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Components of Yield in Sweet and Pop-Corn

By

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ABSTRACT

In popcorn yield was found to be positively associated with leaf breadth and node number whereas leaf length showed negative relationship. The multiple correlation coefficient suggested that number of rows / ear was the most important yield component. In sweet corn, node number was positively and significantly correlated with grain yield, ear length, number of rows / ear and grain number / row accounted for 64.71 per cent whereas number of rows / ear and ear length contributed 54.48 per cent of variability in yield. Correlation coefficients among yield components were different in sweet and popcorn. This points to the need of development of different selection procedures for these two types of corn.

INTRODUCTION

Since plant yield in any crop is a complex character being greatly influenced by environmental factors, selection for yield *per se* is often ineffective. On the other hand selections based on yield components which are relatively simply inherited and correlated with yield can be more rewarding. (Grafius, 1956). The present studies were conducted to estimate correlation coefficients in sweet corn (*Zea mays saccharata*) and popcorn (*Zea mays everta*) and to utilise the information thus obtained for selection.

MATERIALS AND METHODS

Thirteen promising strains of sweetcorn and seven of popcorn obtained from exotic and indigenous sources were included in the present investigation conducted during *kharif* 1972 at the Maize Experimental Station Bajaura (H. P.). The experiment was grown in a randomized block design with four replications. One trial each on sweet and pop corn was laid out. Correlation coefficients for different characters in all possible combinations were calculated. Estimates of phenotypic correlation coefficients were done according to the methods described by Panse and Sukhatme (1967). Partial and multiple correlation coefficients were worked out according to the method suggested by Croxton and Cowden (1966).

RESULTS AND DISCUSSION

The estimates of correlation coefficients have been presented in Table 1.

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TABLE 1. Phenotypic correlation coefficients

Characters		Plant height	Ear length	Ear girth	No. of rows/ ear	No. of grain row	Length of leaf	Breadth of leaf	No. of nodes	Grain yield at 15 per cent moisture
Days to silk	P.C.	—.358	—.433	—.104	—.296	.152	.505	.390	—.653	—.679
	S.C.	.432	.507	.168	.306	.222	...	...	.221	.093
Plant height	P.C.		.808*	—.114	—.182	.493	—.483	—.152	.794*	—.041
	S.C.		.677*	—.096	.376	.512	..	...	.715**	.521
Ear length	P.C.			.099	—.197	.737	—.567	—.376	.774*	.433
	S.C.			.155	.545	.900**	...	...	.414	.064
Ear girth	P.C.				.124	.082	.038	—.122	.157	.186
	S.C.				.203	.494	...	...	—.575*	—.538
No. of rows	P.C.					.181	—.083	—.322	.325	.752
per ear	S.C.					.590*	....	...	.471	.427
No.of grains	P.C.						—.908**	—.753	.629	.735
per row	S.C.						...	...	.272	—.060
Length of	P.C.							.711	—.466	—.776*
leaf	S.C.							...	...	...
Breadth of	P.C.								—.428	.985**
leaf	S.C.								...	...
No. of nodes	P.C.									.846*
	S.C.									.681*

* Significant at 5 %

** Significant at 1 %

P. C. = Pop corn S. C. Sweet corn

Correlations in pop corn : Yield was found to be positively associated with breadth of leaves and number of nodes. Leaf length, however, showed negative relationship with grain yield. The results suggested that selection for high node number, shorter but broad leaves will increase the yield in pop-corn.

Partial correlation coefficients of yield and earlength when the effect of rows/ear was eliminated, yield and number of rows / ear when either ear length or number of grains / row was kept constant, and yield and number of grains / row after excluding the effect of number of rows / ear, was positive and significant. Thus it is evident that

TABLE 2. Partial correlation coefficients

First order partial correlation coefficients			
Character correlated	Eliminated variable		Correlation coefficient
Grain yield × ear length	No. of row/ear	P. C.	.891*
		S. C.	−.222
	No. of grains/row	P. C.	−.237
		S. C.	.274
Grain yield × No. of row/ear	Ear length	P. C.	.947**
		S. C.	.469
	No. of grains/row	P. C.	.929**
		S. C.	.580*
Grain yield × No. of grains/row	No. of rows/ear	P. C.	.925**
		S. C.	−.432
	Ear length	P. C.	.683
		S. C.	−.273
Ear length × No. of rows/ear	No. of grains/row	P. C.	−.500
		S. C.	.038
Ear length × No. of grains/row	No. of rows/ear	P. C.	.803
		S. C.	.861**
No. of row/ear × No. of grains/row	Ear length	P. C.	.495
		S. C.	.273

Table 2 [Continued]

Second order partial correlation coefficient			
Character correlated	Eliminant variable		Correlation coefficient
Grain yield × ear length	No. of rows/ear and No. of grains/row	P. C.	.657
		S. C.	.327
Grain yield × No. of row/ear	Ear length and No. of grains/row	P. C.	.961**
		S. C.	.589*
Grain yield × No. of grains/row	Ear length and No. of rows/ear	P. C.	.772
		S. C.	-.474
No. of rows/ear × ear length	No. of grains/row and grain yield	P. C.	-.779
		S. C.	-.152
No. of grains/row × ear length	No. of rows/ear and grain yield	P. C.	-.127
		S. C.	.871**
No. of rows/ear × No. of grains/row	Ear length and grain yield	P. C.	-.653
		S. C.	.474

* Significant at 5% ** Significant at 1%

P. C. = Popcorn S. C. = Sweetcorn

ear length, number of rows / ear and number of grains / row make positive and significant contribution towards yield but their true relationship remains masked, as evidenced by phenotypic correlation coefficients Ear length was found to be associated with yield in maize (Sharma and Dhawan, 1968 and Singh, 1970). Green (1964 observed high yield to be associated with the number of rows of grains / ear in popcorn. Kumar (1970) also found number of grains to be positively correlated with yield in maize.

Second order partial correlations depicted that yield and number of rows / ear, had positive relationship when the effects of ear length and number of grains/row were eliminated. Number of row / ear, therefore, is the most important character which makes major contribution toward yield. The variability as indicated by R^2 revealed

that ear length, number of rows/ear and grain number / row account for 96.67 per cent of variation in yield, whereas number of grains and number of rows, and ear length and number of rows contribute 93.77 and 91.73 per cent respectively towards yield. The multiple correlation coefficients also suggested that number of rows / ear was the most important yield component and that more emphasis should be placed on this character.

Correlations in sweet corn :

Number of nodes / plant were positively and significantly associated with grain yield. Grain number increased with the increase in ear length. High positive relationship between plant height and number of nodes suggested that node number was a major component of plant height. Partial correlation coefficient of grain yield with number of rows / ear after eliminating the effect of number of grain/row was positive and significant. It was not in accordance with the simple correlation coefficients observed between these two chracters. Green (1964) and Singh (1966)also observed grain yield to be positively associated with number of rows / ear. The multiple correlation of yield with ear length, number of rows / ear and number of grains / row accounted for 64.71 per cent variation, whereas number of rows / ear and ear length contributed 54.48 per cent variation in yield.

The results given in Table 1 reveal that correlations among yield components were different in sweetcorn and popcorn. The difference in association pattern in sweet and pop corn emphasize that different selection procedures have to be developed for the two types.

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