

**GENETIC RELATIONSHIP BETWEEN DIPLOID  
*SOLANUM NIGRUM* L. AND *SOLANUM*  
*NODIFLORUM* JACQ.**

THE interrelationship of the members of the *Solanum nigrum* complex has often been a puzzle to the evolutionary biologists. Although some aspects, of interrelationship and mechanism of evolution of higher chromosomal forms, of the species of this complex have been studied by several investigators<sup>1-9</sup>, a good deal still remains to be done to present a clear picture of the origin and evolutionary relationship of the species of this complex. The present paper deals with the genetic relationship between the diploid *Solanum*

namely, the colour of berry. In both the species the fruits are shiny bluish black, spherical and identical in size (Fig. 2). The gametic chromosome number in both the species is 12.

A statistical comparison of the mean values of morphological characters of the two species (Table I) has shown that there are no significant differences in several morphological characters except in the number of epidermal cells per unit area (in this case the field of the microscope is taken as the unit area), breadth of stomatal apertures, diameter of corolla, length of filaments, length of anthers, breadth of anthers and length of gynoecium.

TABLE I

*Comparison of means of morphological characters of diploid S. nigrum (A) and S. nodiflorum (B)*

Characters	Sample Size of		Mean value of		Difference between means A-B	SED
	A	B	A	B		
Height of plant (cm)	5	5	77.00	73.54	3.46	0.14
Length of petiole (cm)	125	50	2.98	3.28	0.30	0.45
Length of leaf blade (cm)	125	50	9.67	11.07	1.39	0.74
Breadth of leaf blade (cm)	125	50	5.64	6.46	0.82	0.89
Thickness of leaf ( $\mu$ )	100	100	38.27	21.66	16.61	0.11
Number of epidermal cells in the field of microscope	50	25	54.55	42.07	12.48 S	2.84
Number of stomata in the field of microscope	50	25	16.20	14.39	1.81	0.79
Length of guard cell ( $\mu$ )	125	125	24.20	23.77	0.43	0.18
Breadth of guard cell ( $\mu$ )	125	125	8.94	8.03	0.91	1.73
Length of stomatal aperture ( $\mu$ )	125	125	9.44	10.25	0.81	0.59
Breadth of stomatal aperture ( $\mu$ )	125	125	0.73	0.98	0.25 S	2.06
Number of flowers per inflorescence	125	125	4.09	4.07	0.02	0.10
Number of fruits per inflorescence	125	125	3.45	3.65	0.20	0.48
Diameter of corolla (mm)	125	125	5.78	6.48	0.70 S	3.29
Length of filament (mm)	125	125	1.07	1.15	0.08 S	3.14
Length of anther (mm)	125	125	1.25	1.07	0.18 S	2.18
Breadth of anther (mm)	125	125	0.51	0.46	0.05 S	2.25
Length of gynoecium (mm)	125	125	2.68	2.85	0.17 S	2.14
Diameter of fruit (mm)	125	125	6.47	6.63	0.16	0.35
Number of seeds per fruit	125	125	34.81	37.39	2.58	0.35
Size of pollen grain ( $\mu$ )	250	250	21.07	20.67	0.40	0.26

S = The differences have been tested statistically and those indicated by the letter S are found to be significant at 5% level.

SED = Standard Error of the difference of means.

*nigrum* L. and *S. nodiflorum* Jacq. as indicated by the pairing behaviour of chromosomes of their  $F_1$  hybrids.

Diploid *S. nigrum* and *S. nodiflorum* resemble each other in several morphological characters particularly with respect to the important diagnostic character,

One hundred reciprocal cross pollinations were performed successfully between diploid *S. nigrum* and *S. nodiflorum*. The hybrids were taller than the parents (Fig. 1) with large, thick, dark green, ovate leaves and large flowers. They flowered profusely and produced



FIGS. 1-3. Fig. 1. Plants of diploid *S. nigrum* (left), *S. nodiflorum* (right) and  $F_1$  hybrid (middle). Fig. 2. Fruits of diploid *S. nigrum* (left), *S. nodiflorum* (right) and  $F_1$  hybrid (middle). Fig. 3. Prometaphase I in  $F_1$  hybrid with 12 bivalents.

shiny bluish black berries with a large number of viable seeds. The percentage of pollen fertility of the hybrids was 79.8 whereas in the parent diploid *S. nigrum* and *S. nodiflorum* it was 71.5 and 69.9 respectively.

The course of meiosis in the parental species was normal with 12 bivalents at diakinesis and metaphase I. The chiasma frequency per bivalent, at metaphase I, in diploid *S. nigrum* and *S. nodiflorum* was 1.59 and 1.10 respectively.

Meiosis in  $F_1$  hybrids was normal with 12 bivalents at both the diakinesis and metaphase I. At metaphase I, the chiasma frequency per bivalent was 1.34. Anaphase I and the subsequent stages of meiosis were found to be perfectly normal.

The presence of 12 bivalents in pollen mother cells of the hybrids indicates the allosyndetic nature of chromosome pairing and confirms the identity of genomes of the parents diploid *S. nigrum* and *S. nodiflorum*.

The cytomorphological studies and a statistical comparison of mean values of morphological characters of diploid *S. nigrum* and *S. nodiflorum* and their ready crossability with each other producing fertile hybrids with normal meiosis indicate that the two taxa are very closely related to each other. In fact, the relationship is so close, that the two species together seem to constitute one taxon.

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