017), Adhikari et al (2018) and Kandel et al (2018), there is a positive correlation between grain yield and plant height, ear height, and kernels per row. This suggests that these traits can be used to increase yield in maize hybrids grown in Rampur. The days to 50% anthesis (r = -0.010) and days to 50% silking (r= -0.069) had negative correlation with grain yield (Table 4). The similar results were reported by Bartaula et al (2019). The correlation study between yield and its component traits is important to improve the effectiveness of selection (Kalla et al 2001, Zeeshan et al 2013).

**Table 4. Pearson correlation for different traits of maize hybrids at NMRP, Rampur**

| Trait | AD | SiD | PH | EH | NLB | GY | CL | CD | NoKR | NoKPR | TKW |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AD | 1.0 | | | | | | | | | | |
| SiD | $0.827^{**}$ | 1.0 | | | | | | | | | |
| PH | $-0.041^{Ns}$ | $-0.080^{Ns}$ | 1.0 | | | | | | | | |
| EH | $-0.014^{Ns}$ | $-0.143^{*}$ | $0.708^{**}$ | 1.0 | | | | | | | |
| NLB | $-0.054^{Ns}$ | $-0.032^{Ns}$ | $0.019^{Ns}$ | $0.028^{Ns}$ | 1.0 | | | | | | |
| GY | $-0.010^{Ns}$ | $-0.069^{Ns}$ | $0.401^{**}$ | $0.411^{**}$ | $0.001^{Ns}$ | 1.0 | | | | | |
| CL | $0.168^{*}$ | $0.197^{**}$ | $0.147^{*}$ | $0.015^{Ns}$ | $-0.061^{Ns}$ | $0.098^{Ns}$ | 1.0 | | | | |
| CD | $-0.094^{Ns}$ | $-0.083^{Ns}$ | $0.012^{Ns}$ | $0.028^{Ns}$ | $-0.136^{*}$ | $-0.009^{Ns}$ | $0.138^{*}$ | 1.0 | | | |
| NoKR | $-0.034^{Ns}$ | $0.025^{Ns}$ | $-0.025^{Ns}$ | $-0.026^{Ns}$ | $-0.088^{Ns}$ | $-0.066^{Ns}$ | $0.042^{Ns}$ | $0.588^{**}$ | 1.0 | | |
| NoKPR | $0.196^{**}$ | $0.228^{**}$ | $0.167^{*}$ | $0.055^{Ns}$ | $-0.059^{Ns}$ | $0.160^{*}$ | $0.800^{**}$ | $0.056^{Ns}$ | $-0.022^{Ns}$ | 1.0 | |
| TKW | $-0.245^{**}$ | $-0.216^{**}$ | $0.013^{Ns}$ | $-0.076^{Ns}$ | $-0.072^{Ns}$ | $-0.018^{Ns}$ | $0.005^{Ns}$ | $0.255^{**}$ | $-0.162^{*}$ | $-0.158^{*}$ | 1.0 |

AD= 50% anthesis days, SiD= 50% silking days, PH= Plant height (cm), EH= Ear height (cm), NLB= Northern leaf blight, GY= Grain yield (kg ha$^{-1}$), CL= Cob length (cm), CD= Cob diameter (cm), NoKR= Number of kernel rows, NoKPR= Number of kernel row$^{-1}$, TKW= 1000 kernel weight (g), , * = correlation is significant at the 0.05 level, ** = correlation is significant at the 0.01 level, Ns= correlation is not significant at 0.05 level

## CONCLUSION

Important traits identified for selection to bring an improvement in maize grain yield are number of kernel row$^{-1}$, number of ear ha$^{-1}$, ear height, cob length and thousand kernel weight. Similarly, the promising hybrids identified for growth based on yield, yield traits along with other traits were RML142/CML581, RML134/CML613, RL160/RML18, RL223/RML17, RML129/RML17, RML124/RML76, RL287/RML96, RL252/RML76, RL219/RML96 and RML142/RML17. Plant height, ear height, and kernel number per row are the main factors influencing grain yield in maize. Therefore, these traits should be considered important selection criteria in maize breeding programs.


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## AUTHORS' CONTRIBUTION

Krishna Hari Dhakal conceptualized the study, designed the experiment, conducted field data collection, and analyzed the data. He also drafted and finalized the manuscript

## CONFLICT OF INTEREST

The author declares no conflict of interest related to this study.

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