SWORD-BEAN MOSAIC—A NEW VIRUS DISEASE OF *CANAVALIA ENSIFORMIS* DC.

A DISEASE characterized by mosaic mottling, leaf distortion, blistering and mottling of pods was observed on sword-bean (*Canavalia ensiformis* DC.) crop grown on the university farm. The present note constitutes a report on the identification of this virus. The disease was transmitted mechanically to sword-bean by conventional leaf rub method using 0·5 M phosphate buffer (pH 7·5) for extracting the sap. The characteristic mosaic symptoms appeared on the inoculated plants of sword-bean within 3–4 weeks (Fig. 1). Positive transmission was also obtained by

FIG. 1. Symptoms of sword-bean mosaic virus disease on sword-bean.

Aphis gossypii on an acquisition feeding of 60 seconds and inoculation feeding of 4 hrs indicating that the virus was transmitted in a non-persistent manner. The virus, however, was not transmitted through the seeds of sword-bean when 120 seeds were collected from the infected plants and seed transmission was determined employing growing on test.

The host range of the virus was restricted mostly to Leguminosae, except sunflower in Compositae family. The virus could infect *Canavalia virosa*, cowpea (Early Ramshorn, C–152, Black-eye), sunn-hemp, urd-bean (*Phaseolus mungo*), lima-bean, French-bean (Bountiful, Top Crop), fenugreek (*Trigonella foenum graecum*), soybean (Bragg, Monetta, Lee), pigeon-pea (BDN–1), horse-gram (*Dolichos biflorus*), Field-peas (SL–420) and sunflower (EC–68414). *C. virosa* reacted to this virus with the symptoms of vein necrosis on inoculated leaves followed by systemic veinal necrosis and defoliation while necrotic lesions were formed on cowpea (C–152), sunnhemp, urd-bean, peas, Top Crop bean, horse-gram and pigeon-pea. On cowpea (Early Ramshorn and Black-eye), fenugreek, soybean and sunflower, systemic mottling and on lima-bean vein-clearing followed by mosaic of bright yellow discoloration (Fig. 2) was observed. Bountiful bean also reacted with this virus systemically with the symptoms of epinasty, top necrosis and death of the plants. However, mung-bean (*P. aureus*), French-bean (Contender, Tendergreen), *Gomphrena globosa*, *Chenopodium album*, *C. amaranticolor*, *C. murale*, *C. quinoa*, *Datura stramonium*, *D. metel*, cucumber (Bangalore Special, Bangalore Dwarf), *Nicotiana glutinosa*, tobacco (Xanthi, White Burley), chillies (NP–46 A) and soybean (Clark–63, Early Pelicans) were not susceptible. Even back inoculation test were negative.

FIG. 2. Symptoms of sword-bean mosaic virus on lima-bean.

Studies on physical properties carried out as per procedures outlined by Bos *et al.*[3] indicated that the virus *per se* was inactivated between 55–60° C and at

the dilution of 10^{-4}. The virus was viable *in vitro* for 2 days at 27–30° C. The serological tests were performed for establishing the relationship, if any, using ring interface precipitin tests (Ball[1]) with the antisera of bean common mosaic (BCMV), bean yellow mosaic (BYMV), cucumber mosaic (CMV), soybean mosaic (SbMV) and tobacco mosaic (TMV) viruses indicated that sword-bean mosaic virus was not serologically related to BCMV, BYMV, CMV, SbMV and TMV.

Peanut mottle virus (Kuhn[7]), TMV–cowpea strain (Capoor *et al.*[4], Sharma and Varma[9]) and groundnut chlorotic spot virus (Hargopal and Nayudu[5]) have been reported to cause mosaic mottling symptoms on sword-bean. However, sword-bean mosaic virus differs from these viruses in transmission studies, physical properties, host range and lack of serological relationship with TMV. The present virus disease also differs from bay-bean (*Canavalia maritima*) mosaic (Rodriguez *et al.*[8]) related to cowpea aphid-borne mosaic virus (Bock and Conti[2]) in symptomatology on sword-bean, host range and reactions on susceptible hosts. Therefore, it seems probable that the sword-bean mosaic virus with the following cryptogram—SWBMV : */* : */* : */* : S/Ap, is a new virus disease, hitherto unrecorded on sword-bean. However, from the transmission, physical properties and host-range, SWBMV seems to be a typical member of potyvirus group (Harrison *et al.*[6]) and its relationship by using high titred antisera with other potyvirus group members infecting leguminous plants need investigations.

Thanks are due to the Director, Danish Government's Seed Pathology Institute for Developing Countries, Copenhagen, Denmark and Dr. M. Musil, Institute of Virology, Bratislava, Czechoslovakia, for the supply of antisera.

Department of Plant Pathology, V. R. Mali.
Marathwada Agricultural University,
Parbhani 431 402, M.S., India,
April 17, 1978.

1. Ball, Ellen M., *Serological Tests for the Identification of Plant Viruses*, Amer. Phytopathol. Soc., Ithaca, N.Y., 1961, p. 16.
2. Bock, K. R. and Conti, M., *Description of Plant Viruses*, CMI/AAB, 1974, No. 134.
3. Bos, L., Hagedorn, D. J. and Quantz, L., *Tijdschr. PlZiekt.*, 1960, **66**, 328.
4. Capoor, S. P., Varma, P. M. and Uppal, B. N., *Curr. Sci.*, 1974, **16**, 151.
5. Hargopal, T. and Nayudu, M. V., *Phytopath. Z.*, 1971, **71**, 33.
6. Harrison, B. D., Finch, J. T., Gibbs, A. J., Hollings, M., Shepherd, R. J., Valenta, V. and Wetter, C., *Virology*, 1971, **45**, 356.
7. Kuhn, C. W., *Phytopathology*, 1965, **55**, 880.
8. Rodriguez, R. L., Bird, J., Monllor, A. C., Waterworth, H. E., Kimura, M. and Maromorosch, K., In *Tropical Diseases of Legumes*, eds. Bird, J. and K. Maramorosch, Acad. Press, N.Y., 1975, 91 p.

BIOCHEMICAL ANALYSIS OF BRACT MUTATIONS IN BOUGAINVILLEAS: Requirement of Light for Betacyanin Synthesis in *Bougainvillea* cv. 'Mrs. H. C. Buck'

It was reported that a repression of genes for betacyanin synthesis in cv. 'Mrs. H. C. Buck', that produces only magenta-coloured bracts, had given rise to cv. 'Mary Palmer' that has both magenta and parchment white bracts on the same plant. These seem to be partially activated by light and high temperatures[1, 2]. Keeping this in veiw, it was thought desirable to study the effect of these environmental factors separately on betacyanin synthesis.

A plant of *B.* cv. 'Mrs. H. C. Buck' growing in the compound of National Botanic Gardens, Lucknow, was selected and ten young branches with growing young bracts that had not yet started synthesizing betacyanin were covered with black polythene bags to cut off light. These bags were opened for 15 min. daily to provide aeration to the branches. The pigments of the bracts, thus, produced in the dark and those growing in shade (diffused light) and in the normal sunlight were analysed colorimetrically and by paper electrophoresis after three weeks. Colorimetric determination was done by the method of Kinsman *et al.*[3] and paper electrophoresis was performed by the method described earlier[2].

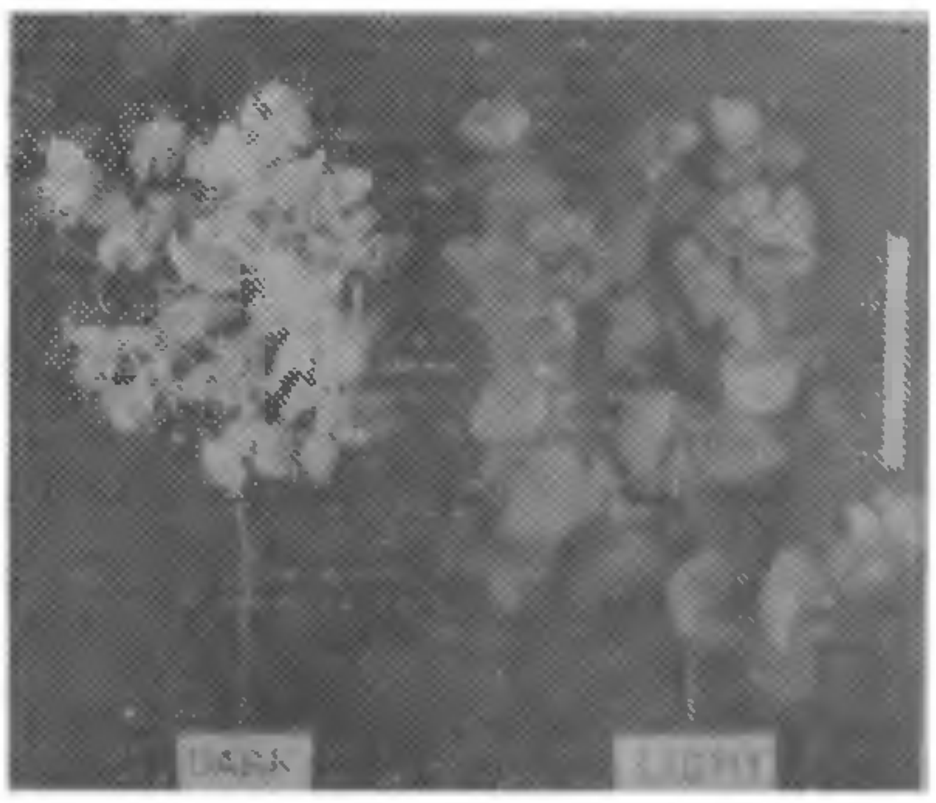

Fig. 1. Bracts of *B.* cv. 'Mrs. H. C. Buck' in the dark (left) and in light.

Figure 1 shows that the bracts growing under normal sunlight were of dark magenta colour and those in the dark became absolutely white. Lack of light, thus, completely inhibited the appearance of magenta colour in the bracts.