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Evaluation of S_1 Maize (*Zea mays* L.) Families at Seedling Stage for Fodder Purposes

Syed Sadaqat Mehdi and Muhammad Ahsan
Department of Plant Breeding and Genetics, University of Agriculture, Faisalabad-38040, Pakista

Abstract

Seeds from five hundred S_0 families were used to evaluate their S_1 families for seedling traits. Based on the performan of five hundred S_1 families at seedling stage, the values of coefficients of variation were high for fresh shoot and ro weight (29.91 and 36.06%, respectively). Dry root weight was negatively and significantly correlated with fresh sho length. However, dry shoot weight with fresh shoot length; dry root weight with fresh root length were positively and no significantly correlated. Fresh shoot weight was found to be significantly and positively correlated with fresh shoot lengt fresh root length, fresh root weight, dry shoot weight and dry root weight. However, fresh shoot weight might be use as selection criteria to select promising families for green fodder yield evaluation.

Introduction

Maize (*Zea mays* L.) is an important kharif fodder crop, adaptable to widely varying climatic and soil conditions. It is extensively grown in the irrigated and rainfed areas of Punjab. The staggered planting of maize from February to September helps cope with the fodder scarcity problems faced in May-June and October-November (Nazir, 1994). Its nutritious fodder is relished by all kinds of livestock especially milch animals. Maize is a cash crop for growers, as around cities it is widely grown for sale as green fodder. Significant variation exists for nutritional quality traits of the stover and whole-plant forage in maize (Wolf *et al.*, 1993). Differences in the rate of dry matter accumulation in different parts of the plant are related to changes in morphological structure. However, peak yield of green herbage occurs at the beginning of milky ripeness (Kirilov and Naidenov, 1990).

The production of maize fodder crop per acre is very low in Pakistan as compared to many other countries of the world. This is because, very little attention has been paid in the past to the improvement of maize as fodder crop. An adequate and regular supply of nutritious fodder is needed in Pakistan for livestock production in order to meet the requirements of milk, meat, butter and other products for human population. Therefore an organized fodder research program is initiated to meet the said problems.

Materials and Methods

In order to initiate this experiment, maize germplasm was collected from different research organizations of the country as indicated in Table 1. From the said maize germplasm, five hundred S_0 families were produced for their further seedling evaluation.

The experiment was conducted in a wire house in the Department of Plant Breeding and Genetics, University of Agriculture, Faisalabad on February 21,1998. Five hundred S_0 families were raised in 20 blocks and each block was assigned with 25 S_0 families. The experiment was conducted in a modified randomized complete block design with two replications. Ten seeds per family were sown iron trays filled with river sand by keeping row-to-row a plant-to-plant distances of 5.0 and 3.5 cm, respective Water was applied to the seedlings regularly and was no limiting factor for growth.

Table 1: Sources of Maize germplasm collected fr different organizations.

Name of the organization	Name of the germplas
Maize Section, AARI, Faisalabad	B-42
Cargil Seed Co. (Pvt.) Lahore	Hybrid-707, 777, 91 922, 927, 929, 787 7879.
Dept. Of PBG, UA. Faisalabad	Izono Populations, S_1 Families
Univ. College of Agri., Rawalakot, Azad Kashmir	Kashmir Gold.
Maize & Millet Res. Institute, Yousafwala	EV-4085, Sarhad Wh Y-102, CBCM II, Po Rica-9425, Neel Sultan, Golden, Aga 85, SYP-30, 346, Po Rica 0443 TL-95B, Po Rica 9422, Akbar, 108, SYP-27, TL-9 Poza Rica 9422, M 211, S-9543, Strit. A Rotacbco, Sintet 9521, TL-95A Acr 9243, Exo-2 ACROSS-9225, Afgoyee.

The experiment was harvested after eighteen days planting and data were recorded for fresh shoot le (cm), fresh root length (cm), fresh shoot weight (g) fresh root weight (g). Fresh samples were left for dryin the oven. When they were completely dried, data w recorded for dry shoot weight (g) and dry root weight Data were analyzed for the analysis of variance techni

(Steel and Torrie, 1980). Thereafter simple correlation coefficients were estimated by using the method of Kwon and Torrie (1964). Mean and coefficients of variation (CV%) were also calculated for each seedling trait.

Results and Discussion

Pooled means and coefficients of variation (CV %) for seedling traits among five hundred S_1 families are given in Table 2. The CV (%) magnitudes were found lower for fresh shoot and root length per plant (17.51 and 19.01%, respectively). They were also found lower for dry shoot weight (CV = 17.85%), dry root weight (CV = 19.47%) and germination percentage (CV = 12.16%). However the values of CV (%) for fresh shoot weight per plant, fresh root weight per plant were found to be higher (29.91 and 36.06). These results indicate that there was more variability among S_1 lines for fresh shoot weight and fresh root weight. Therefore, fresh shoot weight variability will be more useful in developing the population for fodder purposes. But, Suwantaradin *et al.* (1975) compared the effectiveness of two sets of arbitrarily assigned relative economic weight to several agronomic traits in 144 S_1 lines of maize and reported that both sets were found effective in improving percentage emergence, emergence index and undesirable responses were predicted for other. Dhillon (1991) reported two new methods of selection, alternative recurrent selection of S_1 and half-sib families. The new methods have greater expected genetic gains/year than mass, S_1, modified S_1, full-sib, modified full-sib, half-sib, modified ear-to-row and alternative modified S_1-half sib selections.

Table 2: Pooled means ± standard deviation and CV% for seedling traits among five hundred S_1 families

Seedling traits	Mean	CV%
Fresh shoot length per plant (cm)	13.72±2.4019	17.51
Fresh root length per plant (cm	11.12±2.1144	19.01
Fresh shoot weight per plant (g)	1.29±0.3859	29.91
Fresh root weight per plant (g)	0.96±0.3462	36.06
Dry shoot weight per plant (g)	0.59±0.1053	17.85
Dry root weight per plat (g)	0.55±0.1071	19.47
Germination percentage	93.31±11.35	12.16

Table 3: Correlation coefficients for indicated seedling traits among five hundred S_1 maize families.

	1	2	3	4	5
Fresh root wt.	0.377**				
Dry shoot wt.	0.463**	0.222**			
Dry root wt.	0.191**	0.312**	0.730**		
Fresh shoot wt.	0.039^{NS}	0.109*	0.474**	0.423**	
Fresh root wt.	-0.125**	0.055^{NS}	0.266**	0.446**	0.847**

NS = Non significant; *, ** = Significant at 5 and 1 per cent level of significance, respectively.

Fresh shoot weight was positively and significantly correlated with fresh shoot length, fresh root length, fresh root weight, dry shoot weight and dry root weight. There was also positive and significant linear correlation for dry shoot weight with fresh root length and dry root weight. Fresh root weight was positively and significantly correlated with dry shoot weight, dry root weight, fresh shoot and root length. Fresh shoot length was also positively and significantly correlated with fresh root length. But fresh shoot length was negatively and significantly correlated with dry root weight (Table 3). It is concluded from the results that fresh shoot weight can be used as selection criteria while comparing S_1 families at seedling stage in maize. But, Li (1993) reported that emergence percentage has been extensively used as an indicator for seedling vigour. Similarly, Fakorede and Ayoola (1980) used emergence percentage, emergence index, dry matter accumulation growth rate and relative growth rate as an indicator for seedling vigour during the first 30 days of growth.

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