physiological maturity to downy mildew infection. Two varieties of ridgegourd (*Luffa acutangula*) *viz.*, Pusa Nasdar, a susceptible variety and a long variety which is moderately resistant were used. When the plants were at the 5–6 leaf stage the total phenolic content of the cotyledonary leaves and the first five leaves from the base were analysed individually by the following method.

To get the extract, 0.5 g of fresh tissue was ground in a glass mortar with methanol. The extracted material was heated in an oven at 80° C for 30 min. It was then cooled and the solution filtered using Whatman No. 1 filter paper. The filtrate was evaporated at 60° C. The residue was recovered with 10 ml of distilled water. The total phenols were estimated by the method of AOAC[7]. The results are expressed in catechol equalents.

TABLE 1
*Total phenolics in the leaves of two varieties of ridgegourd*

| Leaf No. from the base | Disease reaction | mg/g fresh wt. |
|---|---|---|
| Pusa Nasdar (Susceptible) | | |
| Cotyledonary leaf | Susceptible | 1.20 |
| 1st true leaf | Susceptible | 1.45 |
| 2nd true leaf | Susceptible | 1.55 |
| 3rd true leaf | Moderately resistant | 1.70 |
| 4th true leaf | Resistant | 2.15 |
| 5th true leaf | Resistant | 2.15 |
| Long Variety (Moderately Resistant) | | |
| Cotyledonary leaf | Susceptible | 1.20 |
| 1st true leaf | Susceptible | 1.45 |
| 2nd true leaf | Susceptible | 1.60 |
| 3rd true leaf | Resistant | 2.00 |
| 4th true leaf | Resistant | 2.15 |
| 5th true leaf | Resistant | 2.55 |

Table 1 shows that total phenolics in the cotyledonary leaves and the mature leaves is small in both the varieties tested. As the leaves mature, the concentration of phenols decreases. The total amount of phenols in the young leaves of long variety is comparatively more. The third leaf in long variety remained uninfected when it is sprayed with sporangial inoculum, while in Pusa Nasdar there was little infection. There is no appreciable difference in the phenolic contents of the cotyledonary leaves and the basal two leaves between these two varieties.

The inhibitory activity of phenols is generally attributed to the reactivity of the quinone which the system generates[8,9]. Most of the work on phenolics is in relation to host response to pathogen infection. In carrot presence of higher concentration of preformed phenolics in young leaves is being correlated to the resistance to *Alternaria dauci* infection[10].

The concentration of total phenols and their susceptibility to infection is related to *P. cubensis* in both varieties. In ridgegourd atleast top two leaves remain healthy even under heavy inoculum pressures at 5–6 leaf stage. Higher concentration of phenolics in these leaves may be one of the internal factors inhibiting downy mildew infection.

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## ORIGIN AND EVOLUTION OF *SOLANUM SCABRUM* MILL. AND ITS RELATIONSHIP WITH THE INDIAN HEXAPLOID *SOLANUM NIGRUM* L.

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A fertile and true breeding mutant with large purplish black fruits and viable seeds was obtained[1] from $C_3$ population of synthetic hexaploids ($n=36$), produced by doubling the chromosome number of sterile $F_1$ hybrids ($n=18$) of the cross tetraploid *S. nigrum* × diploid *S. nigrum*[2]. Since the mutant produced large fruits, as compared to those of the Indian hexaploid *S.*

nigrum, they are designated as 'big fruited hexaploid *S. nigrum*'. They are fertile and breed true and resemble, *S. scabrum* in both morphological and cytological features. It is suspected that they are closely related to each other and a programme of investigations has therefore been initiated. The present paper deals with the origin and evolution of *S. scabrum*, and its relationship with the Indian hexaploid *S. nigrum*.

A stock of *S. scabrum* Mill. was raised from seed supplied by Dr. J. M. Edmonds, Cambridge University Botany School, Cambridge, England. The 'big fruited hexaploid *S. nigrum* L.' was grown and the two species were hexaploids ($n=36$) and resembled each other in several morphological features. These were tall and erect with thick, ovate-elliptic leaves, and bore several large, globose, purplish blue fruits with many viable seeds. The pollen fertility was about 83%.

The reciprocal cross pollinations between the two species were successfull; the reciprocal hybrids were morphologically alike and fertile, and bore large purplish blue fruits with viable seeds. The hybrids resembled the parents in morphological characters including the colour and size of berry. The pollen fertility was 82.9%. The hybrids were hexaploids with $n=36$ chromosomes.

*S. scabrum* and the "big fruited hexaploid *S. nigrum*" showed normal meiosis with 36 bivalents. However, at metaphase I, in 8% of the cells of *S. scabrum*, 2 univalents were invariably seen. At metaphase I, the mean pairing of chromosomes, per cell, was $35.83_{II}+0.34_{I}$. The frequency of chiasmata, per bivalent, was 1.19, while in the latter it was 1.22.

The meiotic chromosome behaviour of the hybrids, at metaphase I, was mostly normal with 36 bivalents; occasionally 2 univalents were observed. The mean pairing of chromosomes per cell was $35.70_{II}+0.60_{I}$. The frequency of chiasmata per bivalent was 1.2. The subsequent stages of meiosis were normal.

The identical cytomorphological features of the parents, and their ready crossability with each other producing fertile hybrids with as many as 36 bivalents at metaphase I, may indicate the homology of genomes of the two parents. This is further corroborated by the comparable frequencies of chiasmata, per bivalent at metaphase I of the hybrids with those of the parents. Since no multivalents were observed in the parents and hybrids, the pairing of chromosomes in the latter was most likely to be due to allosyndesis. The occasional presence of univalents at metaphase I of the hybrids, could be due to precocious separation of chromosomes of a bivalent. Since in pollen mother cells of the hybrids the typical meiotic configurations as observed in structural hybrids could not be detected, the precocious separation of chromosomes of a bivalent is most likely to be due to some degree of genic differences in architecture of the two chromosomes. The genic differences of the parents appear not significant enough, to induce either morphological differences between the parents or effect the frequency of chiasmata per bivalent or pollen fertility of the hybrids.

The close similarity of cytomorphological features of the "big fruited hexaploid *S. nigrum*" and *S. scabrum*, and their ready crossability with each other producing fertile hybrids indicate that *S. scabrum* might have originated and evolved as mutant of the hexaploid *S. nigrum*.

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## OCCURRENCE OF ENDOSPERM HAUSTORIUM IN *RHYNCHOSPORA CORYMBOSA* (L.) BRITTON, (CYPERACEAE)

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FOR long it was believed that endosperm in the Cyperaceae is nonhaustorial. Nijalingappa and Devaki[1] reported the occurrence of both the micropylar and chalazal haustoria in *Scleria foliosa* for the first time in the family. The following account presents some of our findings concerning the development and organization of endosperm haustorium in *Rhynchospora corymbosa* (L.) Britton.

The endosperm is *ab initio* Nuclear. The primary endosperm nucleus divides earlier than the zygote and produces a large number of nuclei. The free nuclear endosperm enlarges and grows towards the chalaza. At the 64-nucleate stage the zygote divides producing a two-celled proembryo and the antipodal cells remain healthy (figure 1). When the proembryo attains the quadrant-stage, wall formation begins in the endosperm at the micropylar region and extends gradually towards the chalazal part leaving a third of the region coenocytic (figure 2) which functions as an haustorium. The endosperm, thus differentiates into a massive cellular endosperm proper and a coenocytic