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Correlation Based Response in Forage Maize (Zea Mays L.) for Various Fodder and Kernel Yield Traits

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ABSTRACT

The character association between fodder and kernel yield and its contributing traits were studied among one hundred forage maize accessions collected from parts of India (Madhya Pradesh, Rajasthan and Uttar Pradesh) along with a known forage maize variety (African Tall). The results revealed that fodder yield was positively and significantly associated with kernel yield and its related traits like days to maturation, cob length, kernel length and test weight. Also, Kernel yield related traits like days to maturation, kernel length and test weight were significantly associated with fodder yield traits like days to 50% silking, plant height, number of leaves per plant and stem girth. Therefore, fodder yield might be a good indicator for kernel yield production. It might be suggested that a dual purpose variety in maize could be developed by selecting plants with more plant height, number of leaves per plant, stem girth, days to maturation, test weight and kernel length alone or jointly which might increase the level of fodder and kernel yield.

Keywords: Forage maize (Zea mays L.), correlation, character association, fodder and kernel yield traits.

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INTRODUCTION

Yield being a complex character, is the cumulative and interactive effect of number of component traits [1]. So improvement in yield whether it is for fodder or kernel yield depends on improvement of those component characters. However because of their complex interactive nature with each other, knowledge of the association of these component traits with yield and among themselves is of utmost importance [2]. Maize stands out as one of the most important cereal crop in world with enormous role in food, fodder and nutritional security. The use of maize as animal feed is to well known. It is the cheapest and most palatable carbonaceous for animals. Forage maize plant does not have problems of Hydrocyanic acid and therefore it can be used even before in flowering or in dry weather. Quite often maize crops are grown as a dual purpose crop for fodder and grain. Presence of remarkable range of adaptability of maize in varying altitude, moisture, fertility, disease and pest regimes makes it a favourable choice to bridge the gap between demand and supply of fodders. Developing superior varieties offers solution to the problem of sustained and increased fodder supply per unit area and per unit time. The variability in plant traits and utility of maize has been subject of appreciation since loge time. Therefore, the knowledge of association of forage and kernel yield and its component traits is of very important. The present investigation was conducted to generate information on association of forage and kernel yield and its related traits.

MATERIALS AND METHODS

The materials for the present study comprised of 100 accessions of forage maize collected from different parts of India mainly Madhya Pradesh, Rajasthan and Uttar Pradesh. The accessions were evaluated with known forage maize variety (African Tall) in randomized block design with three replications for three consecutive years, 2001- 03. Each accession was evaluated in a plot of two rows of 4m length at 0.4m apart. In order to maintain the genetic purity and to avoid cross pollination, selected plants were bagged till pollination was over. Observations were recorded on various fodder and kernel yield traits separately at 50% silking stage and up to the maturity of the accessions. Phenotypic correlation coefficient was calculated as per the methods suggested by Searle [3].

RESULTS AND DISCUSSION

Phenotypic coefficient of correlation was estimated to know the actual picture of relationships existing between the fodder and kernel yield characters and its contributing traits. The emphasis was given to know the pattern of association present among important characters like fodder yield/plant, kernel yield/plant and its associated characters like plant height, number of leaves per plant, leaf length, stem girth, kernel length, days to maturation and 100-seed weight (test weight).

Fodder and kernel yield is the ultimate product of interactions among its characters under the influence of environment. It is quite likely that the contribution of component

Characters	X-1	X-2	X-3	X-4	X-5	X-6	X-7	X-8	X-9	X-10	X-11	X-12	X-13	X-14	X-15	X-16	X-17	X-18	X-19	X-20
X-1	1.000	0.445**	0.522**	0.234*	0.297	0.290**	0.433**	0.617**	-0.002	-0.107	0.815**	-0.102	0.050	-0.124	-0.241*	-0.086	0.238*	0.156	0.531**	-0.032
X-2		1.000	0.597**	0.413**	0.391**	0.275**	0.405**	0.722**	-0.102	-0.119	0.524**	0.054	0.068	-0.124	-0.093	-0.001	0.268**	0.118	0.472**	0.118
X-3			1.000	0.286**	0.310**	0.302**	0.433**	0.628**	0.045	-0.120	0.556**	0.059	0.101	-0.093	-0.076	0.038	0.267**	0.144	0.581**	0.174
X-4				1.000	0.430**	0.216*	0.366**	0.519**	-0.141	-0.103	0.313**	0.082	0.020	-0.146	0.027	0.022	0.112	0.084	0.213**	0.133
X-5					1.000	0.175	0.342**	0.420**	-0.062	-0.129	0.284**	-0.019	0,039	-0.121	-0.039	-0.021	0.183	0.144	0.229**	0.015
X-6						1.000	0.501**	0.444**	0.124	0.069**	0.327**	-0.017	-0.024	-0.134	-0.017	-0.069	0.142	0.093	0.199*	0.045
X-7							1.000	0.622**	-0.059**	-0.153	0.423**	0.068	0.068	-0.111	-0.044	0.017	0.210*	0.132	0.316**	0.079
X-8								1.000	-0.075**	-0.233*	0.719**	0.196*	0.103	-0.054	0.006	0.070	0.316**	0.186	0.612**	0.250*
X-9									1.000	0.064	0.041	-0.082	-0.034	-0.013	0.033	-0.020	-0.097	-0.057	-0.029	0.078
X-10										1.000	-0.209	-0.114	0.002	-0.016	-0.103	-0.024	-0.019	0.021	0.015	-0.189
X-11											1.000	-0.062	0.037	-0.089	-0.282**	-0.074	0.302**	0.142	0.503**	-0.022
X-12												1.000	0.127	-0.00	0.534**	0.366**	0.006	0.098	-0.01	0.222*

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														3					0	
X-13													1.000	0.368**	0.055	0.157	0.359**	0.211*	0.145	0.168
X-14														1.000	0.039	0.090	0.025	-0.370**	-0.201*	-0.052
X-15															1.000	0.141	-0.073	-0.096	-0.229*	0.319**
X-16																1.000	0.027	0.071	0.052	0.264**
X-17																	1.000	0.509**	0.539**	0.276**
X-18																		1.000	0.513**	0.295**
X-19																			1.000	0.410**
X-20																				1.000

Table 1: Estimation of phenotypic correlation coefficient for various fodder and kernel yield traits

*, ** Significant at 5% and! % level respectively.
X-1 = Days to 50% silking, X-2 = Plant height, X-3 = Number of leaves/ plant, X-4 = Leaf blade length, X-5 = Sheath length, X-6 = Leaf width, X-7 = Stem girth, X-8 = Dry fodder yield/ plant, X-9 = Leaf stem ratio, X-10 = Crude protein%, X-11 = Days to maturation, X-12 = Cob length, X-13 = Cob width, X-14 = Number of kernel rows, X-15 = Number of kernel/ rows, X-16 = Shank diameter, X-17 = Kernel length, X-18 = Kernel width, X-19 = Test weight, X-20 = Kernel yield/ plant.

showing highly significant association with fodder and kernel yield may get diluted through the interaction with other components. Therefore, Improvement in characters like plant height, number of leaves per plant and stem girth might be helpful to improve the fodder and kernel yield in maize both directly and indirectly [4-7].

Dry fodder yield is a dependent trait on various fodder yield traits, but it is also dependent on various kernel yield traits. Days to maturation is one of the important trait which determine dry fodder yield potential and kernel yield, therefore, positive correlation with days to 50% silking, plant height, number of leaves per plant, leaf length, sheath length, leaf width and stem girth appeared advantageous (Table 1). Similarly, dry fodder yield/plant had positive and significant association with kernel yield and its associated traits like days to maturation, cob length, kernel length and test weight (Table 1). The results supported that the forage yield was linearly related to kernel yield with a positive correlation of dry matter to cob length [8, 9].

Kernel length showed positive and significant correlation with dry fodder yield and its associated traits like plant height, number of leaves per plant, days to 50% silking and stem girth. Test weight is a kernel yield trait but it had positive and significant association with dry fodder yield per plant and its related traits like number of leaves per plant, days to 50% silking, plant height, stem girth, sheath length, leaf length and leaf width. Srivas and Singh [10] suggested that an ideal plant type in forage maize for kernel yield could be described as one which characterized by more number of kernels per row, test weight and shank diameter. The traits like (Plant height, Number of leaves/Plant, Stem girth) were having non-significant positive association with kernel yield but indirectly associated with kernel yield traits like days to maturation, kernel length and test weight (Table 1). The results are little in conformity with the findings of Gupta and Singh [11], Debnath and Khan [12], Angelow [13], Rahman et al. [14] and Rana et al. [15].

CONCLUSION

Therefore, it may be concluded that the fodder and kernel yield attributes have different kind of associations between and within the complex character and selection could be practiced among maize lines to develop dual purpose variety by selecting plant with more plant height, number of leaves per plant, stem girth, days to maturation, test weight and kernel length alone or jointly which will increase the level of fodder and kernel yield.

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