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ASSOCIATION STUDIES OF GRAIN YIELD WITH ITS YIELD PARAMETERS UNDER TURCICUM LEAF BLIGHT STRESS IN MAIZE (*Zea mays*)

E.SATHYANARAYANA
Agricultural Research Station , Amberpet, Hyderabad

ABSTRACT

Phenotypic and genotypic correlations were calculated under artificial turicum leaf blight inoculated conditions to assess the degree of relationship of yield components with grain yield in maize. Genotypic correlation coefficiants possessed higher values for all the yield parameters than phenotypic 'r' values. Yield was positively and significantly correlated with number of kernels per row, number of kernel rows/ear, ear length, ear girth and 100 kernel weight both in parents and single crosses. Turicum leaf blight disease score has negatively correlated with grain yield both in parents and single crosses. The results indicated possibility of developing a high yielding turcicum leaf blight resistant variety/hybrid cultivar if genotypes are selected based on their strongly associated yield contributing components.

KEY WORDS : Phenotype, Genotype, Correlations, Turcicum Leaf Blight, Maize, Yield Parameters

Grain yield in maize is a complex character and its expression depends upon the interaction of different yield parameters including turcicum leaf blight stress. An information on the correlation coefficients between grain yield with its yield parameters is prerequisite for improving grain yield. Many workers have reported positive and significant correlation between grain yield with one or other or both of yield components (Laptev, 1981; Baktash *et al.*, 1981; Sharma *et al.*, 1982; Rao, 1986; Manmohan, 1984; Anuradha, 1988; Ravidranath, 1988; Rachupathi Reddy, 1989; Satyanarayana, 1990). Genetics of turicicum leaf blight resistance in maize has been done extensively but association studies between grain yield and its components under turicucum leaf blight stress are very limited (Rachupathi Reddy 1989). Keeping this view as back ground, present study was under taken to know the degree of association between grain yield and its contributing characters in some maize genotypes under artificial turicicum leaf blight epiphytotic conditions.

MATERIALS AND METHODS

The seed material consisting of ten parents (MO 17, CM 119, CM 120, ,H 98, X 102, H 100, Sona 48, $J_1$26, $J_1$55, $J_1$67) and their 45 straight, F_1 crosses were grown during *rabi* 1989-90 in a randomised complete block design with three replication at the Atricultural Research Station, Amberpet, Hyderabad. All the cultivars were sown in single rows of 5 m long with were 75 cm apart. Plant to plant distance was maintained as 20 cm with in a row. The crop was provided with recommended cultural practices. Biotic stress of turcicum leaf blight was artificially created by introduction of diseased leaf material into the whorls of all individual plants followed by spraying with spore suspension. Six such inoculations were attended commencing from 20 days after planting till tasseling stage at an interval of six days each.

Data from randomly selected five plant basis were recorded for plant height, ear height, ear length, ear girth, number of kernel rows per ear, number of kernels per row and hundred seed weight while on total plant basis, for days to 50 per cent silking, days to 50 per cent dry husk, turcicum leaf blight disease score and grain yield. Disease score was recorded in 1 to 5 scale of Payak and Sharma (1982) where 1.00 to 2.5 scale considered as resistant and above 2.5 and upto 5.0 as susceptible. The correlation coefficient analysis was done on the mean data according to Dewey and Lu (1959).

RESULTS AND DISCUSSION

The values of genotypic correlation coefficient were higher when compared to phenotypic correlation coefficients for all the yield parameters (Table 1). This observation indicated the masking effect of environment by the genetic constitution of each trait.

Table 1. Correlation (phenotype and genotype) coefficients in parents and single crosses (F_1 s) of grain yield with various yield components under turcicum leaf blight stress at Agricultural Research Station, Amberpet.

Characters	Association with grain yield			
	Phenotypic correlation coefficients		Genotypic correlation coefficients	
	Parents	Single crosses	Parents	Single crosses
Days to 50% silking	-0.03	0.32**	-0.05	0.38**
Days to 50% dry husk	0.04	-0.18	0.06	-0.22*
Plant height	-0.21	0.16	0.32	0.20
Ear height	0.19	0.34**	0.21	0.39**
Turcicum leaf blight	-0.21	-0.29**	-0.25	-0.35**
Ear length	0.80**	0.35**	0.91**	0.45**
Ear girth	0.79**	0.27**	0.91**	0.33**
No. of kernels/row	0.75**	0.36**	0.86**	0.46**
No. of kernel rows/ear	0.71**	0.20*	0.92**	0.31**
100 kernel weight	0.50*	0.22**	0.55**	0.25*

*, ** Significant at 5 per cent and 1 per cent level respectively.

Parents

The phenotypic correlation coefficient of yield with its components indicated that yield was positively and significantly correlated with ear length (0.80) followed by ear girth (0.79), number of kernels/row (0.75), number of kernel rows/ear (0.71) and 100 kernel weight. In case of genotypic correlation coefficient, number of kernels rows/ear (0.92), followed by ear length (0.91), ear girth (0.91), number of kernels/row (0.86) and 100 kernel weight (0.55) had positive and significant correlation with yield while days to 50 per cent silking and turcicum leaf blight disease score had negative association.

Single crosses

In F_1 single corsses, number of kernels per row (0.36) followed by ear length (0.35), ear height (0.34) days to 50% silking (0.32) ear girth (0.27), 100 kernel weight (0.22) and number of kernel rows/ear (0.20) in that order had positive and significant correlation with yield at phenotypic level. While turcicum leaf blight disease score (-0.29) was negatively and singificantly associated. In case of genotypic correlation coefficients number of kernels/row (0.46) followed by ear length (0.45), ear height (0.39), days to 50% silking (0.38), ear girth (0.33), number of kernel rows/ear (0.31) and hundred kernel weight (0.25) possessed positive and significant correlation with yield; while turiccum leaf blight disease score was (-0.35) negatively and significantly correlated.

The correlation coefficients for the parental inbreds indicated that yield was positively and significantly correlated with number of kernel rows/ear, ear length, ear girth, number of kernels per row and 100 kernel weight. Therefore, in the process of selection of parents emphasis may be laid on these yield components to increase grain yield. This statement also enjoyed the support of Anuradha (1988) and Satyanarayana (1990). In case of single crosses, grain yield was significantly and positively correlated with number of kernels/row, ear length, ear height, days to 50% silking, ear girth, number of kernel rows/ear and 100 kernels weight. In the similar type of investigation Bhole and Patil (1984), Rao (1986), and Ravindranath (1988) reported significant correlation for ear length and 100 grain weight while Sharma *et al.* (1982) and Raghupathi Reddy (1989) for number of kernels per row and number of kernels per ear while for all the ear traits by Singh *et al.* (1987) and Satyanarayana (1990).

Anuradha (1988) and Satyanarayan (1990) observed a negative correlation coefficient for charcoal rot disease score, days to 50 per cent silking and days to 50% dry husk with grain yield. Similarly in the present study also, turcicum leaf blight disease score and days to 50 per cent dry husk possessed negatively significant correlation with grain yield.

The present studies in short revealed that yields in parents and single crosses of maize were strongly dependent upon number of kernels per

row, ear length, ear girth and 100 kernel weight with addition of resistance to turcicum leaf blight. Therefore for developing a high yielding turcicum leaf blight resistant variety, the breeder should take care of all these yield components. The strong positive association of these above yield parameters with grain yield is attributed to gene action of linkage and pleiotropy.

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GENETIC VARIABILITY AND CAUSAL RELATIONSHIPS IN RICE

A.ROY, D.V.S.PANWAR and R.N.SARMA

Department of Plant Breeding, Haryana Agricultural University, , Hissar 125 004.

ABSTRACT

Variability, correlation and path coefficient analyses were made for 11 characters in a collection of 99 rice genotypes (*Oryza sativa* L.). Bacterial blight severity, plant height, spikelets/panicle and grains/panicle showed high heritability with high genetic advance. Yield/plant was positively associated with days to 50 per cent flowering, spikelets/panicle and milling per cent. Path coefficient analysis revealed grains/panicle, spikelets/panicle and bacterial blight severity are the most important characters contributing to yield.

KEY WORDS : Rice, Variability, Heritability, Correlation

The improvement of crops is dependent on magnitude to genetic variability and the extent to which the desirable characters are heritable. A critical survey of genetic variability is, therefore, a pre-requisite for planning an effective breeding programme. Yield being a complex character, direct selection would not be reliable approach without giving due importance to its genetic background. Though correlations give information about the components of yield, yet they do not provide a true picture of relative importance of direct and indirect influence of component traits towards yield. Path coefficient analysis helps in examining the relative contribution of both direct and indirect effects of component traits on yield. So, the present investigation was carried out to elucidates the extent of genetic variation and nature of causal relationships in yield attributes in few rice genotypes to determine the important yield