GENETIC CORRELATION AMONG GRAIN YIELD AND ITS COMPONENT TRAITS IN PEARL MILLET (*Pennisetum glaucum* (L.) R. Br.) HYBRIDS

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ABSTRACT

Sixty six pearl millet (Pennisetum glaucum (L.) R. Br.) hybrids along with their parental lines were grown in a randomized complete block design with three replications to assess the genetic correlation among 11 quantitative traits. A positive genetic correlation with grain yield per plant was recorded for plant height, number of productive tillers per plant, ear head weight, dry fodder yield per plant and harvest index. Ear head weight was marked as the most contributing character towards high grain yield (rA = 0.8049) followed by dry fodder yield (rA = 0.6782), harvest index (rA = 0.5703), plant height (rA = 0.5291) and number of productive tillers per plant (rA = 0.3600). These characters could be used as an indirect selection for the improvement of grain yield in hybrids or lines because these all characters were positive and significantly correlated with grain yield.

KEY WORDS: Genetic correlation, pearl millet

INTRODUCTION

Pearl millet (*Pennisetum glaucum* (L.) R. Br.) is a member of the family *Poaceae* with chromosome number 2n=14. It is an important member of the genus *Pennisetum,* which has high importance for both food and fodder and it is the most drought tolerant major cereal. The grain is the main purpose of cultivation of pearl millet in India and other countries. However, it is also grown on small scale as high quality forage crop in India, USA, Australia, South America and South Africa. The share of pearl millet in total food grain production is to the tune of 10.7 per cent. In India, it is grown on about 7.3 million hectares of area with an annual production of 8.74 million tones and productivity of 1198 kg/ha (Anonymous, 2013). It is widely cultivated in the states of Rajasthan, Maharashtra, Gujarat, Uttar Pradesh and Haryana (Anonymous, 2013). Commercial hybrid seed in pearl millet has been possible mainly through the development of hybrids by the utilization of cytoplasmic genetic male sterility system. Burton (1951) was the first to develop cytoplasmic male sterile line, Tift 23A. This opened up a new field for hybrid seed production in pearl millet. The use of CMS in pearl millet paved the way for grain yield augmentation with the development and release of the high yielding hybrid varieties.

Genetic correlation analysis is a handy technique which elaborates the degree of association among important quantitative traits. The studies on correlation are quite old and extensive, but unfortunately, there is hardly any rule set on how much a character contributes

towards the expression of other character(s) in a plant population.

Keeping in view, the genetic base of the material under study and the effects of environment are very important while studying genetic correlation among various quantitative characters in crop species. Such studies could lead plant breeders in the selection of traits contributing towards the character(s) of concern, and ultimately their improvement through hybridization.

MATERIALS AND METHODS

The present study on pearl millet was conducted at Department of Genetics and Plant Breeding, Junagadh Agricultural University, Junagadh, Gujarat. Six diverse lines *viz.,* ICMA 04111, JMSA 20071, ICMA 92777, ICMA 04999, JMSA 20064 and ICMA 05333 were crossed with eleven testers *viz.,* J 2534, J 2527, 334-SB 11, 283-SB-11, STPT 115, J 2290, J 2454, J 2507, J 2539, J 2340 and 285-SB 11 in a line x tester mating design during *kharif* 2012 to produce 66 hybrids. The resulting 66 hybrids along with 17 parents were evaluated during summer 2013 in a Randomized Block Design with three replications. Each plot with a spacing of 60 x 15 cm consisted of single row of 5.0 m length. All need based agronomic practices were followed during the crop growth period to raise a good crop. Observations were recorded on randomly selected five plants in each replication and entry for 11 quantitative traits *viz.,* days to 50 per cent flowering, plant height (cm), ear head girth (cm), ear head length (cm), number of productive tillers per plant, ear head weight per plant (g), days to maturity, 1000-grain weight (g), dry fodder yield per plant (g), grain yield per plant (g) and harvest index (%). The genetic correlation was estimated by the formulae described by Falconer and Mackay (1996).

RESULTS AND DISCUSSION

The genotypic correlation among grain yield and its component traits in pearl millet is presented in Table 1. The results showed that grain yield per plant exhibited strong positive and significant correlation with the plant height, number of productive tillers per plant, ear head weight, dry fodder yield per plant and harvest index (Table 1). Ear head weight was marked as the most contributing character towards high grain yield (rA = 0.8049) followed by dry fodder yield (rA = 0.6782), harvest index (rA = 0.57038) plant height (rA = 0.5291) and number of productive tillers per plant (rA = 0.36003). Similar results were reported earlier by Anarase *et al* (2001), Bezaweletaw *et al*. (2006) and Ganapathy *et al*. (2011) and suggested that selection on the basis of the phenotypic of these characters will lead to high grain yield in pearl millet. Days to 50 per cent flowering, ear head girth, ear head length, days to maturity and 1000 grain weight had no significant correlation with grain yield per plant and thus, these characters cannot use for indirect selection for the yield.

Among the yield components, days to 50 per cent flowering was negatively and significantly correlated with the harvest index. But the plant height had high significant correlation with ear head length, ear head weight and dry fodder yield per plant. Ear head girth had positive and significant correlation with 1000 grain weight and negative correlation with number of productive tillers per plant. Ear head length was also negatively correlated with number of productive tillers per plant. These results are in conformity with results reported by Phul *et al.* (1974).

Number of productive tillers per plant possessed positively significant correlation with ear head weight and dry fodder yield per plant. Ear head weight was positively correlated with dry fodder yield per plant. This was matched with results reported by Deosthale *et al.* (1991).

CONCLUSION

Based on the results, it can be concluded that characters *viz.,* plant height, number of productive tillers per plant, ear

head weight, dry fodder yield per plant and harvest index could be used as an indirect selection for the improvement of grain yield in hybrids or lines because these all characters were positive and significantly correlated with grain yield.

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Table 1: Genetic correlation among various characters of pearl millet hybrids

Characters	Days to 50 Per Cent Flowering	Plant Height (cm)	Ear Head Girth (cm)	Ear Head Length (cm)	Number of Productive Tillers	Ear Head Weight (g)	Days to Maturity	1000 Grain Weight (g)	Dry Fodder Yield Per Plant (g)	Harvest Index (%)	Grain Yield Per Plant (g)
Days to 50 Per cent Flowering	1.0000										
Plant Height (cm)	0.0258	1.0000									
Ear Head Girth (cm)	-0.1217	-0.0512	1.0000								
Ear Head Length (cm)	0.0910	0.5166 **	0.0987	1.0000							
Number of Productive Tillers	-0.0025	0.0475	-0.4405**	-0.4292 **	1.0000						
Ear Head Weight (g)	-0.1571	0.4023 **	0.0052	0.1001	0.2629*	1.0000					
Days to Maturity	0.1388	0.2191	0.0037	0.2192	-0.1265	0.0838	1.0000				
1000 Grain Weight (g)	-0.1079	-0.0402	0.4637 **	0.1279	-0.2161	0.1224	-0.0805	1.0000			
Dry Fodder Yield Per Plant (g)	0.1435	0.5076 **	-0.1225	0.08492	0.4970**	0.5381**	0.1308	0.1086	1.0000		
Harvest Index (%)	-0.3670 **	0.1941	0.1215	0.1373	-0.0237	0.2019	-0.0055	0.0801	-0.0922	1.0000	
Grain Yield Per Plant (g)	-0.1601	0.5291 **	0.0202	0.1503	0.3600**	0.8049**	0.1053	0.1399	0.6782**	0.5703**	1.0000

[MS received: February 11, 2015] *[MS accepted: March 28, 2015]*