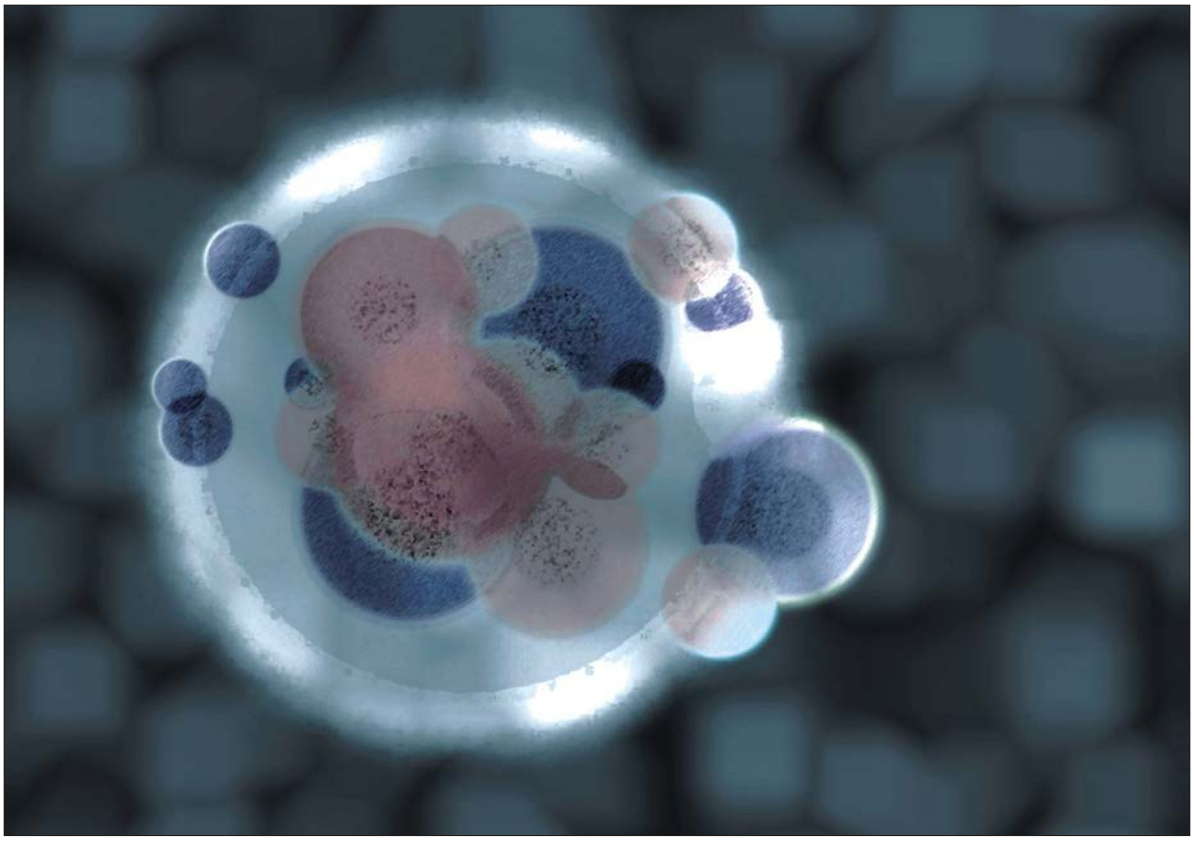

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Comparative Evaluation of Newly Developed Maize Population for Fodder Purposes

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Abstract: Synthetic (newly developed) maize population had significantly more number of leaves per plant than Tall and Mixture populations. It had also significantly greater plant height than dwarf, F_1 hybrid and Mixture. This population was also found significantly high green fodder yielding than Tall, Medium, Dwarf, F_1 hybrid and Mixture. Newly developed population had low magnitude of coefficient of variation for leaves per plant, plant height and green fodder yield than all other populations. It is therefore suggested on the basis of these results that Synthetic (newly developed) maize population may be more useful while growing for green fodder yield.

Key words: Synthetic population, maize, fodder, interrelationships

Introduction

Maize (*Zea mays* L.) is a dual purpose crop in Pakistan. It is being used as food and as an important kharif fodder grown alone and in mixture in the country. Maize is adaptable to widely varying climatic and soil conditions. In view of its increasing importance, improvement on maize has picked considerable attention in Pakistan and other countries of the world (Hunter, 1980; Han, 1982; Prasad and Singh, 1980; Bhole and Patil, 1983; Russell, 1985; Dai *et al.*, 1990; Hussain and Aziz, 1998; Ahsan, 1999; Mehdi and Ahsan, 1999; Ahsan and Mehdi, 2000). It is extensively grown in the irrigated and rainfed areas of Punjab. Bhatti (1988) reported that fodder production is approximately 52-54 percent less than the actual requirement of Pakistan. 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).

Maize provides the cheapest and most valuable fodder for animals, especially the milch cattle. As a cash crop, the farmers around cities, grow it widely for sale as green fodder. Being highly productive and bearing abundant leaf growth, it is typically adapted to soils of high fertility. When used as a grain crop the stalk and leaves of maize are kept as stover. Although significant variation exists for nutritional quality traits of the stover and whole-plant forage in maize (Wolf *et al.*, 1993). However, differences in the rate of dry matter accumulation in different parts of the plant are related to changes in morphological structure. Whereas, 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 low in Pakistan as compared to many other countries of the world. This is because, little attention has been paid in the past to the improvement of maize as fodder crop. In spite of the tremendous importance of the fodder crops in the country, there is not even a single variety of maize grown purely for fodder purposes. In order to provide an adequate and regular supply of nutritious fodder, considerable efforts are needed to develop a maize variety for fodder purposes. Keeping in view the above points, this experiment was conducted to evaluate the newly developed synthetic maize population for green fodder yield.

Materials and Methods

This experiment was conducted in the research area of the Department of Plant Breeding and Genetics, University of Agriculture, Faisalabad on March 27, 2000. Six maize populations (Dwarf, Medium, Tall, Synthetic (newly developed), F_1 hybrid and Mixture) were raised in a randomized complete block design with six replications. The experimental unit consisted of single row plot of 15 feet length with row-to-row and plant-to-plant distances of 30 and 15 cm, respectively. Normal cultural practices were applied to the plants throughout their growing period. The experiment was harvested for green fodder yield (g) on May 27, 2000, when the 50 percent of the plants in each row initiate tasseling. Other plant traits, such as leaves per plant and plant height of ten randomly selected plant for each genotype also recorded at the harvest.

Data were analyzed for the analysis of variance technique (Steel and Torrie, 1980). Thereafter linear correlation coefficients (Kwon and Torrie, 1964). Mean and coefficients of variation (CV%) were also calculated for each seedling trait.

Results and Discussion

There were significant differences among six maize genotypes (Table 1) for leaves per plant, plant height and green fodder yield. Ayub *et al.* (1998) reported significant differences among maize cultivars for plant height and fresh fodder yield. Newly developed population was found to be significantly different for number of leaves per plant (12.5) than Tall (11.1) and Mixture (10.4) populations. There were also significant differences for number of leaves per plant between tall and Mixture populations. Newly developed population had significantly greater plant height (128.2 cm) than dwarf (90.6 cm), F_1 hybrid (93.6 cm) and Mixture (90.6 cm). Newly developed population had also significantly high green fodder yield (1950 g) than Tall (1433 g), Medium (1450 g), Dwarf (1117 g), F_1 hybrid (1330 g) and Mixture (1283 g). But there were no significant differences for green fodder yield among Tall, Medium, Dwarf, F_1 hybrid and Mixture populations (Table 2). It is suggested from the results that Newly developed population was high green fodder yielding as compared to other populations.

Newly developed population had low magnitude of coefficient of variation for leaves per plant (6.11%), plant height (5.19%) and green fodder yield (19.12%) than all other populations (Table 2). The pooled coefficient of variation magnitude (Table 3) for green fodder yield (35.4%) was found to be high than plant height (21.6%) and leaves per plant (10.3%). Ahsan and Mehdi (2000) also reported higher values of genetic coefficient of variation (29.97%) for green fodder yield in S_1 maize families under field conditions.

The linear correlation coefficient (Table 4) was found to be highly significant between leaves per plant and plant height (0.574**). Leaves per plant and plant height were also highly

Table 1: Mean squares from the analysis of variance for indicated plant traits among six maize genotypes evaluated for green fodder yield

Source	df	Leaves plant^{-1}	Plant height (cm	Green fodder yield (g)
Replications	5	2.7843**	158.3^{NS}	687778**
Genotypes	5	3.2576**	1293.9*	479778*
Error	25	0.7560	432.5	124578

NS = non-significant, *, ** Significant at 5 and 1 percent levels of probability, respectively

Table 2: Mean ± S.E and coefficient of variation (CV%) for six maize genotypes for some indicated plant traits

	Leaves plant^{-1}		Plant height (cm)		Green fodder yield (g)	
Population	Mean ± S.E	CV%	Mean ± S.E	CV%	Mean ± S.E	CV%
New population	12.5 ± 0.31^{a}	6.11	128.2 ± 2.72^{a}	5.19	1950.0 ± 152.0^{a}	19.12
Tall	11.1 ± 0.28^{bc}	6.19	116.6 ± 14.7^{abd}	30.87	1433.0 ± 126.0^{b}	21.15
Medium	11.6 ± 0.56^{ab}	11.82	105.3 ± 6.22^{abc}	14.46	1450.0 ± 240.0^{b}	40.62
Dwarf	11.9 ± 0.47^{ab}	9.60	96.6 ± 9.05^{bc}	22.95	1117.0 ± 209.0^{b}	45.83
F_1 hybrid	11.5 ± 0.56^{ab}	11.93	93.6 ± 5.46^{bc}	14.15	1330.0 ± 199.0^{b}	36.77
Mixture	10.4 ± 0.27^{c}	6.36	90.6 ± 3.63^{cd}	9.80	1283.0 ± 196.0^{b}	37.33
LSD	1.03		24.73		419.78	

Population means sharing the same letters are not significantly different

Table 3: Pooled mean ± Standard deviation and coefficient of variation (CV%) for some indicated traits among six genotypes of maize

Trait	Mean ± SD	CV%
Leaves	11.5 ± 1.1845	10.3
Plant height (cm)	105.1 ± 22.72	21.6
Green fodder yield (g)	1427.8 ± 505.7	35.4

Table 4: Linear correlation coefficients for some indicated traits in maize

	Green fodder weight	Leaves
Leaves	0.524**	
Plant height	0.474**	0.574***

** = significant at 1 percent level of significance

and significantly correlated with green fodder yield (r = 0.524** and 0.474** respectively). Ahsan (1999) found a significant and positive linear correlation coefficient between plant height and leaves plant per plant in maize. There were positive and significant inter-relationships among green fodder yield, leaves per plant and plant height in maize S_1 families (Mehdi and Ahsan, 1999; Ahsan and Mehdi, 2000).

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