



Morphological studies on interspecific hybrids between *Solanum indicum* L. and *Solanum melongena* L.

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Brinjal (*Solanum melongena* L.) is one of the most common, popular and principal vegetable crops grown all over India. A substantial quantity of the crop is damaged annually due to diseases and pests, especially fruit borers, little leaf and rootknot nematodes. No resistant varieties are so far under cultivation and the pesticidal measures are not much effective and are also costly and injurious to health of the consumers as well as farmers. To overcome this problem, it is desirable to try interspecific hybridization and transfer the resistance present in some of the wild species. *Solanum indicum* L., a prickly shrub found wild in forests and hilly tracts is reported to be resistant to little leaf and brinjal fruit and shoot borer under field conditions [1].

The present investigation was carried out at the Department of Botany, B.A. College of Agriculture, Gujarat Agricultural University, Anand to study the possibilities of transferring disease and pests resistance characters from *S. indicum* to popular cultivars and to study the inheritance of morphological characters like fruit colour, fruit shape, prickles etc. Two popular varieties of *S. melongena* (Doli-5 and Morbi 4-2) were used as male parents and crossed with wild species *S. indicum* as a female parent. The resulting hybrids alongwith parents were grown in a randomized block design with two replications during kharif season of 1997. Each plot consisted of two rows of 6.00 mt length following inter and intra row spacings of 90 cm and 60 cm, respectively. The data on morphological characters of the parents and hybrids were collected from randomly selected five plants for comparative studies. The pyralid infestation was calculated in percent by counting the number of fruits per plant infested with pyralid i.e. brinjal fruit and shoot borer (*Leucinodes orbonalis* Gn.) at each picking and summed over all pickings. Little leaf disease incidence was calculated in percent by counting the number of infected plants per plot. The root-knot nematode infestation was calculated in terms

of root-knot index using the method of Taylor and Sasser [2].

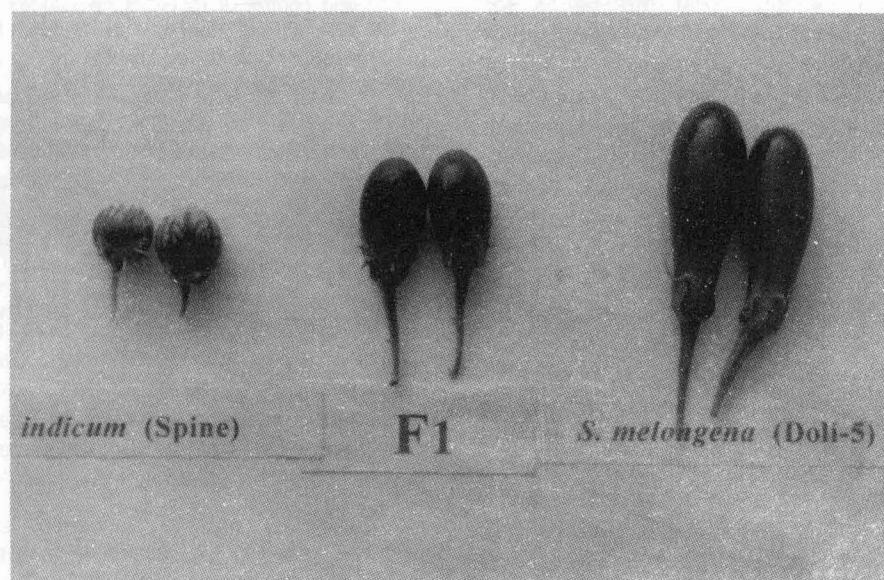
The easy crossability of *S. indicum* with *S. melongena* var. Doli-5 and Morbi 4-2, which produced profuse seeds indicates closeness of the two species.

A detailed comparative description of morphological characters of parents and hybrids has been presented in Table 1. A perusal of results indicated that F_1 's were intermediate in growth habit (semi-spreading) with predominant spines present on stem, petiole, both surface of leaves and on the calyx. The dominant nature of spine in the interspecific hybrids of brinjal was also reported earlier [1]. The higher number of spines present on upper surface of leaves, both in hybrids and parents indicate the defensive mechanism of plants against pest and diseases. It was further observed that hybrids were taller and profusely branched than their respective parents, which suggested the overdominance type of gene action for these traits. The light green colour of leaves in the hybrids was dominant character inherited from the wild species *S. indicum*. On the other hand, leaf length and leaf breadth were found to be governed by incomplete dominance.

The F_1 of *S. indicum* \times Doli-5 produced medium oblong fruit either solitary or in cluster of 2-4 each, whereas *S. indicum* \times Morbi 4-2 F_1 produced round solitary fruits, indicating complete dominance for these traits. Moreover, the F_1 's showed intermediate fruit colour. Similar feature was also reported earlier [1]. Likewise, F_1 hybrids produced intermediate fruit size with incomplete dominance for length, breadth and diameter of fruits [3]. The number of fruits in the F_1 's exceeded both the parents, which revealed overdominance for this trait. The higher number of fruits in the interspecific hybrids of *S. melongena* and *S. macrocarpon* was also reported [4]. The superiority

Table 1. Comparison of morphological characters of *S. indicum*, *S. melongena* var. Doli-5 and Morbi 4-2 and their F₁ hybrids

Characters	Parents			Hybrids	
	<i>S. indicum</i>	Doli-5	Morbi-4-2	<i>S. indicum</i> × Doli-5	<i>S. indicum</i> × Morbi 4-2
Plant habit	Erect and spiny	Spreading and spineless	Spreading and spineless	Semi-spreading, spiny	Semi-spreading, spiny
Plant height (cm)	50.16	83.00	75.50	92.67	93.66
No. of branches per plant	11.00	12.00	16.49	22.83	18.33
No. of spines (upper/lower)	6.11/4.38	0/0	0/0	4.05/2.33	4.17/3.94
Leaf nature and colour	Spiny, Smooth, Light green	Spineless, Smooth, Green	Spineless, Smooth, Purplish green	Spiny, Smooth, Light green	Spiny, Smooth, Light green
Leaf length (cm)	8.48	14.89	14.79	13.56	12.40
leaf breadth (cm)	6.23	10.81	9.92	9.24	8.26
Fruit nature and shape	Solitary or in cluster of 2-3 each, round	Cluster of 3-5 each, oblong	Solitary and round	Solitary or in cluster of 2-4 each, medium oblong	Solitary and round
Fruit colour	Green stripe	Purple	Purple	Purple stripe	Purple stripe
Fruit length (cm)	2.81	9.11	7.47	5.64	4.55
Fruit breadth (cm)	2.55	3.34	6.86	3.03	3.66
Fruit diameter (cm)	7.90	10.31	21.35	9.49	11.30
No. of fruits per plant	6.83	20.16	7.00	43.00	18.67
Fruit yield per plant (gm)	53.33	524.33	650.67	758.17	450.33
100 seed weight (mg)	315.00	365.00	475.00	380.00	510.00
Pyralid infestation (%)	8.21	22.90	27.86	5.98	7.64
Little leaf incidence (%)	10.00	30.00	35.00	20.00	20.00
Root-knot nematode incidence (Root-knot index)	4.25	4.75	4.66	4.64	4.51

**Fig. 1a.** Fruits of *S. indicum*, *S. melongena* var. Doli-5 and their F₁ hybrid

of hybrids over both the parents may be due to bringing together greatest number of favourable growth factors from differing parental species resulting in heterosis [5]. With regard to fruit yield per plant, the hybrid *S. indicum* × Doli-5 excelled both the parents, while the

hybrid *S. indicum* × Morbi 4-2 excelled only one parent, which revealed overdominance for first hybrid and incomplete dominance for second hybrid. The superiority of hybrids over both the parents were also found for 100 seed weight.

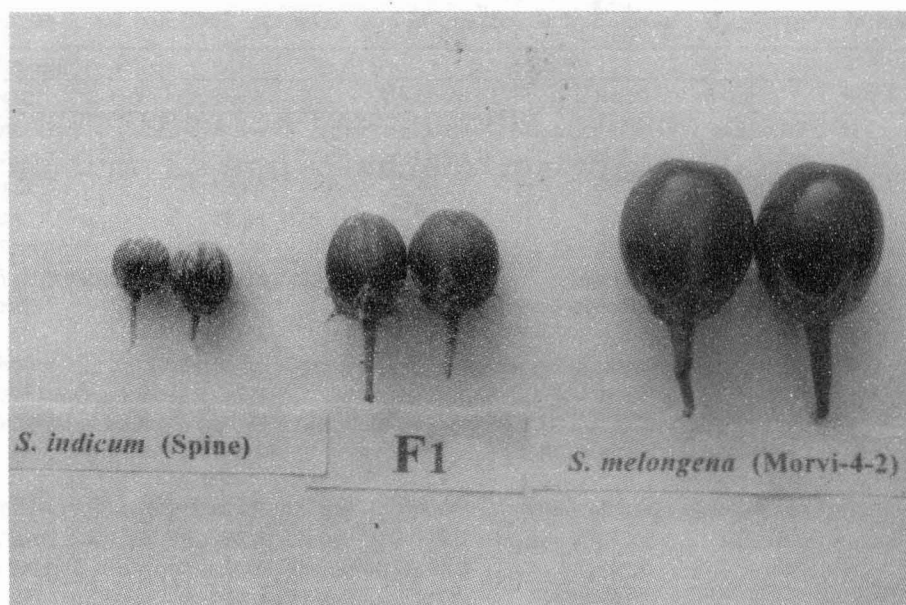


Fig. 1b. Fruits of *S. indicum*, *S. melongena* var. Morbi 4-2 and their F_1 hybrid

The wild species *S. indicum* exhibited resistance under field condition against pyralid infestation and little leaf disease, while cultivated varieties were susceptible. The hybrids were found to be highly resistant against pyralid infestation and moderately resistant against little leaf disease, which indicates that the genes for resistance were transmitted from the *S. indicum* to the F_1 's. Rao and Kumar [1] also reported resistance of interspecific hybrids against brinjal shoot and fruit borer. In contrary, the F_1 hybrids alongwith parents were highly susceptible to root knot nematode under field condition (Root-knot index more than 4.0).

The F_2 generation was also studied and screened for pyralid infestation and little leaf diseases and the results will be published separately.

References

1. Rao G. R. and Kumar A. 1980. Some observations on interspecific hybrids of *Solanum melongena* L. Plant Sci., **89**: 117-121.
2. Taylor A. L. and Sasser J. N. 1978. Biology, identification and control of root-knot nematodes (*Meloidogyne* spp.) Co-op. Publ., Dept. Plant Pathol., NCSU and USAID, Raleigh, N.C. U.S.A., pp. 111.
3. Baksh S. 1979. Cytogenetic studies on the F_1 hybrid *Solanum incanum* L. \times *Solanum melongena* L. variety Giant of Banaras. Euphytica, **28**: 793-800.
4. Gowda P. H. R., Shivashankar K. T. and Joshi. 1990. Interspecific hybridization between *Solanum melongena* and *Solanum macrocarpon* : Study of the F_1 hybrid plants. Euphytica, **48**: 59-61.
5. East E. M. and Jones D. F. 1919. Inbreeding and outbreeding, Philadelphia.