the data collected on the 35th day indicated a higher percentage of plants with morphological and chlorophyll abnormalities at 20kR than at 40kR, the analysis on the 95th day revealed that the percentage of these plants was higher under 40kR treatment than at 20kR. This may be due to the recovery of plants at 20kR from the effects of radiations after the 35th day. Such a recovery was observed by earlier investigators also[3,4]. Apart from these observations leathery leaf, fused leaflet and imparipinnate leaf variants affecting the leaf character and Xantha, Albina, Dark green, Virescent and Striata were the ones found affecting the chlorophyll development. Sterile plants of two each in Pollachi and TMV_3 and two plants having sterile branches in PVBM were encountered at 40kR treatment.

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SEROLOGICAL TESTS TO FIND OUT ANTIGENIC DIFFERENCES AMONG ISOLATES OF *XANTHOMONAS VESICATORIA* (DOIDGE) DOWSON AND SOME OTHER PHYTOPATHOGENIC BACTERIA

SEROLOGICAL techniques are used for identifying and typing pathogenic bacteria (Katznelson and Sutton, 1956; Lucas and Grogan, 1969; Otta and English, 1969; Charudattan *et al.*, 1973).

In the present investigation 28 isolates of *Xanthomonas vesicatoria* (22 from chillies, 3 each from tomato and *Dhatura*), 14 other *Xanthomonas* spp. and 5 non xanthomonads phytopathogenic bacteria were subjected to serological tests to find out antigenic differences among them. Antisera types I and II of *Xanthomonas vesicatoria* were obtained from Prof. R. E. Stall and R. Charudattan, University of Florida, USA. Agar gel double diffusion tests as described by Ouchterlony (1958) were used throughout these experiments. The medium consisted of 0·01 M PBS (Phosphate Buffered Saline, pH 7·2), Difco agar 1·5% to which 0·04 ml of 80% phenol per 100 ml of the medium was added as a perservative. Dilution of antisera with saline water (0·85%) in the ratio of 1 : 2 was used throughout the experiments. After pouring the antigen and antisera in the respective wells, petrl-dishes were incubated at 8° C. Observations were recorded at 12 hr. intervals upto 5 days for the formation of white precipitation bands between the antigen and aniserum wells.

On the basis of reaction with the type of antiserum/antisera and inability of the isolates to react with either of the two antisera, the various isolates were categorised into 4 groups. In these reactions, two types of precipitation bands, *viz.*, arc like and fast moving near the antigens and antisera wells respectively were formed similar to those observed by Charudattan *et al.*[1].

Group I—reacted with type I antiserum, comprised of 18 chilli isolates, 2 tomato isolates, 1 *dhatura* isolate. *Group II*—reacted with type II antiserum comprised of 1 chilli isolate. *Group III*—reacted with type I and type II antisera comprised of 2 chilli isolates. *Group IV*—did not react with either type I or type II antisera, comprised of 2 *dhatura* isolates and 1 chilli isolate. Reaction of 6 isolates 2 each from chilli, tomato and *dhatura* with type I antiserum is indicated in Fig. 1.

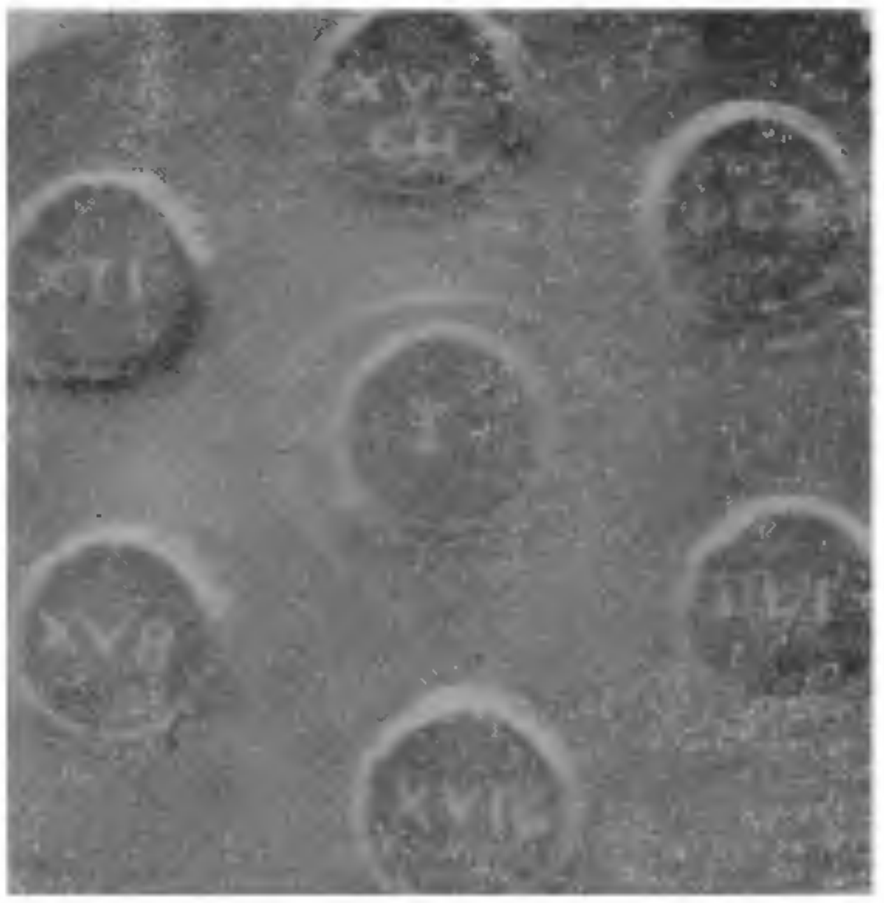

FIG. 1. Serological reactions of heated antigens of *Xanthomonas vesicatoria* isolates; XB8 and XV16 (from chilli), XT1 and XVE64 (from tomato) and DL1 and DL2 (from *dhatura*), with antiserum type I. Antigene of isolates DLI and XV16 did not react while others formed a faast moving band near the antiserum well.

Out of 14 *Xanthomonas* spp. 5 species, *viz.*, *X. sesami*, *X. clerodendroni*, *X. argemoneae*, *X. pisi* and *X. ricini* reacted serologically with type I antiserum and none with type II. Only *X. argemoneae*

was found to react in the manner similar to that of *X. vesicatoria* in forming a fast moving band near the antiserum well with heated antigens and one arc like band near antigen well with non-heated antigens. Thus *X. argemoneae* may possibly belong to *X. vesicatoria* group and the 4 other species appear to share some common antigens with *X. vesicatoria* as they reacted with the antiserum prepared against *X. vesicatoria* though the fast moving band near the antiserum well by heated antigens was absent. Nine other species of *Xanthomonas, viz., X. translucens, X. oryzae, X. campestris, X. malvacearum, X. cymopsidis, X. azadirachtii, X. vignicola, X. amaranthicola, X. citri,* 2 species of *Pseudomonas, i.e., P. sesami, P. mangiferi-indicae, E. catorovora, Corynebacterium michiganense* and *Agrobacterium tumefaciens* did not react with either type I or type II antisera produced against *X. vesicatoria* isolates.

Thus, 9 species of *Xanthomonas,* 2 species of *Pseudomonas,* 1 species each of *Erwinia, Corynebacterium* and *Agrobacterium* are not serologically related to *X. vesicatoria* and serological specificity appears to be confined to generic level of phytopathogenic bacteria used in these experiments, and to some extent in species level.

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STUDIES ON A MOSAIC DISEASE OF MUSK MELON (*CUCUMIS MELO* L.)

A SURVEY of virus diseases of musk melon (*Cucumis melo* L.) conducted in 1974 revealed two distinct types of symptoms, *viz.,* melon mild mosaic and melon ringspot mosaic. Detailed studies conducted on the mild mosaic disease (Fig. 1) are reported here.

The disease is characterised by mosaic mottling of the leaves in the form of irregular chlorotic and green areas on the leaves without any leaf distortion.

FIG. 1. Melon affected with mild mosaic.

The causal virus was found to be sap transmissible to cucurbitaceous hosts only. It infected bottle gourd (*Lagenaria siceraea*), *Luffa cylindrica, Momordica charantia, Citrullus vulgaris, C. vulgaris* var. *fistulosus* and *Cucumis sativus* producing mosaic symptoms. The virus did not infect tobacco var. White burley or *Nicotiana glutinosa* but induced local lesions on *Chenopodium amaranticolor.*

The virus was found to be infective when heated to 90° C for ten minutes, at a dilution of 1 : 100,000 and also after storage for 60 days at room temperature.

The virus was purified using 8·5% butanol, M/20 phosphate buffer (pH 7·5) containing 0·1% thioglycollic acid and two cycles of differential centrifugation as reported by Shankar *et al.* (1971[1]. The electron micrographs (Fig. 2) revealed the virus particles to be rigid rods measuring 280 mμ × 15 mμ.

An antiserum of the virus was prepared by injecting white albino rabbits intramuscularly with purified virus preparations emulsified with Freund's adjuvant (Bacto) complete, thrice at weekly intervals followed by an intravenous injection with purified virus alone after a week and bleeding the rabbits 10 days after the last injection. The serum