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SOME OBSERVATIONS ON SPECIES HYBRIDS OF *SOLANUM NIGRUM* L. COMPLEX

THE present note deals with certain interesting observations recorded in species hybrids of *S. nigrum* complex. *Solanum nodiflorum* Jacq. subsp. *nodiflorum* and *S. douglasii* Dunn. are the species of *Solanum nigrum* complex used in present study. Both the species are erect, annual, herbaceous weeds with ovate-elliptic leaves. In the latter the fruits are purple whereas in the former they are purplish black and small in size.

Several reciprocal cross pollinations were made between the two species, but the crosses were successful only when *S. nodiflorum* subsp. *nodiflorum* was used as female parent. Fifty flowers were pollinated with pollen of *S. douglasii*. The fruit-set was 8% and the mean number of seeds per fruit was 33. One hundred seeds were sown, but only 11 germinated.

All the hybrids were abnormal in appearance. The growth of the plants was stunted and did not produce flowers. The leaves were small, thick, twisted and crumpled, and looked like 'virus infected', but on

examination they were found to be free from virus. The hybrids, after some time, produced normal healthy shoots which bore several flowers and fruits with a few viable seeds. Meiosis was studied from flower buds of the normal shoots.

The parents displayed normal course of meiosis with 12 bivalents at diakinesis and metaphase I. The mean frequency of chiasmata in *S. nodiflorum* subsp. *nodiflorum* was 1.25 while in *S. douglasii* it was 1.19. In hybrids no meiotic aberrations were observed. All the hybrids had a predominance of 12 bivalents at diakinesis and metaphase I and the mean association of chromosomes, per cell, was $11.80_{11} + 0.40$. The mean frequency of chiasmata, per bivalent, was 1.23. In almost all the cells anaphase I was found to be normal with 12 chromosomes at each pole.

In the hybrids, the occurrence of mostly regular meiotic pairing of chromosomes with normal fertility indicates that the parental species *S. nodiflorum* subsp. *nodiflorum* and *S. douglasii* are closely related to each other without any fundamental structural differences between their chromosomes and the differences in some of their morphological features seem to be due to differences in certain genetic factors² which may be due to mutations³ because generally the significant morphological variations are likely due to structural changes in chromosomes which in turn will lead to reduction in fertility of the hybrids⁴. Since the two species seem to differ in certain genetic factors, they can maintain their identity only by isolation.

The failure of crosses when *S. douglasii* was used as pistillate parent appears to be due to interaction between chromosomes from the male gamete and the cytoplasm in the egg, but the cytoplasmic inhibitory effect is not very effective as interspecific isolating mechanism since gene exchange can take place via the reciprocal hybrids⁵. The cytoplasmic inhibitory effect does not get progressively greater as the species are more distantly related. The nuclear determined sterility factors may have a greater general significance as reproductive isolating mechanism than the abnormalities determined by cytoplasm.

The virus infected like symptoms of some of the hybrids which later on produced several fertile shoots of normal appearance is likely due to incipient disharmonious interaction between the genotype or certain genetic factors of *S. nodiflorum* subsp. *nodiflorum* with the cytoplasm of *S. douglasii*.

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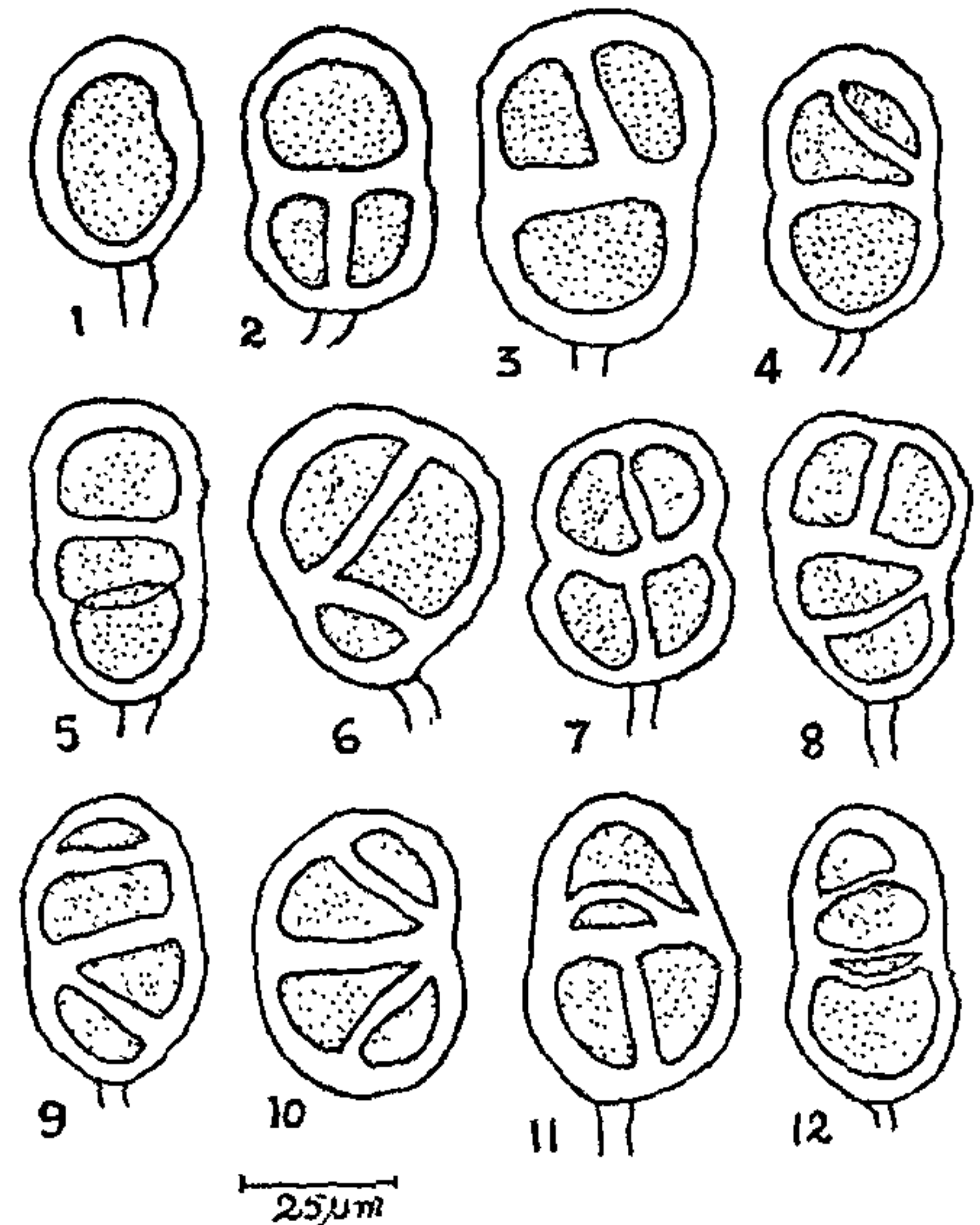
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SEPTAL VARIATION IN THE TELIOSPORES OF RAMAKRISHNANIA (UREDINALES)

THE genus, *Ramakrishnania*, was described by Ramachar and Bhagyanarayana¹ with *R. ixorae* as the type species. The distinct feature of this rust fungus is the production of teliospores bilaterally on the indeterminate growing basal cell. The teliospores are two celled by horizontal septum and puccinioid. (*sensu stricto*) with simple, long persistent pedicels. Subsequently the authors have observed in addition to the normal teliospores, abnormal teliospores and the same are reported in this paper. Ramachar and Bhagyanarayana² reviewed the literature regarding such abnormal spores while reporting the variations in teliospores of *Puccinia abutili* Berk. & Br.

Teliospores of *Ramakrishnania* in addition to normal two celled by horizontal septum, exhibit 3-celled and 4-celled, conditions. Such spores are of occasional occurrence. Similarly one-celled mesospores are also present (Fig. 1). In the case of 3-celled spores the lower cell shows the presence of vertical septum (Fig. 2), the upper cell shows a near oblique septum (Figs. 3 and 4) or an additional septum is laid down in the horizontal plane (Fig. 5). The 3-celled teliospores exhibited another variation in the septal formation with the result the 3 cells appear as irregularly formed and thereby giving the spore a tri-radiate appearance (Fig. 6). The amount of variation in the position of septa was maximum in case of 4-celled teliospores. The 4-celled spores showed the presence of vertical septa in each cell of the 2-celled teliospore (Fig. 7). In some spores the vertical septum is present in the upper cell while the lower cell showed an oblique septum (Fig. 8). In a few others the lower cell has the oblique septum and the upper cell shows a horizontal septum (Fig. 9) while in some both cells are divided by oblique septa (Fig. 10). In addition, the four cells are formed in a peculiar fashion in that the lower cell has a vertical septum and a lenticular cell is formed in between the upper and lower cell (Fig. 11). Still in some others the upper cell is divided into two by a somewhat horizontal septum and below the horizontal septum of the normal 2-celled teliospore is an additional small cell present

(Fig. 12). These types of septal variations as seen in the teliospores of *Ramakrishnania* have not been reported so far in any rust fungi. The factors responsible for this type of abnormal spore production whether genetical or environmental, the significance of such spores in the taxonomy or evolution of the rust fungi cannot be said with certainty.



FIGS. 1-12. Camera lucida drawings of the teliospores showing septal variations. Fig. 1. One-celled mesospore. Figs. 2-6. 3-celled teliospores. Figs. 7-12. 4-celled teliospores.

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