American-Eurasian J. Agric. & Environ. Sci., 15 (5): 848-852, 2015
ISSN 1818-6769

DOI: 10.5829/idosi.aejaes.2015.15.5.12631

Comparisons of Six Hybrids Corn (*Zea mays* L.), in Terms of Yields and Components in Sulaimania

Anwar Rashid Abdulla, Jalal Omer Ahmed and Sirwan Qadir Mahmood

Industrial Crops Department, Bakrajo Agricultural Technical Institute,
Sulaimani Polytechnic University, Iraq

Abstract: To study the comparison between morphological characters of corn plant an experiment was carried out at the Research Field of Agricultural Technical Institute of Bakrajo, affiliates to the Sulaimania Polytechnic University-during two conductive seasons 2011 and 2012. Experiment was conducted in randomized complete blocks design (RCBD) in three replications. Analysis result of hybrid corn showed that, there was a significant difference among corn hybrids in some traits. The results of mean comparing of traits are shown between some with hybrids significant difference exists. Correlation analysis for traits in (2011-2012) showed that grain yield was in the strongest relation with 100 grains weight (r = 0.524), followed by number of grains per ear (r = 0.470) and number of grains per row (r = 0.455) and in the 2nd season (2012-2013) the number of grains per ear (r = 0.498) and number of grains per row (r = 0.459) showed the most correlation with grain yield.

Key words: Comparison · Hybrid · Yield · Yield Component · *Zea mays* L.

INTRODUCTION

Maize ranks third among the cereal crops worldwide after wheat and rice. In Pakistan, maize is grown on an area of 950 thousand hectares with total production of 3487 thousand tons [1, 2] with an average yield of 2892 kg ha^{-1}. It is consumed as food by human and feed for the livestock and poultry. Maize (*Zea mays L.*) is an important staple food crops and provide bulk of raw materials for the livestock and many agro-allied industries in the world. Plant breeders are interested in developing cultivars with improved yield and other desirable agronomic and phenological characters. In order to achieve this goal, the breeders had the option of selecting desirable genotypes in early generations or delaying intense selection until advanced generations [3]. To determine relationships, correlation analyses are used such that the values of two characters are analyzed on a paired basis, results of which may be either positive or negative. The results of correlation are of great value in evaluation of the most effective procedures for selection of superior genotypes. When there is positive association of major yield characters, component breeding would be very effective, but when these characters are negatively associated, it would be difficult to exercise simultaneous selection for them in developing a variety [4-5]. Grains yield is a function of genotype x environment interaction [6]. More acceptable crop genotypes are the one which exhibits wide adaptability to varying environments. In number of grains per ear and the unit grain weight [5 and 7]. Increase or decrease one of these components, keeping the size of other components constant, contributes to increase or decrease in grain yield, respectively, thus any exercise whether agronomic (management) or breeding type (genotype), which increases any of these components, keeping the other components constant, will increase the final grain yield [8 ,9]. The grain yield of a maize genotype (variety or hybrid) depends on its potential grain yield components [10].

The objectives of the present study was to determine the association between maize grain yield and some other agronomic characters with the view to identifying characters whose selection could be used in improving grain yield also another purpose of the experiment is a comparison of six hybrid of maize (Dko434, Dko648, Tetar, Dkc6022, Dko5012 and Dkc6418).

Corresponding Author: Jalal Omer Ahmed, Industrial Crops Department, Bakrajo Agricultural Technical Institute, Sulaimani Polytechnic University, Iraq.

MATERIALS AND METHODS

The experiment was carried out at the Research Field of Agricultural Technical Institute of Bakrajo, affiliate to the Sulaimania Polytechnic University. The experiment was conducted in two conductive summer seasons 2011 and 2012. The soil of Bakrajo farm belongs to (Clay Loam). Soil physical and chemical analyses are shown in Table 1. After the preparation of the soil were peas planted on the lines, The distance between lines was 70 cm, the distance between plants was 25cm inside the panels and the area of the each panel was 2*3 m (6 m^2). Experiment was performed by randomized complete block design (RCBD) with three replications for each verity of maize. Seeds were sown in 1th of July 2011 and 2012 respectively. The treatment consisted of 6 maize hybrids (Dkco434, Dkc648, Tetar, Dkc6022, Dkc5012, Dkc 6418). The cultural treatment was done soil preparation, plowing hoeing, weeding, weeds control by herbicides. Data analysis was done by using SPSS for analysis of variance and compare means by Duncan and correlation coefficient analysis. Data were recorded on 5 competitive plants of each plot and grain yield (kg ha^{-1}) was calculated for the entire plot. The data recorded were subjected to correlation analysis to estimate phenotypic correlation coefficients among the different traits following the method described by Kwon and Torrie[11, 12].

Table 1: Soil Physical and Chemical Analysis

Properties	Sample 1 value	Sample 2 value
EC	0.31	0.31
pH	7.10	7.17
%N	0.24	0.32
Available P(ppm)	28.8	27.2
SolubleK^+ meq/l	0.228	0.233
Soluble K^+ meq/l	0.369	0.400
Soluble K^+ meq/l	2.3	2.5
%Sand	12.17	14.54
%Silt	45.72	41.23
%Clay	42.11	44.23

RESULTS AND DISCUSSION

The results of mean comparing of traits are shown in (Table 4 and 5) between majority genotypes significant differences exist.

Plant Height: Tables 2 and 3 show the mean of the final plant height. The mean plant height of the Dkc648 was higher than other hybrid. The mean of Tetar is higher than others and mean of the Dkc5012 is higher than that of all other hybrid (Table 1). The mean of the Dkc648 is higher than that of all other hybrid. The mean of Tetar is higher than others and mean of the Dkc6022 is higher than that of all other hybrid (Table 2). The mean difference is statistically significant in the case of hybrid corn treatment, compared to in all other hybrids (Table 2 and 3 and 4).

Number of Ear per Plant: The table 1 and 2 show the mean of the final Number of ear per plant. The mean of the Dkc6022 is higher than that of all other hybrid. The mean of Dkc6418 is higher than others and mean of the Dkc434 is higher than that of all other hybrid (Table 1). The mean of the Dkc6022 is higher than that of all other hybrid. The mean of Dkc6418 is higher than others and mean of the Dkc434 is higher than that of all other hybrid (Table 2). The mean difference is statistically significant in the case of hybrid corn treatment, compared to in all other hybrids (Table 2 and 3 and 4).

Number of Rows per Ear: The table 2 and 3 show the mean of the final Number of rows per one ear. The mean of the Dkc5012 is higher than that of all other hybrid. The mean of Tetar is higher than others and mean of the Dkc6418 is higher than that of all other hybrid (Table 1). The mean of the Dkc5012 is higher than that of all other hybrid. The mean of Dkc6022 is higher than others and mean of the Dkc6418 is higher than that of all other hybrid (Table 2). The mean difference is statistically significant in the case of hybrid corn treatment, compared to in all other hybrids (Table 2 and 3 and 4).

Table 2: Mean comparing in corn hybrids in 2011

	Traits						
Hybrids	Plant height (cm)	Number of ears per plant	Number of rows per ear	Number of grains per row	Number of grains per ear	1000grains weight	Grain yield (kg/h)
Dkco434	147.33ab	1.166a	14.58ab	33.67b	491.47b	291.33a	4415.1b
Dkc648	159b	1.5ab	13.41ab	28.16ab	377.74ab	281.16a	3739a
Tetar	152.66ab	1.32a	15.25b	27.58ab	426.58ab	269.33ab	3939.1ab
Dkc6022	137.33a	1.763b	15b	27.67ab	418.62ab	282.2a	4014.9ab
Dkc5012	140a	1.53ab	16.41b	29.5ab	487.08b	224.6b	3816.4a
Dkc6418	147.66ab	1.733b	11.58a	22.67a	266.41a	299.66a	4224.8ab

Table 3: Mean comparing in corn hybrids in 2012

	Traits						
Hybrids	Plant height (cm)	Number of ears per plant	Number of rows per ear	Number of grains per row	Number of grains per ear	1000 grains weight	Grain yield (kg/h)
Dkco434	148.32abc	1.4a	14.21bc	34.01a	483.3a	281.5b	4007.4ab
Dkc648	158c	1.36a	13.35ab	28.77a	386.29a	284.53b	3718.8a
Tetar	154.67bc	1.33a	14.36bc	29.61a	430.06a	262ab	3877ab
Dkc6022	143a	1.56a	15.11bc	26.7a	404.95a	277.36b	3949.9ab
Dkc5012	143.67ab	1.38a	16.56c	29.7a	491.08a	224.56a	3687.8a
Dkc6418	150.67abc	1.43a	11.63a	31.23a	363.67a	285.43b	4199.6b

Table 4: Mean comparing in corn hybrids in 2011-2012

	Traits						
Hybrids	plant height (cm)	Number of ear per plant	Number of row per ear	Number of grain per row	Number of grain per ear	1000 grain weight	Grain yield (kg/h)
Dkco434	147.83ab	1.28a	14.4abc	33.17a	487.39a	286.41b	4211.3b
Dkc648	158b	1.43ab	13.39ab	28.48a	382.01a	282.4b	3729.2a
Tetar	153.66ab	1.26a	15.06bc	28.6a	428.32a	265.83ab	3912.6ab
Dkc6022	140.16a	1.65b	15.05bc	27.17a	411.78a	279.7b	3982.4ab
Dkc5012	141.83a	1.48ab	16.49c	29.6a	489.08a	207.91a	3752.1a
Dkc6418	149.16ab	1.58ab	11.62a	28.53a	297.77a	287.85b	4212.2b

Table 5: Correlation coefficient of studied traits in corn hybrids in 2011

Traits	Plant height	Number of ears per plant	Number of rows per ear	Number of grains per row	Number of grains per ear	1000 grains weight	Grain yield (kg/h)
Plant height	1						
Number of ears per plant	-.237	1					
Number of rows per ear	.052	-.098	1				
Number of grains per row	.335	-.260	.507*	1			
Number of grains per ear	.234	-.202	.816**	.905**	1		
1000grains weight	-.031	-.037	.694**	-.362	-.591**	1	
Grain yield (kg/h)	-.197	.099	.538*	.487	.522*	.584*	1

Table 6: Correlation coefficient of studied traits in corn hybrids in 2012

Traits	Plant height (cm)	Number of ears per plant	Number of rows per ear	Number of grains per row	Number of grains per ear	1000 grains weight	Grain yield (kg/h)
Plant height	1						
Number of ears per plant	-.057	1					
Number of rows per ear	-.126	.019	1				
Number of grains per row	.425	.096	.023	1			
Number of grains per ear	.260	.103	.611**	.800**	1		
grains weight1000	-.059*	-.002	.642**	-.182	-.538*	1	
Grain yield (kg/h)	.045	.435	.509*	.459	..534*	.570*	1

Number of Grains per Row: The table 2 and 3 show the mean of the final Number of grains per row. The mean of the Dkc434 is higher than that of all other hybrid. The mean of Dkc5012 is higher than others and mean of the Dkc6418 is higher than that of all other hybrid (Table 1). The mean of the Dkc434 is higher than that of all other hybrid. The mean of Dkc6418is higher than others and mean of the Dkc6022 is higher than that of all other hybrid (Table 2). The mean difference is statistically significant in the case of hybrid corn treatment, compared to in all other hybrids (Table 2 and 3 and 4).

Number of Grains per Ear: The table 2 and 3 show the mean of the final Number of grains per one ear. The mean of the Dkc5012 is higher than that of all other hybrid. The mean of Dkc434 is higher than others and mean of the Dkc6418 is higher than that of all other hybrid (Table 1). The mean of the Dkc5012 is higher than that of all other hybrid. The mean of Tetar is higher than others and mean of the Dkc648 is higher than that of all other hybrid (Table 2). The mean difference is statistically significant in the case of hybrid corn treatment, compared to in all other hybrids (Table 2 and 3 and 4).

1000 Grains Weight: The table 2 and 3 show the mean of the final 1000 grains weight. The mean of the Dkc6418 is higher than that of all other hybrid. The mean of Dkc434 is higher than others and mean of the Dkc5012 is higher than that of all other hybrid (Table 1). The mean of the Dkc6418 is higher than that of all other hybrid. The mean of Dkc434 is higher than others and mean of the Dkc5012 is higher than that of all other hybrid (Table 2). The mean difference is statistically significant in the case of hybrid corn treatment, compared to in all other hybrids (Table 2 and 3 and 4).

Grain Yield: Table2 and 3 show the mean of the final Grain yield. The mean of the Dkc434 is higher than that of all other hybrid. The mean of Dkc6418 is higher than others and mean of the Dkc648 is higher than that of all other hybrid (Table 1).

The mean of the Dkc6418 is higher than that of all other hybrid. The mean of Dkc434 is higher than others and mean of the Dkc5012 is higher than that of all other hybrid (Table 2). The mean difference is statistically significant in the case of hybrid corn treatment, compared to in all other hybrids (Table 2 and 3 and 4).

Correlation Analysis: To determine association between studied traits we calculated coefficient of correlation. Studied in 2011 year showed (Table 5) that grain yield was in the strongest relation with 1000 grain weight (r = 0.584). After this traits the number of rows per ear (r = 0.538) and number of grains per ear (r = 0.522) showed the most correlation with grain yield (Table 5). Increasing number of rows per ear and number of grains per ear caused increase majority traits according highest correlation this trait with other traits. The highest positive correlation were observed between number of rows per ear and number of grains per ear (r=0.816) and 1000 grains weight (r = 0.694) and number of grains per row (r = 0.507). However, negative correlation was also found among certain characters in the present study. Studied in 2012 year showed (Table 6) that grain yield was in the strongest relation With 1000 grain weight (r = 0.570). After this traits the number of grains per ear (r = 0.539) and number of rows per ear (r = 0.509) showed the most correlation with grain yield (Table 6).The highest positive correlation were observed between number of rows per ear and 1000 grains weight (r = 0.642) and number of grains per row and number of grains per ear (r = 0.8). However, negative correlation was also found among certain characters in the present study [9]. Khatun in 1999 found that grain yield plant-1 was positive and significantly correlated with number of kernels ear-1, ear weight and ear insertion height. High correlation of grain yield with plant height is also reported by other researchers [14, 15]. Troyer and Larkins [16] observed that plant height was positively correlated with days to flowering morphologically, as internodes' formation stops at floral initiation and that early flowering maize varieties are usually shorter in height.

CONCLUSION

The traits 1000 grains weight, number of grains per ear and number of rows per ear were positively correlated and could be used for the selection of batter yielding lines under kurdistan region. The results compare means showed between hybrids minimum grain yield was recorded in the Dkc648 hybrid and maximum was recorded in Dkc6418 hybrid. It was concluded that 1000 grain weight, number of grains per ear and number of rows per ear are the characters which contribute largely grain yield of maize seedlings and selection can be made on the basis of these characters.

REFERENCES

1. Anonymous, 2010. Economic Survey of Pakistan. Govt. of Pakistan, Finance and Economic Affairs Division, Islamabad, Pakistan, pp: 21.
2. Roney, John 2009. The Beginnings of Maize Agriculture, Archaeology Southwest, 23(1): 4.
3. Puri, Y.P., C.O. Qualset and W.A. Williams, 1982. Evaluation of yield components as selection criteria in barley breeding. Crop Sci., 22: 927-931.
4. Nemati, A., M. Sedghi, R.S. Sharifi and M.N. Seiedi, 2009. Investigation of correlation between traits and path analysis of corn (*Zea mays* L.) grain yield at the climate of Ardabil region (Northwest Iran). Not. Bot. Hort. Agrobot. Cluj., 37(1): 194-198.

5. Gautam, P., D.M. Gustafson and Z. Wicks III, 2011. "Phosphorus Concentration, Uptake and Dry Matter Yield of Corn Hybrids" (PDF). World Journal of Agricultural Sciences, 7(4): 418-424.
6. Annicchiarico, P., 2002. Genotype x environment interaction: Challenges and opportunities for plant breeding and cultivar recommendations. FAO Plant Prod. Prot. Paper, 174.
7. Gardner, F.P., R.B. Pearce and R.L. Mitchell. 1985. Physiology of Crop Plants. Iowa State Univ. Press, Ames, Iowa.
8. Devi, I.S., S. Muhammad and S. Muhammad. 2001. Character association and Path Co–efficient analysis of grain yield and yield components in double crosses of maize. Crop Res. Hisar. 21: 355-359.
9. Karl, Jason 2010. Maize (the Subspecies) Is – Not – A Day-Neutral Plant. ISBN 9781450708692
10. Grafius, J.E., 1960. Does overdominance exist for yield in corn? Agron. J., 52: 361.
11. Kwon S.H. and J.H. Torrie, 1964. Heritability and interrelationship of two soybean (Glycine max L.) populations. Crop Sci., 4: 196-198.
12. Himi, E. Mares, D.J. Yanagisawa and A. Noda, K 2002. Effect of grain colour gene (R) on grain dormancy and sensitivity of the embryo to abscisic acid (ABA) in wheat. Journal of Experimental Botany 53 (374): 1569-74.
13. Khatun, F., S. Begum, A. Motin, S. Yasmin, M.R. Islam, 1999. Correlation coefficient and path analysis of some maize (*Zea mays* L.) hybrids. Bangladesh J. Bot., 28: 9-15.
14. Annapurna, D., H.A. Khan and S. Mohammad, 1998. Genotypic– phenotypic correlations and path coefficient analysis between seed yield and other associated characters in tall genotypes of maize. Crop Res. Hisar., 16: 205-9.
15. Gautam, A.S., R.K. Mittal and J.C. Bhandari, 1999. Correlations and path coefficient analysis in maize (*Zea mays* L.). Ann. Agric. Biol. Res., 4: 169-71.
16. Troyer, A.F. and J.R. Larkins, 1985. Selection of early flowering in corn: 10 late synthetics. Crop Sci., 25: 695-697.