

STUDIES ON BRINJAL HYBRIDISATION-I

FEATURES OF F₁ HYBRIDS BETWEEN CULTIVATED AND WILD BRINJAL*

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Brinjal, *Solanum melongena* Linn is a popular vegetable and an important subsidiary food. Few reports are available on the breeding behaviour of nontuber bearing *Solanum* spp. None of the intergeneric crosses were successful (Miwa *et al* 1958). Reports on interspecific and intraspecific crosses are many and hybrids ranging from total sterility to total fertility were obtained from such crosses (Swaminathan 1949, Mittal 1950 and Bhaduri 1957). Many authors have reported hybrid vigour in intervarietal crosses of brinjal (Pal and Singh 1946, Sambandam 1964). No attempt has so far been made to breed varieties of brinjal suitable for Kerala conditions of soil and climate. A programme of hybridisation was hence initiated with this aim in view. Hybridisation between cultivated varieties and their wild relatives is a potent tool for improving the cultivated varieties. Hence in the present studies a wild brinjal variety, *Solanum melongena* var. *insanum*, known as a hardy variety resistant to pests and diseases, was used for the hybridisations. The cultivated strains of brinjal used in the studies were *S. melongena* Round Special (RS), Round Mixed (RM), and Purple Long (PL). These were used as female parents and the wild variety (SI) as the male parent. The characters of the F₁ progeny studied were their morphology, insect resistance, wilt resistance and chemical composition. Separate field experiments were laid out in randomised block design for studying these features. For the morphological studies the hybrids were planted in the middle with the respective male and female parents flanked on either side. Insect resistance was assessed by observing the natural infestations of jassids, Epilachna beetles, shoot borers, and fruit borers on the plants. For determining resistance to wilt the sick-soil-potculture method was adopted. Chemical studies consisted of estimation of the dry matter percentage, protein contents, starch contents and total alkaloids of parents and hybrids.

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Results

Morphology. Results are given in Table 1. In all the three crosses the F1 hybrids showed highly significant increase in height, number of leaves, number of branches, number of flowers, number of fruits and length of tap root over those of their respective parents and over parental means. But the shape of the fruits of the F1 hybrid plants was intermediate and their size less than intermediate.

Table I

Mean measurements of some of the morphological characters studied in the F1 hybrids and their parents (per plant on 70th day of transplanting)

Treatment	No. of leaves	No. of branches	No. of flowers	No. of fruits	Length of tap root (in cm)
RS	206.3	29.2	60.5	33.9	33.7
RS x SI	382.9	59.9	105.8	65.9	71.8
RM	238.2	31.0	65.5	33.2	32.6
RM x SI	396.6	59.5	111.2	69.2	75.9
PL	159.4	29.2	56.6	42.9	42.2
PL x SI	348.0	52.3	114.3	80.3	60.3
SI	250.6	52.6	63.5	54.1	67.0

Insect resistance. Observations showed that none of the hybrids was resistant to any of the 4 pests studied. This is in contrast to the wild parent which was extremely resistant to these insects.

Wilt resistance. Out of the total 18 cultivated brinjal parents planted in sick soil, 10 wilted while none of the 18 F1 hybrids cultivated under the same condition wilted; there was also no incidence of wilt in any of the 18 wild brinjal parents.

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Table 2

Mean percentage of dry matter contents, starch contents, protein contents and alkaloid contents of fruits of the F₁ hybrids and parents

	Mean percentage			
	Dry matter	Starch	Protein	Alkaloid
RS	11.40	1.62	2.15	0.0616
RS x SI	15.40	2.13	2.41	0.3066
RM	12.11	1.63	2.24	0.0746
RM x SI	15.28	2.14	2.48	0.3191
PL	12.61	1.63	1.80	0.0366
PL x SI	14.60	2.50	2.27	0.1416
SI	20.41	3.73	2.92	0.5431

Chemical composition. It may be seen from Table 2 that the percentage of dry matter contents, starch contents, protein contents and alkaloid contents of the F₁ hybrids showed a significant increase over those of their cultivated parents. The wild parent however, had the maximum of these components.

Discussion

From the results presented, it is noted that in all the three crosses the F₁ progeny showed a high degree of heterosis in many economically important characters such as number of branches, number of flowers and total number of fruits per plant. Further, the length of the tap root of the F₁ plants was much more than that in the cultivated brinjal varieties. At seedling stage this character showed a positive heterotic expression whereas at maturity it was equal in length to the male parent (*var. insanum*). Much of the vigour shown by the F₁ plants can be attributed to this deep root system which enables them to draw nourishment from a more extensive soil area. The sturdy nature of the male parent appears to be due to its deep root system.

The lack of resistance of F1 plants to infestation by pests suggests that the pest resistant character in *S. melongena* var. *insanum* (which is resistant) is controlled by a recessive gene or by poly genes which are inactive in the presence of an alien susceptible genome. On the other hand the resistance of the F1 hybrids to the wilt disease shows that the wilt resistance of *S. melongena* var. *insanum* has been fully transmitted to the F1 plants in all the three crosses. This has revealed the possibility of breeding wilt resistant varieties of brinjal.

Results presented also show that in the brinjal fruits the chemical constituents are controlled by polygenes. Since the alkaloid content of the wild parent is 8 to 18 times higher than that of the cultivated brinjal varieties, during selection in the segregating generation for economic characters, care has to be taken to make sure that the selected plants have only a low level of alkaloid contents.

Summary

The cyto-morphological and chemical aspects of 3 F1 hybrids of crosses involving 3 cultivated brinjal varieties and one wild brinjal variety (*S. melongena* var. *insanum*) were studied.

All the three F1 hybrids showed a high degree of heterosis in many economically important characters including number of branches and total number of fruits per plant.

The insect resistance of var. *insanum* was not observed in the F1 hybrids.

The F1 like its male parent *S. melongena* var. *insanum* showed immunity against wilt disease.

The chemical analysis of the hybrid fruits showed a significant increase in dry matter, starch, protein and total alkaloids in line with the high doses of these ingredients found in the wild parent.

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