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GENETIC VARIABILITY IN TOMATO

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ABSTRACT

Genetic variability in eighty seven cultivars of tomato (*Lycopersicon esculentum* Mill) was studied at the Agricultural College and Research Institute, Madurai during 1989- 90. Significant differences were observed for all the characters with high values of heritability. High genotypic co-efficient of variation, heritability (broad sense) and genetic advance (5%) estimates were obtained for fifteen quantitative characters *viz*., days to first fruit set, days to fruit maturity, Plant height, primary branches per plant, nodes between two inflorescences, nodes to first inflorescence, flowers per inflorescence, fruits per inflorescence, locules per fruit, equatorial perimeter of fruit, average fruit weight, total soluble solids, pH, fruits per plant and fruit yield per plant. The traits *viz*., average fruit weight, plant height and equatorial perimeter of fruit showed high heritability along with high genetic advance showing additive gene effect whereas flowers per inflorescence, fruits per inflorescence, total soluble soilds and pH exhibited high heritability with low genetic advance which indicated non additive gene effect.

The exploitation of variability is of great importance and is a pre-requisite for the effective screening of superior genotypes. The variability into various heritable and non-heritable components additive, dominance and interaction variances by using suitable design enables to select superior genotypes in a population. Therefore, the present investigation was undertaken to estimate the extent of variability, heritability and genetic advance present in eighty seven cultivars of tomato.

MATERIALS AND METHODS

The experiment was laid out in a randomised complete block design with three replications and eighty seven treatments (varieties) during 1989-90 at the Department of Agricultural Botany, Agricultural College and Research Institute, Madurai. The observations were recorded for days to fruit set, fruit maturity, plant height (cm), primary branches per plant, nodes between two inflorescences, nodes to first inflorescence, flowers per inflorescence, fruits per inflorescence, locules per fruit, equatorial perimeter of fruit (cm), average fruit weight (g), total soluble solids (%), pH, fruits per plant and fruit yield per plant (g). The variability existing in various characters under study was calculated according to Burton (1952). The heritability and genetic advance Lush, 1949 was calculated and the observations are presented.

RESULTS AND DISCUSSION

The data for range, general mean, phenotypic co-efficient of variation, genotypic co-efficient of variation, heritability, genetic advance, co-efficient of variability and standard error are presented in Table 1. A wide range of variation for different characters was observed. Phenotypic co-efficient of variation was minimum for days to fruit set (1.83) and maximum for fruits per plant (133.80). Similarly genotypic coefficient of variation was minimum for days to fruit set (1.61) and maximum for fruits per plant (123.14). In general, the phenotypic co-efficients of variation were higher than genotypic co-efficient of variation indicating that the genotypic influence is lessened under the influence of the given environment. The heritability (broadsense) for most of the characters except days to fruit, primary branches per plant (47.80) followed by days to fruit set (65.13) and days to fruit maturity (67.09) were higher showing that the varieties under study have a great scope for the selection based on these characters. The heritability estimate was the highest for average fruit weight (97.80) followed by plant height (96.45) and total soluble solids (5.14). Genetic advance for the characters fruits per plant (43.21), plant height (42.19), equatorial perimeter of fruit (31.16), fruit yield per plant (28.24) and average fruit weight (20.33) were higher indicating the scope for selection. The high heritability values for average fruit weight, plant height, fruits per plant, equatorial perimeter of fruit and average fruit weight were accompanied with high genetic advance. These characters are, therefore, governed by additive gene effects. It may also be concluded that selection on the basis of these characters will be more useful for the improvement of this crop.

Table 1. Genetic variability in tomato

Characters	Heritability (%)	Genetic advance (5%)	Range	General mean	PCV	GCV	CV (%)	SED
Days to fruit set	65.13	2.91	65.30-101.61	95.68	1.82	1.61	0.92	0.982
Days to fruit maturity	67.09	3.17	105.23-161.84	137.93	1.92	1.87	0.83	0.794
Plant height (cm)	96.45	42.19	32.81-191.48	95.68	23.04	21.05	4.64	1.241
Primary branches/plant	47.80	1.26	7.91-16.11	13.12	11.53	10.41	8.75	0.329
Nodes between two inflorescences	87.91	2.06	0.91-7.30	2.58	2.17	2.03	0.12	0.019
Nodes to first inflorescence	78.16	3.59	3.32-8.06	5.17	10.47	9.33	1.03	0.263
Flowers/inflorescence	94.91	6.74	2.91-10.72	6.41	20.71	20.20	3.89	1.002
Fruit/inflorescence	93.40	2.86	1.07-8.12	4.33	29.34	28.06	5.56	1.947
Locules/fruit	78.56	1.14	1.94-5.68	3.78	24.51	21.62	11.11	0.461
Equatorial perimeter of fruit (cm)	91.25	31.16	3.02-9.13	6.37	29.14	27.20	13.06	3.842
Average fruit weight (g)	97.80	20.33	4.98-51.43	36.91	33.98	32.44	4.60	2.433
Total soluble solids (%)	95.14	9.78	4.57-10.91	7.63	19.41	18.76	2.13	0.871
pH	92.09	8.35	3.21-6.87	5.51	10.34	9.98	0.73	0.092
Fruits/plant	87.40	43.21	3.02-141.00	19.11	133.80	123.14	56.42	1.443
Fruit yield/plant (g)	68.43	28.24	168.00-1011.16	551.03	42.21	39.13	20.45	2.912

The characters, *viz.*, flowers per inflorescence, fruits per inflorescence, total soluble soilds and pH had high heritability values but low value of genetic advance, while the characters, *viz.*, primary branches per plant, days to fruit set and days to fruit maturity had low values of heritability and genetic advance. This indicated that all these characters are controlled by the non-additive effects of genes thus, discouraging the scope for selection based on these characters in tomato. These findings are in close agreement with those of Paranjothi (1974), Kumar *et al.*, (1980) and Reddy and Gulshan Lal (1987).

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PERFORMANCE OF INTERSPECIFIC HYBRIDS OF *Sorghum bicolor* (L.) MOENCH x *S.halepense* (L.) PERS FOR VEGETATIVE CHARACTERS

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ABSTRACT

Per se performance for vegetative fodder characters in 30 inter specific hybrids involving 11 parents (six *S.bicolor* varieties and five *S.halepense* accessions) was studied. The parents SS 33, SS 31, SS 25, SS 30 for green fodder yield, CO 27 for earliness, FD 1690, FD 1694, FD 1692 and CO 27 for number of leaves and tillers per plant were identified as donors for the improvement of fodder types.

Sorghum is a major grain cum fodder crop in India and it is extensively grown for fodder in the Northern States. Interspecific hybrids and their derivatives derived from species easily crossable to the cultivated sorghum with other desirable traits is worthy of exploitation. Among the different species of sorghum, *S.halepense* has been found easily crossable with cultivated sorghum possessing desirable traits such as perenniality, thin stem, leafiness, resistance to drought and insect pests and