CARRIAGE OF A DISTINCT ISOLATE OF POTATO VIRUS Y IN *SOLANUM NIGRUM* L.

Solanum nigrum, a common solanaceous weed, has been recorded as a natural carrier of several viruses in different countries[1-5]. In the present studies this plant has been recorded from different localities of Lucknow and its suburbs with symptoms typical to those of viruses. Studies were carried out to evaluate its role in the spread of the disease to economic plants as also to identify the virus by transmission tests, physical properties, serology and electron microscopy.

Initial inoculum was obtained by crushing infected leaves with an equal amount of phosphate buffer (0·1 M, pH 7). The culture, thereafter, was maintained by aphids on young healthy seedlings grown in sterilized soil under insect proof conditions. The non-viruliferous aphids, *viz.*, *Myzus persicae* Sulz., *Aphis gossypii* Glov., *A. fabae solanella* Theobald and *A. nerii* Boyer were given a starvation period, acquisition access (on *S. nigrum*) and inoculation access of 3 hours, 2–5 minutes and 24 hours respectively for testing them as vectors. Physical properties, electron microscopy and serology were carried out as usual[6].

S. nigrum plants, both naturally and experimentally infected, exhibited vein clearing, mosaic motttling, blistering and reduction of leaf lamina. Such symptoms persist in the plants till they survive (Fig. 1).

FIG. 1. Leaves of *Solanum nigrum*. Left = Infected. Right = Control.

The virus could be transmitted to some members of the family solanaceae, *Brassica rapa*, *Spinacea oleracea* and *Ricinus communis* by sap, and aphids, *viz.*, *M. persicae* and *A. gossypii*, but not through *A. fabae solanella* and *A. nerii*. *Raphanus sativus* and *Momordia charantia* could, however, be infected by mechanical means but not by aphids. Cucurbitaceous hosts were less susceptible while legumes were non-hosts (Table I).

TABLE I

Mechanical and aphid transmission of virus from S. nigrum *to some other plants*

Hosts*	Mode of Transmission	
	Mechanical	Aphid
Brassica compestris L.	(–)	(–)
B. oleracea L. var. *botrytis*	(–)	(–)
B. rapa L.	MM	MM
Chenopodium amaranticolor Coste and Reyn.	(–)	(–)
C. quinoa L.	(–)	(–)
Cucumis sativus L.	(–)	(–)
Datura metel L.	Vn, SM, Bl, Rdl	Vn, SM, Bl, Rdl
D. stramonium L.	Vn, SM, Bl	Vn, SM, Bl
Gomphrena globosa L.	(–)	(–)
Lablab purpurens L.	(–)	(–)
Lagenaria vulgaris Ser.	(–)	(–)
Lycopersicum esculentum L.	MM, SS	MM, SS
Momordica charantia L.	MM	(–)
Nicotiana glutinosa L.	SM, Rdl	SM, Rdl
N. plumbaginifolia Viv.	MM	MM
N. tabacum L. var. Samsun NN	Vn, SM, Rdl	Vn, SM, Rdl
N. tabacum L. var. White Burley	Vn, SM, Rdl	Vn, SM, RDl
Phaseolus aureus Roxb.	(–)	(–)
P. mungo L.	(–)	(–)
P. vulgaris L.	(–)	(–)
Physalis minima L.	MM, SS, Bl, Rdl	MM, SS, Bl, Rdl
Raphanus sativus L.	MM	(–)
Ricinus communis L.	MM	MM
Solanum melongena L.	MM	MM
S. xanthocarpum Schard and Wendl.	(–)	(–)
Spinacea oleracea L.	MM	MM
Vigna sinensis L.	(–)	(–)

* 10 plants used in either case.

Bl = Blistering, MM = Mild mosaic, Rdl = Reduction in leaf lamina, SM = Severe mosaic, SS = Shoestrining, Vn = Vein clearing, (–) = No reaction.

The virus has a thermal inactivation point, dilution end point and longevity *in vitro* (30–32° C) of 60–70° C, 10^{-3} – 10^{-4} and 2–3 days respectively. Flexuous rods ranged from 650–740 nm in length and 10–12 nm in breadth (Fig. 2). Clarified sap reacted positively with antisera of potato virus Y (PVY). No reaction could be obtained with antisera of cucumber mosaic, tobacco mosaic and potato viruses, X, M and S.

FIG 2. Electron micrograph showing virus particles.

Present studies indicate that *S. nigrum* harbours a non-persistent, aphid transmitted virus having flexuous rod-shaped particles. On the basis of transmission tests, serology and electron microscopy, the virus under investigation stands very close to PVY. On the other hand, *D. stramonium*, a host of the present virus is not susceptible to PVY while *C. amaranticolor*, a host of the latter, could not be injected by virus under investigation. Symptoms of PVY on *S. nigrum*, although apparent in the beginning disappear later on making the plants a symptomless carrier[7]. In the present case, however, the symptoms on *S. nigrum* persist till the plants survive. Since separation of different strains of PVY is generally based on substantial differences in host range and symptoms, the present virus is identified as a distinct isolate of PVY designated as PVY, *S. nigrum* strain. The role of the weed *S. nigrum*, as a source of primary inoculum for infection of solanaceous hosts seems to be vital and as such presence of these plants among crop plants should be viewed with caution by the growers.

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EXTERNAL SEXUAL CHARACTERS IN THE JUVENILE STAGES OF THE LEMON-BUTTERFLY, *PAPILIO DEMOLEUS*

DURING the course of our studies on the development and metamorphosis of the reproductive organs in *Papilio demoleus*, we felt the need to identify the sexes of the fifth (ultimate) instar larvae and pupae and were able to discover external sexual characters that not only provide a fairly accurate means of sexing these stages in this species but also differ in essential respects from those described in other Lepidoptera[1–5].

The female larva of *P. demoleus* bears small triangular and transparent cuticular areas, a pair in each of the 8th and 9th abdominal sternites (Fig. 1). The areas are flat without pits or invaginations and transparent without any pigmentation. The female pupa, on the other hand, bears a small narrow vertical furrow or slot biginning in the posterior-half of the 8th abdominal sternite and extending on the 9th sternite (Fig. 2). The male larva (Fig. 3) and pupa (Fig. 4) lack similar, infact, any sexual marking and have to be recognised by elimination of the features present in the female. The above characters permitted almost a 100% accuracy in the identification of the sexes of the juvenile stages in the 200 specimens that were examined.

Stehr and Cook[1] and Hinks and Byres[2] describe a single median pit on the 9th abdominal sternite and Kean and Platt[3], a pair of bristle-bearing minute bumps on the 8th abdominal sternite of the male larva. While the former authors[1, 2] do not mention any distinguishing features in the case of the male pupa, the latter ones[3] describe a pair of swellings on the 9th abdominal sternite and Stammeshaus[4] and Lal and Chandra[5], a genital pore on the same segment. The male larva and pupa of the present insect differ from the above cases in lacking all positive external sexual characters. In the female larva, whereas Stehr and Cook[1] and Hinks and Byres[2] find a pair of pits each on the 8th and 9th abdominal sternites, Kean and Platt[3] find a pair of dark spots (chitin windows) on the 8th abdominal sternite alone. In case of the female pupa, while Kean and Platt[3] describe a slot on the 8th abdominal sternite extending upto the 9th abdominal sternite, Stemmeshaus[4] and Lal and Chandra[5] find a