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CORRELATIONS STUDIES IN SEGGREGATING GENERATIONS OF TOMATO (*Lycopersicon esculentum Mill*)

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Studies on improvement of tomato (**Lycopersicon esculentum** Mill) was taken up at Department of Horticulture, Agricultural College and Research Institute, Madurai. Crosses were made between six parents viz., LE 3, LE 1050, LE 1052, LE 1059, LE 1029 and LE 1036. The five crosses in F1, F2 and their back crossed generations (BCP 1 and BCP 2) were evaluated for their association of characters with yield. Most of the important economic characters like number of fruiting clusters per plant showed a positive significant relationship with yield in the crosses B and D in F1 and F2 generations indicating the possibility of isolation of high yielding lines through selection. Number of fruits per plant showed positive association with yield in the crosses A, C, D and E of F1 and F2 generations, whereas in the cross E of BCP 1 and BCP 2 generations negative relationship was noticed for number of fruits per plant with yield, indicating the dependability of F2 generation for further selection. Cross A of F1, F2, BCP 2 generation and cross E of BCP 2 generation showed significant positive relationship between T.S.S. and yield. Cross A of F2 and BCP 1 generations and cross E of F2 and BCP 2 generations showed positive significant association of ascorbic acid with yield indicating the possibility of isolation of lines with high ascorbic acid content.

Yield is one of the most important economic characters in which the vegetable breeder is interested and is found to be quantitative in nature and controlled mostly by poly genes in tomato. Grafius (1956) in proposing a geometric concept for yield, suggested that yield might be more effectively increased simultaneously by one or more yield components. According to Falconer (1960), yield improvement by yield component selection should be superior to selection for yield **per se**, when the component character has a higher heritability than yield when the correlation between yield and other traits is of great importance in designing either a single trait selection or index selection to improve yield. Association analysis reflect such a nature of relationship between yield and yield components. The present investigation was undertaken

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to provide association between yield and its components in tomato (Lycopersicon esculentum Mill).

MATERIALS AND METHODS

The studies were undertaken during 1987-1988. The experimental material consisted of six lines viz., LE3, LE 1050, LE 1052, LE 1059, LE 1029 and LE 1036 which were used as parents, crosses in such a way to produce five F1 hybrids. The parents and F1's were selfed and selfed F1 plants were employed for raising F2 progenies. The F1 hybrids of the five cross combinations were backcrossed to their respective parents to obtain backcross generations.

BCP_1	Symbols	BCP_2	Symbols
(LE 3 x LE 1050) x LE 3	- A	(LE 3 x LE 1050) x LE 1050	- A
(LE 3 x LE 1052) x LE 3	- B	(LE 3 x LE 1052) x LE 1052	- B
(LE 3 x LE 1059) x LE 3	- C	(LE 3 x LE 1059) x LE 1059	- C
(LE 3 x LE 1029) x LE 3	- D	(LE 3 x LE 1029) x LE 1029	- D
(LE 3 x LE 1036) x LE 3	- E	(LE 3 x LE 1036) x LE 1036	- E

Thus a total of six generations were built up from each of the five cross combinations (P1, P2, F1, F2, BCP 1, BCP2). Simple correlation coefficients between yield and yield components were computed for each cross in F1, F2, BCP 1, and P1 and P2 respectively as per the procedure outlined by Panse and Sukhatme (1961).

Correlation coefficient (r) =

$$\frac{\text{SumProducts1.2}}{\sqrt{(\text{S.S.1})\ (\text{S.S.2})}} \text{ where}$$

Sum Products 1.2 = Sum Products between the character 1 & 2

S.S.1 = Sum of squares of the character 1.

S.S.2 = Sum of squares of the character 2.

RESULTS AND DISCUSSION

Association studies are useful especially in crops like tomato where selection has to be exercised simultaneously for more than one character, more so in the case of complex characters like yield which is influenced by other traits. Hence before embarking on selection, an information on the nature of relationship of different characters is essential in a selection programme. The association of characters in the hybrids may depend not only on the relationship existing on the parents but their susceptibility to environmental condition also. Thus it may differ from season to season, and cross to cross, as well as from generation to generation depending upon the magnitude on genetic recombination in F2 or other segregating generations.

The data on association between the plant height, laterals, earliness, number of fruits per cluster, number of fruiting clusters per plant, fruit weight, peel thickness and number of fruits per plant with yield are presented in Table 1 and for total soluble solids, acidity and ascorbic acid with yield were presented in Table 2.

TABLE 1 : Simple correlation coefficients between yield and yield components in five crosses of six generation in tomato.

		P_1	P_2	F_1	F_2	BCP_1	BCP_2
Cross A Cross B ()	1)	0.17 (0.17)	-0.09 (-0.03)	0.27* (0.04)	(-0.01) (0.84)**	-0.03 (-00.19)	0.61** -0.06
	2)	0.29* (0.29*)	0.03 (0.10)	0.18 (-0.14)	0.04 (0.20)	-0.73** (-0.16)	0.04 0.15
	3)	0.21 (0.21)	-0.11 (0.02)	0.59** (0.67)**	0.41** (0.40)**	0.41** (0.40)**	0.05 (-0.23)
	4)	-0.01 (-0.01)	-0.05 (0.06)	0.31 (0.60)**	-0.14 (0.08)	0.97** (0.51)**	0.58** (0.32)*
	5)	0.02 (0.02)	0.11 (-0.05)	-0.07 (0.61)**	0.77** (0.63**)	0.67** (0.09)	0.67** (-0.21)
	6)	0.65** (0.65)**	0.23 (-0.50)**	0.96** (0.27)*	(0.20)** (0.32)**	0.47** (0.90)**	0.15 (-0.78)**
	7)	0.43* (0.43)**	0.45** (-0.07)	0.41** (-0.20)	0.70** (-0.02)	0.62** (0.40)**	0.60** (-0.01)
	8)	0.38** (0.38)**	0.45** (0.76)**	0.89** (0.99)**	0.77** (-0.08)	0.54** (0.88)**	0.63** 0.29*
	9)	-0.22 (-0.22)	-0.04 0.59)**	0.45** (0.71)**	0.23** 0.13	0.56** (0.03)	0.74** (0.87)**
	10)	0.30* (0.03*)	-0.72** (0.16)	0.64** (0.52)	0.26** 0.16	-0.90** (0.36)**	-0.09 (-0.85)**
	11)	0.31* (0.31*)	0.55** (0.26)*	0.14 (0.23)	0.57** 0.01	0.70** (-0.31)*	0.55** 0.27*

Values in the bracket indicates Cross B values.

		P_1	P_2	F_1	F_2	BCP_1	BCP_2
Cross C Cross D ()	1)	0.17 (0.17)	0.24 (0.09)	0.15 (-0.04)	0.30* (-0.08)	0.36** (-0.21)	-0.27* (-0.36)*
	2)	-0.29* (-0.29)*	0.10 (0.02)	-0.02 (0.04)	0.10 (-0.31)**	0.67** (0.23)	0.47** (-0.68)**
	3)	0.21 (0.21)	0.18 (-0.07)	-0.33** (-0.23)	-0.01 (-0.18)	0.14 (0.76)	0.53** (-0.36)**
	4)	-0.01 (0.01)	-0.19 (-0.30)*	0.19 (0.02)	0.17 (0.50)**	0.85 (-0.60)**	-0.47 0.80**
	5)	0.02 (0.02)	-0.02 (-0.02)	-0.18 (0.03)	0.66** (0.55)**	0.79 (-0.02)	0.52** (0.83)**
	6)	0.65** (0.65)**	0.50** (-0.75)**	0.46** (0.81)**	-0.06 (-0.05)	0.16 (0.85)**	0.15 (-0.09)
	7)	0.43** (0.43)**	0.06 (-0.13)	-0.03 (0.05)	0.11 (0.55)**	0.05 (0.20)	0.22 (0.47)**
	8)	0.38(0.38)**	0.10 (0.97)**	-0.83** (0.87)**	0.64** (0.33)**	0.66** (0.99)**	0.46** (0.74)**
	9)	-0.21 (0.21)	0.60** (-0.55)**	0.48** (-0.18)	-0.18 (0.32)**	-0.20 (0.82)**	0.40** 0.30
	10)	0.30*(0.30)*	0.37** (-0.13)	0.51** -(0.05)	0.14 (0.47)**	0.76** -0.32**	-0.28* (-0.15)
	11)	0.31* (0.31)	0.72* (0.51)**	0.59** (0.65)**	0.27** (0.50)**	0.01** (0.71)**	099 (0.72)**

Values in the brackets indicate Cross D Value

Simple correlation coefficients between yield and yield components in five crosses of six generations in tomato.

		P_1	P_2	F1	F_2	BCP_1	BCP_2
Cross E	1.	0.17	-0.01	0.08	0.12	-0.56**	-0.64**
	2.	-0.29*	-0.02	-0.07	0.33**	0.72**	-0.27**
	3.	0.211	0.01	0.25*	0.36**	-0.87**	-0.95**
	4.	-0.01	0.09	0.16	-0.04	-0.16	-0.88
	5.	-0.02	-0.06	-0.34**	0.85**	-0.41**	0.29
	6.	0.65**	0.40**	-0.34**	-0.34**	-0.84	-0.14
	7.	-0.43**	0.18	0.68**	0.13	-0.48**	-0.84**
	9.	-0.21	0.31*	0.20	-0.34**	-0.22	0.28**
	10.	0.30	-0.75**	0.86**	-0.31**	-0.63	-0.13
	11.	0.31*	0.75**	0.09	0.47*	-0.01	0.34

* Significant at 5 per cent level. ** Significant at 1 per cent level.

1. Plant height
2. Laterals
3. Earliness
4. Number of fruits per cluster
5. Number of fruiting clusters per plant.
6. Fruit weight
7. Peel thickness
8. Number of fruits per plant
9. Total soluble solids
10. Acidity
11. Ascorbic acid

When the favourable association for any two characters in F1 an its segregating generations remains identical an significant for both the traits, selection is comparitively easy.

The association between number of fruiting clusters per plant and yield showed such a favourable association in the cross 'B' and 'D' of F1 and F2 generations only. Therefore isolation of high yielding lines with more number of fruiting clusters per plant in F2 generation of the above crosses may be advantageous. Significant positive association for this trait with yield reported by Swadiak (1971) supported the present findings.

On the other hand the association between fruit weight and yield per plant showed positive association in F1 and F2 of cross A. Positive association between these who traits was also reported by Manivannan (1965) and

Chandran (1987) which lent support to the present findings.

The number of fruits per plant had favourable association in F1 and F2 except cross B indicating the selection for high-fruit number would result in improvement of yield. Positive correlation between number of fruits per plant with yield has also been reported by Bangaru (1981), Manivannan (1985) and Chandran (1987). In the cross E the relationship between number of fruits per plant with yield was negative in BCP 1 and BCP 2 generations necessitating the dependability of 5 generation for further selection. The data on the relationship of the qualitative traits as total soluble solids and acidity with yield are presented in Table. 2. Cross A of F1, F2, BCP 1 and BCP 2 generations and cross E of BCP 2 generations expressed significant positive correlations with yield indicating the possibility of isolation of lines with high total soluble solids. Positive association between ascorbic acid and yield was noticed in the cross A of F2 and BCP 1 generation and cross E of F2 and BCP 2 generations.

The relationship between the characters in the hybrids depend upon the association existing in the parents. This is true in the case of number of fruits per plant in the present study indicating the reliability of these parents for this trait. But the parents differed in their nature of association between number of fruiting clusters per plant with yield, fruit weight and yield indicating that due weightage seeds to be given for number of fruiting clusters for plant and fruit weight because of the unfavourable association present in the hybrids involving these parents. This necessitates judicious use of these parents in the selection scheme.

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EFFECT OF SOWING DATES ON YIELD ON YIELD COMPONENTS IN PIGEONPEA

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ABSTRACT

Experiment conducted with pigeonpea (Cajanus cajan (L) Millsp) in three different sowings revealed that the February 21 sowing recorded higher grain yield than the June 21 and September 21 sowings. The yield was more influenced by number of pods per plant rather than the 1000 seed weight and number of seeds per pod. Air temperature at 33°C was found to be an inhibitor for pod setting. A clear cut difference in HI could be noticed between long and short duration cultivars. September 21 sown long duration crop recorded higher HI than the June and February sown crops. Short duration cultivars recorded higher HI in June sown crop than the other two. This study also suggests to increase the plant density in September sowings so as to get normal yield.

A major problem towards increase in productivity in pigeonpea is the reaction of this crop to the varying agro-climatic situations because of its quantitatively short day plant (Wallis, et al., 1980). The information on the effect of weather parameter on yield components in pigeonpea is meagre. So, the present study was aimed at to find out the influence of date of sowing in the yield and yield components in pigeonpea.

MATERIALS AND METHODS

The experiment was laid out under field conditions in clay loamy soil during 1985. Six pigeonpea cultivars comprised of three long duration (CORG 11, PLS 361/1 and SA 1) and three short duration (Co 5, CORG 5 and UPAS 120) were employed. The plots were replicated thrice in a randomised block. Plants were spaced at 45 x 30 cm. Sowings were taken up in three different sowings

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