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.

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

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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].

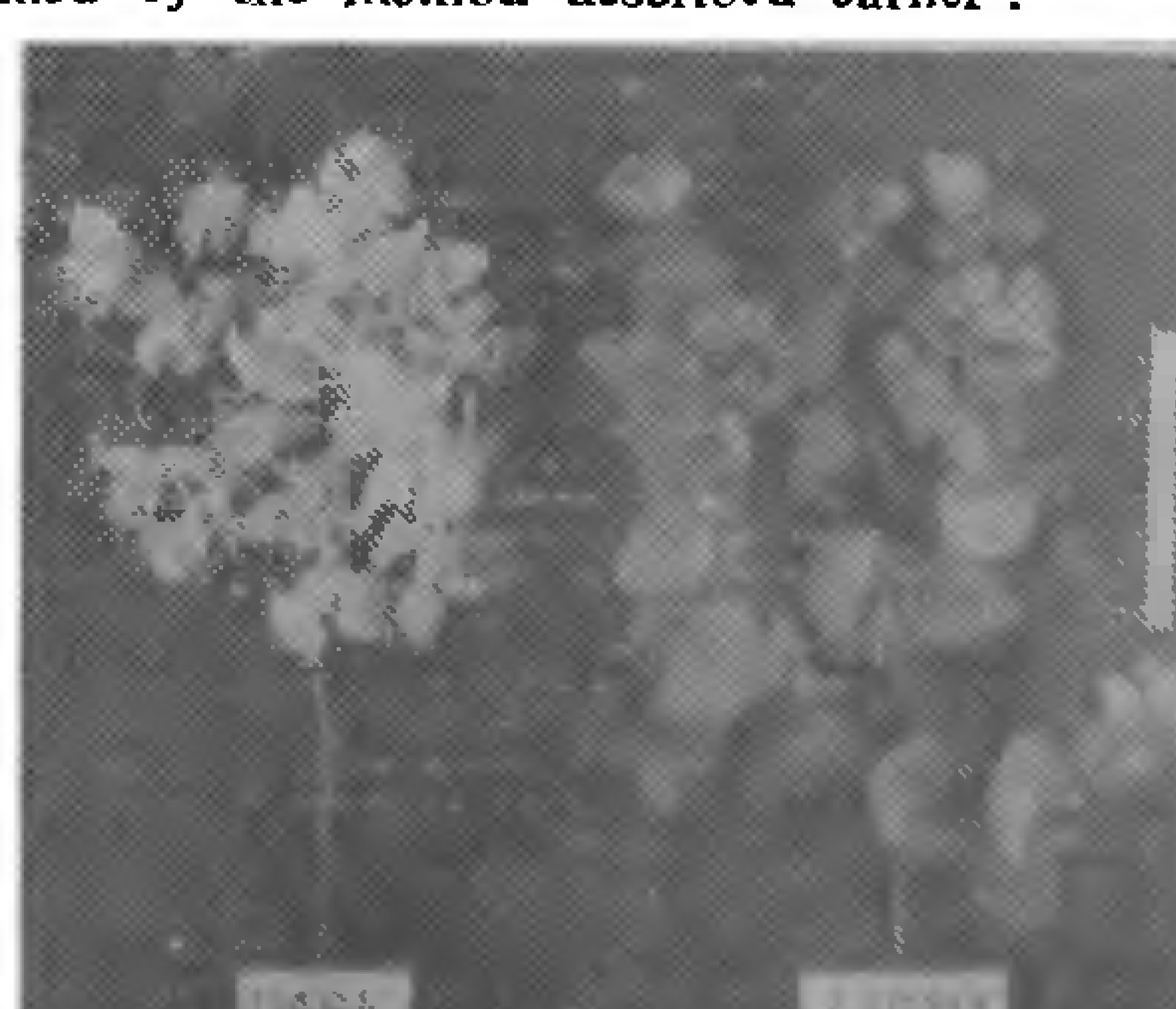

Fig. 1. Bracts of *B.* cv. 'Mrs. H. C. Buck' in the dark (left) and in light.

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.

It is seen that the bracts produced in the sunlight had the maximum betacyanin content (OD = 5·0) followed by that in diffused light (OD = 0·75) and least in the dark (OD= 0·07).

The paper electrophoretic separation of pigments also shows that the synthesis of betacyanins that are responsible for magenta colour in the bracts[4] was inhibited in the dark. It is seen that the pigments of bracts growing under normal sunlight were resolved into three bands of betacyanins and two of betaxanthins (density +++, ++)*. The 3 bands of betacyanins had the electrophoretic mobility of 100, 50 and 30, respectively, relative to betanin and that the thirdb and with the lowest electrophoretic mobility was the most intense in colour (density ++++) followed by second (density +++) and first (density ++) bands. The bracts growing in diffused light exhibited only one faint band that pertained to the third band of normal bracts (density ++). The bracts growing in the dark did not show any band of betacyanins and had only a single band of light yellow betaxanthins (density ++).

These results indicate a photo-control of betacyanin synthesis in *Bougainvillea.* A similar induction of amaranthin synthesis by light in *Amaranthus* seedlings has been reported by Garay and Towers[5]. On the other hand, Wohlpart and Mabry[6] showed that light was not required for the synthesis of betacyanin in *Amaranthus* and *Beta vulgaris.* This is the first report of its kind showing the photo-control of betacyanin synthesis in *Bouganivillea* bracts. Our results, thus, support the observations of Garay and Towers[5] in the case of *Amaranthus.* Another interesting feature is that the effect of darkness also seems to be complementary to the natural mutation which occurred in cv. 'H. C. Buck' and gave rise to the cv. 'Mary Palmer' that has both the magenta and the white-coloured bracts. Work is now in progress to understand the mechanism of photo-control of betacyanin synthesis and its precise role in the bract mutation in cv. 'Mrs. H. C. Buck' that gave rise to cv. 'Mary Palmer'.

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National Botanic Gardens, Lucknow 226 001, India, *April* 29, 1978.

V. K. Kochhar.**
Sunita Kochhar.**
D. Ohri.

* Relative density of each band has been given as score on the basis of visual observation.

** Present address: Biologisches Institut II, Lehrstuhl für Botanik, Universität Freiburg, D-78, Freiburg i. Br., W. Germany.

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NATURE OF RESISTANCE TO YELLOW VEIN MOSAIC IN *ABELMOSCHUS MANIHOT* SSP. *MANIHOT*

Among the commonly grown summer vegetables, Okra [*Abelmoschus esculentus* (L). Moench] is most widely cultivated throughout India. Yellow vein mosaic is known to be a serious virus disease of okra. The disease is spread by an insect vector *Bemisia tabaci* Genn (Varma[4]). This disease causes 50–94% loss (Sastry and Singh[2]). The widely cultivated variety Pusa Sawani which had been reported to be a symptomless carrier of this virus (Singh *et al.*[3]) has recently lost this reaction due to various genetic and agroclimatic factors. An accession of okra received from Ghana (identified as *Abelmoschus manihot* (L.) Medicus ssp. *mainhot* by Royal Botanic Gardens, Kew-London) under the auspices of the National Bureau of Plant Genetic Resources, IARI, New Delhi, has been reported to have a considerable amount of resistance to yellow vein mosaic (Sandhu *et al.*[1]). It was, therefore, necessary to find a suitable source of host resistance in order to develop the cultivars resistant to this virus.

The experimental material consisted of the following species and hydbrids:

1. *A. esculentus* (L.) Moench. Cvs. Pusa Sawani and Pusa Makhmali
2. *A. manihot* (L.) Medicus ssp. *manihot.*
3. F_1 (*A. esculentus* cv. Pusa Sawani × *A. manihot* ssp. *manihot*).

Grafting procedure was used for screening the material for yellow vein-mosaic resistance. Several plants of *A. manihot* F_1 and Pusa Sawani were grafted by "tongue" grafting using Pusa Makhmali as scion. The scion variety (Pusa Makhmali) was kept virus-free by growing in the glass house. The grafted plants. were covered with muslin cloth bags in order to avoid the attack of white fly until the symptoms appeared on the grafted scion portion. The plants were sprayed with Nuvacron prior to grafting to avoid the white fly.