

differs somewhat from that of the cucurbit latent virus, the ageing *in vitro* of which is 3 days. It is suggested that the present virus which normally occurs in the local muskmelons, grown in the riverbeds of the Ganges, may be a strain of *Cucurbit latent virus*.

Dept. of Plant Pathology, S. R. BANDYOPADHYAY,
Faculty of Agriculture, S. MUKHOPADHYAY,
Bidhan Chandra Krishi Viswa
Vidyalyaya,
Kalyani, West Bengal,
April 14, 1977.

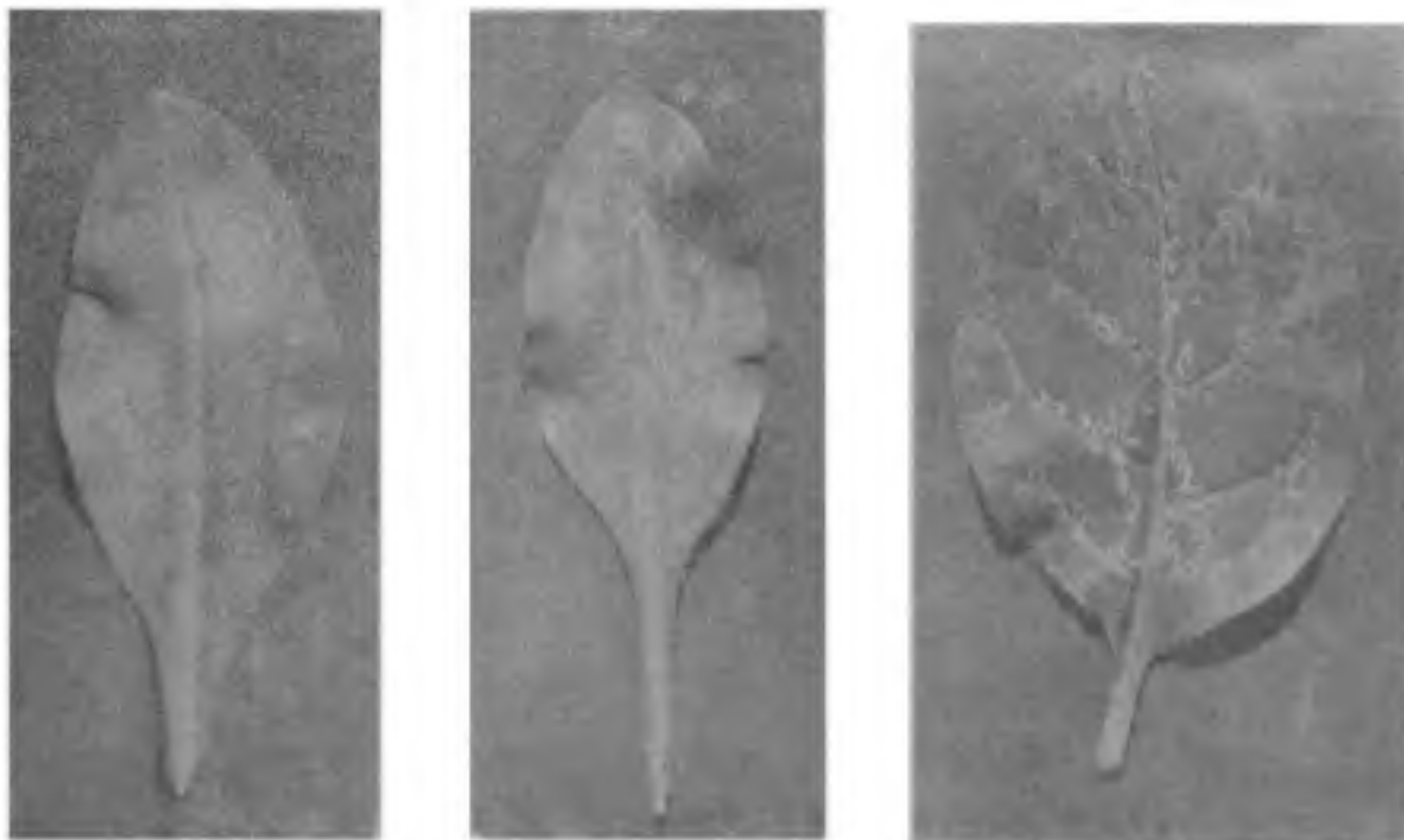
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PETUNIA RINGSPOT VIRUS DISEASE—A NEW RECORD FOR INDIA

PETUNIA plants (*Petunia axillaris* and *P. violacea*) grown in Horticulture Department and University garden were observed with ringspot disease during 1976-77. This disease was characterized by the

symptoms of ring formation or oak-leaf pattern (Fig. 1 a, b) on the leaves and calyx. No flower colour breaking or other ill-effects of this disease were observed. The present paper reports the transmission studies and host range of petunia ringspot disease.

For mechanical transmission, the symptomatic leaves of petunia were triturated in a pestle and mortar with cold 0.1 M phosphate buffer (pH 7.5) plus 0.1% thioglycolic acid and the sap was clarified at 5000 rpm in a refrigerated centrifuge for 15 minutes. The clarified sap was inoculated on the leaves of petunia and test plants, viz., white Burley tobacco, *Nicotiana glutinosa*, *N. rustica*, *Chenopodium amaranticolor*, broad bean, contender cultivar of French bean and C-152 cultivar of cowpea plants which were previously dusted with 800 mesh carborundum by cotton swab method. The symptoms of rings or oak leaf pattern were produced on petunia after about one week of inoculation of infective sap. This indicated the viral nature of the disease. The symptoms on white Burley tobacco and *N. rustica* were of ringspot type (Fig. 2). However, no symptoms were produced on French bean and cowpea. The broad bean host reacted with systemic symptoms of mosaic mottling, stem streaking and wilting and *C. amaranticolor* reacted with ringspot symptoms to the virus causing ringspot disease in petunia. Petunia ringspot was also transmitted, by approach graft and by dodder (*Cuscuta reflexa* from diseased to healthy petunia plants in glass house



FIGS. 1 a, 1 b-2. Fig. 1 a. Petunia leaf displaying ringspot symptoms after the infection of petunia ringspot virus. Fig. 1 b. Petunia leaf displaying oakleaf pattern symptoms induced by petunia ringspot virus. Fig. 2. White Burley tobacco leaf displaying the symptoms of petunia ringspot virus.

For seed transmission, seeds taken from petunia plants infected with ringspot were tested in wooden flats by growing on test. Of the 850 seeds, about 600 seeds were germinated. However, none displayed the symptoms of ringspot disease. This indicated negative seed transmission of petunia ringspot virus through petunia true seeds.

For aphid transmission, the cotton aphids (*Aphis gossypii*), raised from single aphid colony were starved for half an hour and when fed on infected petunia leaves for fifty to sixty seconds, transmitted the disease to healthy petunia plants. This indicated the transmission of petunia ringspot virus by cotton aphid in non-persistent manner.

The disease, viz., petunia asteroid mosaic virus, Lovisolo³, a member of tombus virus group, Harrison *et al.*²; petunia ringspot virus, Rubio Huertos⁵ and petunia witches' broom disease, Sahambi⁶; Mali and Vyanjane⁴ have been reported so far on petunia. The present virus disease resembles petunia ringspot virus disease reported from Spain, Rubio-Heurtos,⁵ in symptomatology on petunia, host plant reactions and transmission studies and in not being transmitted through the true seeds of petunia. Recently, the petunia ringspot virus has been reported as a strain of broad bean wilt virus and member of comovirus group by Doel¹ and Harrison *et al.*² respectively. Therefore, the present petunia ringspot virus disease is identified as a petunia ringspot virus strain of broad bean wilt virus (BBWV). This is a first record on the occurrence of petunia ringspot virus outside Spain.

Department of Plant Pathology,
Marathwada Agricultural
University,
Parbhani 431 402 (M.S.),
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V. R. MALI.
N. T. VYANJANE.
A. U. EKBOTE.

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OCCURRENCE OF *PARASARCOPHAGA MISERA* (WALKER) AND *CAMPOLETIS* SP. AS PARASITES OF *SPODOPTERA LITURA* (FABRICIUS) FROM INDIA

THE tobacco caterpillar, *Spodoptera litura* (Fabr.) (Noctuidae: Lepidoptera), is an important polyphagous pest and has become a serious pest of

cauliflower crop in the Punjab. During the course of our survey, the caterpillars of *S. litura* were collected in large numbers from castor (*Ricinus communis* L.) as well as cauliflower (*Brassica oleracea* L. var. *botrytis* L.) plants in Ludhiana district and reared on fresh host leaves (Temp. 21–27.5° C; R.H.—64%) till they pupated and finally emerged as adults. Some sick and abnormal caterpillars pupated normally but later on changed to jet black in comparison with the light brown colour of the healthy pupae. This change of colour coincided with the emergence of parasitic adult flies, *Parasarcophaga misera* (Walker) (Sarcophagidae: Diptera) from the host pupae. Although *S. litura* was collected from the field from March to November but the parasites emerged only from the pupae developed from caterpillars that were collected during October and November. The percentage of parasitisation was 15 ($n = 240$) in October and 4 ($n = 75$) in November.

From a batch of 50 second and third instar caterpillars of *S. litura* collected from a cauliflower field, situated in the village Jassian in Ludhiana district, two caterpillars exhibited a very little feeding, wrinkled and shrivelled larval bodies. Such caterpillars were suspected for incipient parasitisation. Within a week, yellowish, white grubs of the suspected internal parasite forced their way out of the host sterna and pupated in the whitish cocoons which they had spun around them within few hours of their emergence. Two adult parasitic wasps of *Campoletis* sp. (Ichneumonidae: Hymenoptera) emerged out through the rounded ends of cocoons within 5 and 7 days in the laboratory.

The parasites attacking *S. litura* in India and abroad, known so far, include seven braconids, seven ichneumonids, five tachinids, two eulophids and one each of perilampid and scelionid insects. Among ichneumonids, *Campoletis chlorideae* Uchida—a larval parasite of *Heliothis armigera* Hübn., wrongly identified as *Echoropsis perdistinctus* Vier.⁴ (Sudha Nagarkatti, 1977—Personal communication) is abundantly met with, around Pipariya (Madhya Pradesh) during December and January but the parasite, *Campoletis* sp. bred from the larvae of *S. litura* in the present studies was different from other known species under this genus including *C. chlorideae*. Hence the present finding of *Campoletis* sp. as a larval parasite of *S. litura* appears to be the first record. So far, *P. misera* has been reared only from *Amsacta albistriga* Walk. and *Planispira vittata* at Ooty and Coimbatore (Tamil Nadu) respectively (Sudha Nagarkatti 1977—Personal communication). Thus the present