Available online at www.ijpab.com

DOI: http://dx.doi.org/10.18782/2320-7051.5744

ISSN: 2320 – 7051

Int. J. Pure App. Biosci. **5 (4):** 1697-1701 (2017)

Research Article

International Journal of Pure & Applied Bioscience

OPEN ACCESS

Intercharacter Associations for Grain Yield and Its Attributes in Inbreds of Maize (*Zea mays* L.)

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Received: 12.06.2017 | Revised: 23.06.2017 | Accepted: 25.06.2017

ABSTRACT

The phenotypic and genotypic correlation for yield and its related traits were evaluated in sixty inbred lines of maize (Zea mays L.) at college farm, College Of Agriculture, PJTSAU, Rajendranagar, Hyderabad during kharif, 2013. Association studies revealed that the genotypic correlation coefficients were higher than the corresponding phenotypic correlation coefficients for almost all the characters under study. It indicated that strong inherent associations were somewhat masked at the phenotypic level due to environmental effect. grain yield per plant exhibited positive and significant association with plant height, ear height, ear length, number of kernels per row, ear girth, 100 seed weight, shelling percentage and number of kernel rows per ear both at phenotypic and genotypic levels. Therefore these characters could be used as criteria for selection of genotypes with high grain yield.

Keywords: *Intercharacter, Grain yield, Maize, Zea mays L.*

INTRODUCTION

Maize (*Zea mays L.*) is the third most important cereal crop after rice and wheat. In India, It is being cultivated on an area of 8.80 m ha with a production of 26.14 mt, and an average productivity of 2.56 t/ha. (Indiastat, 2016) Maize has myriad of uses in food, feed and industrial segment. Globally 67 per cent of maize is used for livestock feed, 25 per cent for human consumption, 14% for starch products, 1% each for beverages and seed and rest for industrial purposes. The efficiency of selection in any breeding programme depends on the direction and magnitude of association between yield and its components. Thus, correlation enables to identify the characters or combination of characters which might be useful as indicator of high yield by way of evaluating relative influence of various characters on yield and among themselves as well. Studies on correlation coefficients of different characters are useful criterion to identify desirable traits that contribute to improve the grain yield. Therefore the present investigation has been undertaken to study the character association between yield and yield attributes.

Cite this article: Sandeep, S., Bharathi, M. and Reddy, V. N., Intercharacter Associations for Grain Yield and its Attributes in Inbreds of Maize (*Zea mays* L.), *Int. J. Pure App. Biosci.* **5(4):** 1697-1701 (2017). doi: http://dx.doi.org/10.18782/2320-7051.5744

MATERIALS AND METHODS

The experimental materials consisted of sixty inbred lines of maize obtained from Maize Research Center, Agricultural Research Institute, ANGRAU, Rajendranagar, Hyderabad were evaluated during kharif, 2013 in Randomized Block Design with three replications. Each entry was sown as two rows of 4 meter length with row-to-row and plant-to-plant distance of 75 cm and 20 cm respectively. All the agronomic practices along with prophylactic measures were followed so as to raise a good crop. Observations were recorded on five randomly selected plants for plant height, ear height, ear length, ear girth, number of kernel rows per ear, number of kernels per row, 100-kernel weight, grain yield per plant and shelling percentage. However, observations for the characters namely days to 50 per cent tasseling, days to 50 per cent silking, days to maturity were recorded on plot basis. The mean values of genotypes from each replication were subjected to statistical analysis for estimating correlation coefficients. Correlation coefficients were calculated at genotypic and phenotypic level using the formulae suggested by Falconer[4]. For statistical analysis, Windostat Version 9.1 software package was used.

RESULTS AND DISCUSSION

The estimates of genotypic and phenotypic correlation coefficients were presented in Table 1 and Figure 1 &2. The yield attributing traits were evaluated for their inter relationship with yield and among themselves. Genotypic correlation coefficients at genotypic level were higher than their counter parts at phenotypic level for all the traits which indicates a strong inherent association between the characters. Similar findings were earlier reported by Amini et al[2]. At genotypic level, days to 50% tasseling recorded positive and significant association with days to silking, days to maturity, ear height and plant height. It is positively associated with grain yield per plant. The result is in consonance with the findings of Bello et al. Days to 50% silking registered genotypic positive significant association with plant height, ear height and days to maturity. Similar results were reported by Singh et al[13]. Days to maturity recorded genotypic positive significant association with all the traits except shelling percentage. Plant height recorded genotypic positive significant association with ear height, ear length, ear girth, number of kernel rows per ear, number of kernels per row, 100 seed weight, shelling percentage and grain yield per plant. Similar results for positive association of grain yield with plant height were reported by Akbar et al[1]. Ear height registered genotypic positive significant association with ear length, ear girth, and number of kernel rows per ear, number of kernels per row, 100 seed weight, shelling percentage and grain yield per plant. Earlier similar results for positive were reported by Rafiq et al.[10]. Ear length showed genotypic positive significant association with ear girth, number of kernel rows per ear, number of kernels per row, 100 seed weight and grain yield per plant. The results are in consonance with manjulatha et al. Ear girth had genotypic positive significant association with number of kernel rows per ear, number of kernels per row, 100 seed weight, shelling percentage and grain yield per plant. This finding is in line with Kumar and Satyanarayana for positive and significant association of ear girth with number of kernel rows per ear and 100 seed weight. Number of kernels rows per ear has genotypic positive significant association with number of kernels per row. It is positively associated with grain yield per plant. At genotypic level, number of kernels per row reordered positive and significant association with 100 seed weight and shelling percentage. 100 seed weight recorded positive significant genotypic association with shelling percentage and grain yield per plant. Shelling percentage recorded significant positive genotypic correlation with grain yield per plant. The significant and positive association of shelling percentage with grain yield was earlier reported by Jayakumar *et al*.[8] and Suresh *et al*. Grain yield per plant exhibited highest significant positive genotypic association with plant height and ear

height, ear length, number of kernels per row, ear girth, 100 seed weight, days to maturity and shelling percentage. Highest significant positive correlation of plant height and ear height were reported by Brar et al[3]. The positive and significant association of grain yield and with different characters were earlier reported by many workers viz., plant height[11,12], ear height[9,11,12], ear length[5], ear girth[6] and Sofi and Rather[7], number of kernel rows per ear, number of kernels per row and and shelling percentage[8]. Thus, it can be inferred that selection based on any one of these traits either alone or in combination, will result in identifying high yielding strains.

Table 1: Estimates of Phenotypic (r_p) and Genotypic (r_g) correlation coefficients among yield and yield attributes in sixty genotypes of maize

Characters		Days to 50% tasseling	Days to 50% silking	Days to maturity	Plant height (cm)	Ear height (cm)	Ear length (cm)	Ear girth (cm)	No. of kernel rows per ear	No. of kernels per row	100 Seed weight (g)	Shelling percentage (%)	Grain yield/ Plant (g)
Days to 50% tasseling	r_p	**1.0000**	0.9719 **	0.6207 **	0.2200 **	0.2586 **	-0.0248	0.1397	0.1166	0.0244	0.0098	0.0030	0.0259
	r_g	**1.0000**	0.9883**	0.6842**	0.2331**	0.2863**	-0.0264	0.1391	0.1474*	0.0216	-0.0073	-0.0454	0.0334
Days to 50% silking	r_p		**1.0000**	0.6194 **	0.1870 *	0.2196 **	-0.0128	0.1153	0.0890	0.0105	-0.0052	-0.0405	0.0003
	r_g		**1.0000**	0.6906**	0.2019**	0.2450**	-0.0172	0.1100	0.1085	0.0109	-0.0359	-0.1156	0.0037
Days to maturity	r_p			**1.0000**	0.4894 **	0.4453 **	0.2323 **	0.3179 **	0.1980 **	0.2121 **	0.1997 **	0.1350	0.2580**
	r_g			**1.0000**	0.5154**	0.4984**	0.2566**	0.4274**	0.2565**	0.2268**	0.2104**	0.1628*	0.2779**
Plant height (cm)	r_p				**1.0000**	0.8504 **	0.5985 **	0.5026 **	0.2012 **	0.5828 **	0.4918 **	0.1247	0.7082**
	r_g				**1.0000**	0.9148**	0.6769**	0.6389**	0.2415**	0.6320**	0.5545**	0.1977**	0.7431**
Ear height (cm)	r_p					**1.0000**	0.5204 **	0.5364 **	0.1654 *	0.4815 **	0.4567 **	0.1409	0.6849**
	r_g					**1.0000**	0.6130**	0.6629**	0.2118**	0.5387**	0.5396**	0.2173**	0.7432**
Ear length (cm)	r_p						**1.0000**	0.5290 **	0.1485 *	0.7055 **	0.3619 **	0.0019	0.6189**
	r_g						**1.0000**	0.7489**	0.1683**	0.8339**	0.4304**	-0.0892	0.7101**
Ear girth (cm)	r_p							**1.0000**	0.4712 **	0.4513 **	0.3605 **	0.1666*	0.5254**
	r_g							**1.0000**	0.7157**	0.6137**	0.5429**	0.2635**	0.6730**
No. of kernel rows/ear	r_p								**1.0000**	0.1770 *	0.1524 *	0.0148	0.1645*
	r_g								**1.0000**	0.2094**	0.1800*	0.0663	0.1758*
No. of kernels per row	r_p									**1.0000**	0.2539 **	0.0913	0.6196**
	r_g									**1.0000**	0.2438**	0.1201	0.6783**
100 grain weight (g)	r_p										**1.0000**	0.1522*	0.4651**
	r_g										**1.0000**	0.3048**	0.5228**
Shelling percentage (%)	r_p											**1.0000**	0.2336**
	r_g											**1.0000**	0.3497**

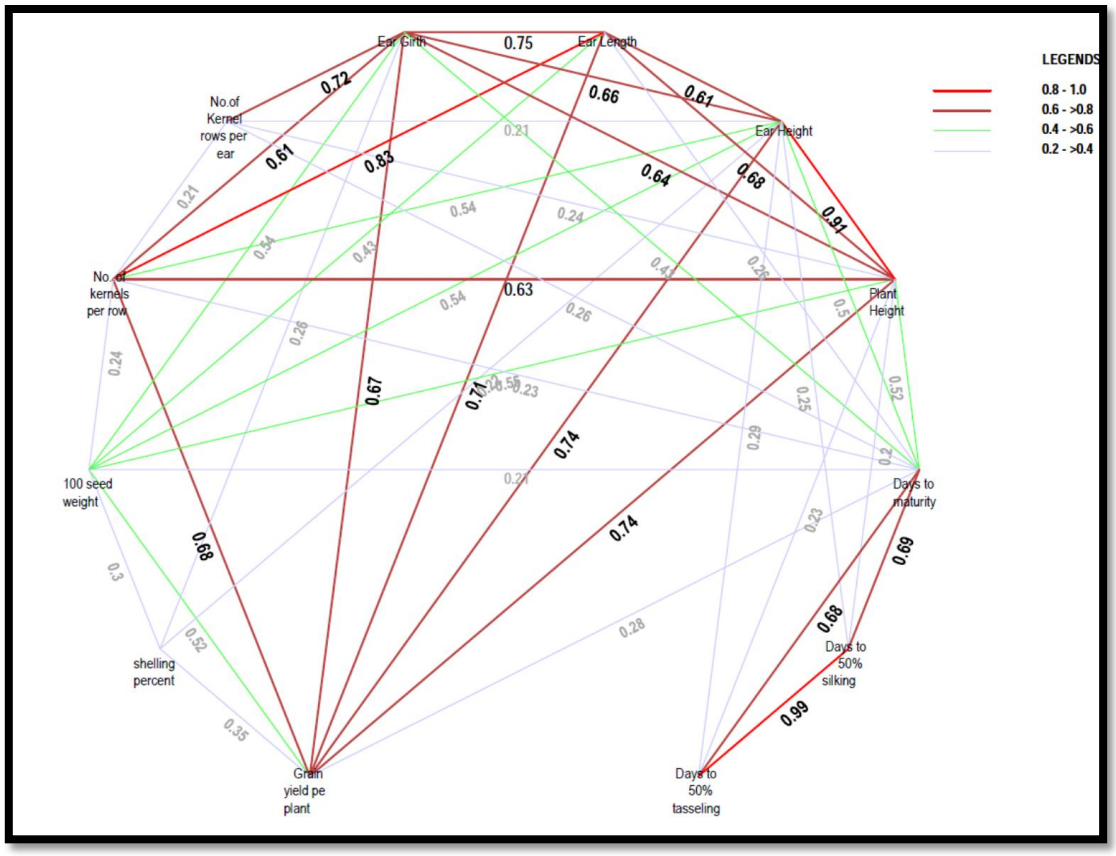

Fig. 1: Genotypic correlations among yield and yield components for twelve characters in maize

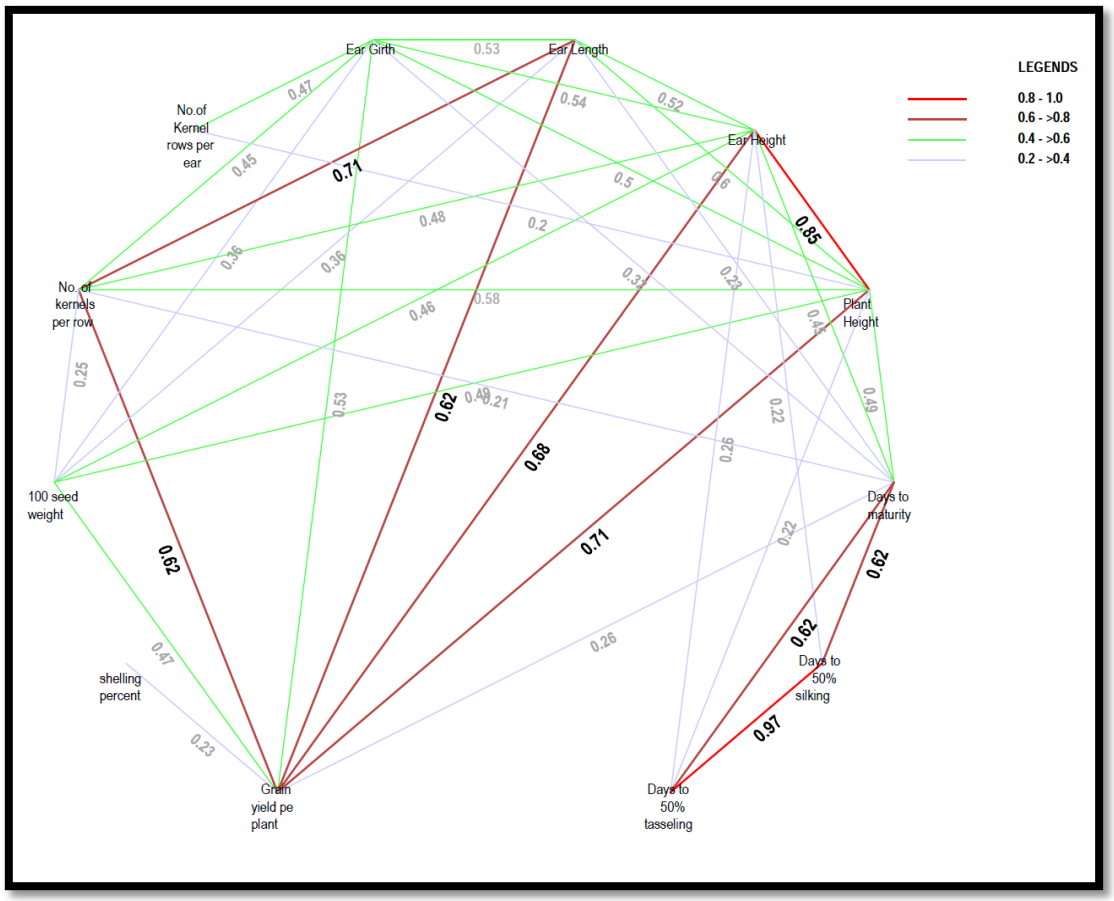

Fig. 2: Phenotypic correlations among yield and yield components for twelve characters in maize

CONCLUSION

The results of the present study revealed significant positive association of grain yield per plant with days to maturity, plant height, ear height, ear length, number of kernels per row, ear girth, 100 seed weight, shelling percentage and number of kernel rows per ear both at phenotypic and genotypic levels. Days to 50% tasseling and days to 50% silking also recorded positive but non-significant association with the grain yield at both the levels. It is interesting to note that the traits days to maturity, plant height, ear height, ear girth, number of kernels per row and number of kernel rows per ear are not negatively associated with any of the yield components and hence these traits can be used for the improvement of yield using the present material.

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