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CHLOROTIC STUNT—A NEW VIRUS DISEASE OF *CATHARANTHUS ROSEUS* IN INDIA

Catharanthaus roseus (L.) G. Don., a common perennial ornamental, known more for its medicinal value, has been observed in and around Lucknow to be suffering from a virus disease characterized by yellow green mosaic followed by crinkling of the leaves and general stunting of the plants. Present communication deals with the mode of natural spread and biophysical properties of the virus. Host range of the virus was also tested to identify the potential dangers which perennial plants, harbouring viruses, often pose to other economically important plants.

Pure culture of the virus was maintained by mechanical inoculation of *C. roseus* plants through sap prepared from a single local lesion produced on cotyledonary leaves of *Cucumis sativus*. Inoculum was prepared by grinding young infected leaves of *C. roseus* in a pestle and mortar with equal amount (W/V) of phosphate buffer (0·2 M, pH-6). The slurry was squeezed through double folds of muslin cloth and centrifuged at 5,000 rpm for 15 minutes at 10° C. The clear supernatant thus obtained, termed as standard extract (SE), was used in all experiments unless stated otherwise.

Transmission tests with aphids, *viz.*, *Myzus persicae*, *Aphis gossypii*, *A. craccivora*, *A. nerii* and *Brevicoryne brassicae* were carried out by giving them starvation period, acquisition probes and inoculation feedings of 3 hours, 2-3 minutes and 24 hours respectively. *C. roseus* was used both as a donor as well as recipient host.

The virus could easily be transmitted by mechanical means through leaves (using carborundum powder as an abrasive) as well as by all the aphid species tested in the present investigation.

Data included in Table I indicate that the virus infecting *C. roseus* has a wide host range including many economically important plants belonging to family Solanaceae, Amaranthaceae, Chenopodiaceae, Caryophyllaceae, Compositae, Cucurbitaceae, Malvaceae and Leguminosae. *Abelmoschus esculentus* L., *Ageratum conyzoides* L., *Ammi majus* L., *Antirhinum majus* L., *Brassica oleracea* L., *Cineraria* sp.,

TABLE I

Reaction of a virus from C. roseus *to some host plants*

Host	Family*	Symptoms
Amaranthus viridis L.	1	LNS
Beta vulgaris L.	2	CLL
Calendula sp.	3	MM
Capsicum annuum L.	4	MM
Celosia cristata L.	1	CLL
Centaurea moschata L. var. *alba*	3	SM
Chenopodium album L.	2	NLL
Chrysanthemum morifolium (Ram) Hernsel	3	MM
Citrullus vulgaris L.	5	LCS, SM
Cucumis sativus L.	5	NLL, SLN
Cucurbita pepo DC.	5	LNS
Lablab purpurens (L.) Sweet	6	LAL
Gomphrena globosa L.	1	CLL
Lycopersicon esculentum Mill.	4	Latent
Meliotus alba L.	6	MM
Nicotiana clevelandii Gray	4	LCS, SLN
N. glutinosa L.	4	SM, BLL
N. plumbaginifolia Viv.	4	SM, BLL
N. tabacum L. var. *Samsun* NN	4	VC, BLL
N. tabacum L. var white burley	4	SM, LD
Physalis minima L.	4	
Sida cordifolia L.	6	MM
Solanum nigrum L.	4	SM, LD
Sonchus oleraceaus Linn.	3	LCS
Spinacea oleracea L.	2	CLL
Vaccaria pyramidata Medic	7	SM, LC, CBF
Zinnia elegans Jacq.	3	MM

BLL = Blistering of leaf lamina; CLL = Chlorotic local lesions; LCS = Local large chlorotic spots; LNS = Local large necrotic spots; NLL = Necrotic local lesions; VC = Vein cleaving; CBP = Colour breaking in petals; LAL = Local angular lesions; LD = Leaf deformation; MM = Mild mosaic; SLN = Systemic lethal necrosis.

*1, Amaranthaceae; 2, Chenopodiaceae; 3, Compositae; 4, Solanaceae; 5, Cucurbitaceae; 6, Leguminosae; 7, Caryophyllaceae

Coccinea indica L., *Cosmos bipinnatus* Cav., *Crotalaria spectabilis* Retz., *Dahlia variabilis* L., *Datura innoxia* Mill., *D. metel* L., *D. stramonium* L., *Dorotheanthus bellidiforme* (Burm. f.) N.E. Br., *Euphorbia hirta* L., *Helichrysum bracteatum* Andr., *Helianthus annuus* L., *Oxalis corniculata* Linn., *Petunia violacea* L. 'Hybrida', *Phaseolus aureus* Roxb., *P. vulgaris* L., Pintobean, Bean bountiful, Bean bataff, *Phlox drummondii* L., *Solanum melongena* L., *S. tuberosum* L. Vars. 2703, 2708 C-140, *S. khasianum* Clarke, *Raphanus sativus* L., *Tagetus erecta* L., *Tridex procumbens* L., *Vigna sinensis* L., California 5 and Early Ramshorn and *Zea mays* L. neither produced any symptoms nor the virus could be recovered from them as evidenced by back inoculation tests.

Bio-physical properties of the virus were carried out using *C. roseus* as donor and *Cucumis sativus* as recipient host. Virus in the standard extract could not withstand dilution of 10^{-4}, heating for 10 minutes at 50° C. and when stored beyond 12 hours at 30–32° C.

Periwinkle mosaic[1,2] is incidentally the only virus which is known to naturally infect *Catharanthus roseus* plants in India. The virus described here is transmitted by mechanical means with an incubation period of about 5–15 days in *C. roseus* as well a by aphids. It has a wide host range and produces local symptoms on *Celosia cristata*, *Beta vulgaris*, *Gomphrena globosa*, *Amaranthus viridis* and *Lablab purpurens*. Periwinkle mosaic virus in contrast, has an incubation of 60–70 days in *C. roseus* and is neither aphid transmissible nor infects any of the aforesaid hosts. *Cucumis sativus* reacts with this virus within 3–4 days after inoculation resulting in the formation of local lesions on colyledonary leaves followed by systemic veinal necrosis leading to the death of the plants within 10 days. Periwinkle mosaic virus, instead, does not cause systemic lethal necrosis of *C. sativus* plants and only produces greenish yellow spots followed by yellow streaks on young leaves after 8–10 days of virus inoculation. Differences in bio-physical properties of periwinkle mosaic and present virus do not seem to be much different. Periwinkle mosaic virus, however, has DEP = 10^{-3}, TIP = 55° C, LIV = 24 hrs. while the virus dealt herein has a DEP = 10^{-4}, TIP = 50° C, LIV = 12 hrs. Ladino clover yellow patch[3] and rose mosaic virus[4] which have been shown to infect *C. roseus* during experimental inoculations differ from our isolate in aphid transmission, bio-physical properties and host range. Present virus infecting *C. roseus* has been tentatively named as periwinkle chlorotic stunt virus till further identification is possible through serology and electron microscopy (in progress).

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A NUCLEAR POLYHEDROSIS VIRUS FROM RICE CASE WORM, *NYMPHULA DEPUNCTALIS* (GUEN.) (LEPIDOPTERA : PYRALIDAE)

THE rice case worm, *Nymphula depunctalis* (Guen.) occurs sporadically on rice in severe proportions at the early stages of the crop. During December, 1977, several larvae and pupae were seen dead due to an epizootic infection in the rice fields of the College of Agriculture, Vellayani, Kerala. Examination of the tissue preparations and haemolymph from infected larvae by light microscopy revealed the presence of numerous refractive polyhedral inclusion bodies in them. The polyhedra did not stain with Giemsa's solution, without pretreatment with acid.

Purified suspension of the inclusion bodies from diseased *N. depunctalis* induced disease causing 60–70% mortality of the larvae in 5–6 days. Infected larvae developed symptoms of anorexia and stopped feeding in 3–4 days. Generally, infected larvae came out of their cases before death. Towards advanced stages of the disease, the tissues were liquefied and the cuticle was highly fragile and ruptured easily liberating the liquefied contents (Fig. 1). When inoculated in the

FIG. 1. Rice case worm, *Nymphula depunctalis* died of NPV, showing breaking of integument and oozing out of liquefied contents (arrows).