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CALOTROPIS MOSAIC VIRUS

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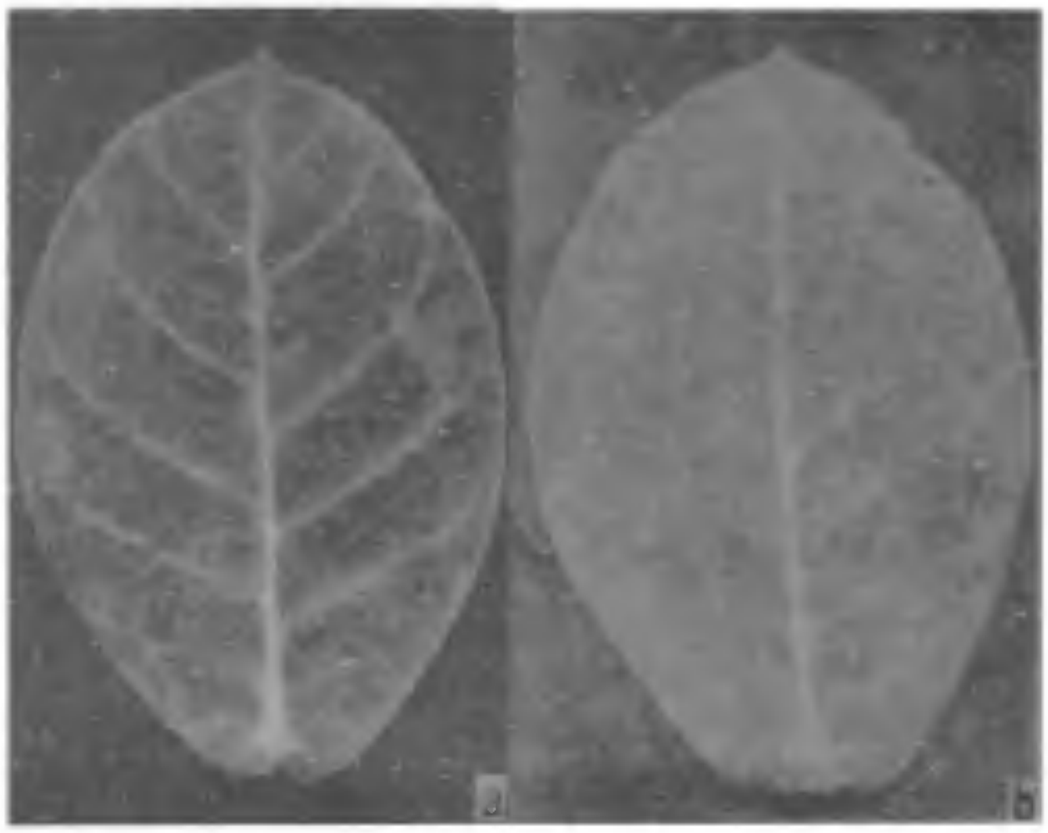
Calotropis procera is a common weed distributed in warmer parts of India. All parts of this are of immense medicinal value. Leaves are applied to cure pains and flowers in curing piles[1]. During 1983–84, 90% of the plants were found to be severely affected by a viral disease. In the early stages, the first systemic symptom is the appearance of spots which become necrotic. The leaves of the affected plants showed mosaic comprising yellow and dark green patches consisting of small spots which may be sufficiently numerous to cover the whole leaf and stand out in marked contrast to the green background of the leaf (figures 1a and b). The severely infected plants were stunted and showed masking of the flower colour. In this communication an attempt has been made to study and characterize the casual organism of the disease, its mechanical transmission, insect transmission, host range and other physical properties.

The disease is readily sap-transmissible to susceptible plants. The plant species (46 in number) belonging to 16 different families were sap-inoculated; of these only 6 plant species were susceptible *Gomphrena globosa*, *Petunia hybrida* and *Chenopodium amaranticolor* showed chlorotic local lesions whereas *C. album* showed necrotic local lesions. *Nicotiana glutinosa*, *N. tabacum* cv Harrison special showed systemic infection on the inoculated leaves.

The following plant species were not susceptible: *Amaranthus caudatus*, *A. viridis*, *Antirrhinum majus*, *Apium graveolens*, *Blumia lacera*, *Brassica campestris*, *Cajanus cajan*, *Capsicum annum*, *Chenopodium murale*, *Citrullus vulgaris*, *Coreopsis drummondii*, *Crotolaria juncea*, *Cucumis sativus*, *Cynopsis tetragonoloba*, *Datura metel*, *D. album*, *Glycine max*, *Heliotropium indicum*, *Kochia indica*, *Lactuca sativa*, *Lagenaria siceraria*, *Lathyrus odoratus*, *Launaea asplenifolia*, *Linaria macrocana*, *Luffa actangula*, *Lycopersicon esculentum*, *Momordica charantia*, *Phlox drumondii*, *Physalis peruviana*, *Rumex dentatus*, *Solanum melongena*, *Phaseolus mungo*, *Vigna siensis*, *Zinnia elegans*, *Solanum nigrum*, *Chenopodium ambrosoides*, *Cucurbita pepo*, *Dianthus caryophyllus*, *Tropaelum majus*, *Xanthium strumarium*.



Figures 1a–b. a. Healthy calotropis procera leaf. **b.** Virus-infected leaf.

Aphids tested for virus transmission were *Mazus persicae*, *Aphis gossypii*, *A. craccivora*, *A. fabae*, *A. nerii*, *Rhopalosiphum maidis*, *Macrosiphoniella sonbornii*, *Lipaphis erysimi*. Only *M. persicae* and *Aphis gossypii* transmitted the virus non persistently from *Calotropis procera* to *N. glutinosa*, *N. tabacum* and *C. amaranticolor*.

cased leaves stained with phloxine and methylene blue did not reveal the presence of any inclusion bodies.

The dilution end point of the virus is 1:500. The virus is inactivated by heating the infectious sap for 10 min at 60°C and by storage at 35°C for two days and for 6 days at 4°C.

The properties of the Calotropis mosaic virus are similar to those of the virus included in the 10th group of Brandes and Wetters[2] classification and Poty virus group of Harrison *et al*[3] which include Beet mosaic, Henbane mosaic, Potato A, Potato Y and Tobacco etch virus (TEV). Out of these viruses, properties of TEV resemble those of Calotropis

mosaic virus, but Calotropis mosaic virus does not produce inclusion bodies in infected plants which are characteristic of TEV and these two viruses also differ in their host range. The properties of Datura enation mosaic virus (DEMV) are similar to those of Calotropis mosaic virus though the host range is different. Calotropis mosaic virus does not infect *Datura metel* and *Solanum nigrum* whereas DEMV produces characteristic symptoms on both the hosts. A perusal of literature reveals that there is no record of any virus disease on *Calotropis procera* L. The Calotropis mosaic virus is therefore a new virus with some properties in common with DEMV and TEV. This report therefore constitutes the first record of a virus disease on *Calotropis* from India. Further investigations on this virus are in progress. The cryptogram of the virus is (x x:x x:x x:S AP).

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LEVELS OF ENZYMES OF C_4 ACID METABOLISM IN DEVELOPING MAIZE SILKS

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THE angiospermic pistil is tripartite: the stigma, which is meant for pollen reception and germination; the style through which the pollen tubes grow; and the ovary enclosing one or more ovules, each containing an embryo sac, the female gametophyte. Pistils show characteristic periods of development[1] and may undergo substantial elongation as in the case of the maize silk. If not pollinated, the silk continues to grow and may reach several centimeters in length beyond the husk. When fertilization is accomplished, elongation quickly ceases, the silk shrivels up and turns brown. The information on the underlying physiological and biochemical changes resulting in the prodigious elongation of maize silks is scarcely available. In other plant systems, the enzyme activities of non-photosynthetic C_4 dicarboxylic acid metabolism have been shown to be related with the metabolic requirements of cell elongation[2,3]. It is, therefore, of interest to investigate this relationship in maize silks and the present communication is the first report on the enzyme profiles of C_4 carbon metabolism during their development.

Silks from the field-grown maize (*Zea mays* L cv J 1034) were collected at four developmental stages designated as I to IV with average lengths of Ca. 5.6, 14.9, 20.3 and 19.3 cm respectively. At stage I the silks were enclosed in the husks which extended out at the rest of the stages. Stage IV represented the senescing stage of silks and their shrivelling led to a slight reduction in length. Five hundred mg of silks were collected at each stage and the enzyme extracts prepared as described previously[3]. Enzyme activities were determined spectrophotometrically at 340 nm following the oxidation of NADH or reduction of NAD(P)$^+$. The activities of enzymes of C_4 metabolism viz PEP carboxylase (EC 4.1.1.31), NAD-malate dehydrogenase (EC 1.1.1.37), NADP-malic enzyme (EC 1.1.1.82) and glutamate-oxaloacetate transaminase (EC 2.6.1.1) were determined by following the assay methods as reported earlier[3]. All the enzymes from each replicate were assayed in duplicate. The variations in replicate values were within 2%. Hence, the average values are given in figures.

The enzymes of C_4 carbon metabolism and changes in their activities were detectable in developing maize silks (figures 1 and 2). Since the maize silks are non-chlorophyllous, a C_4 photo-

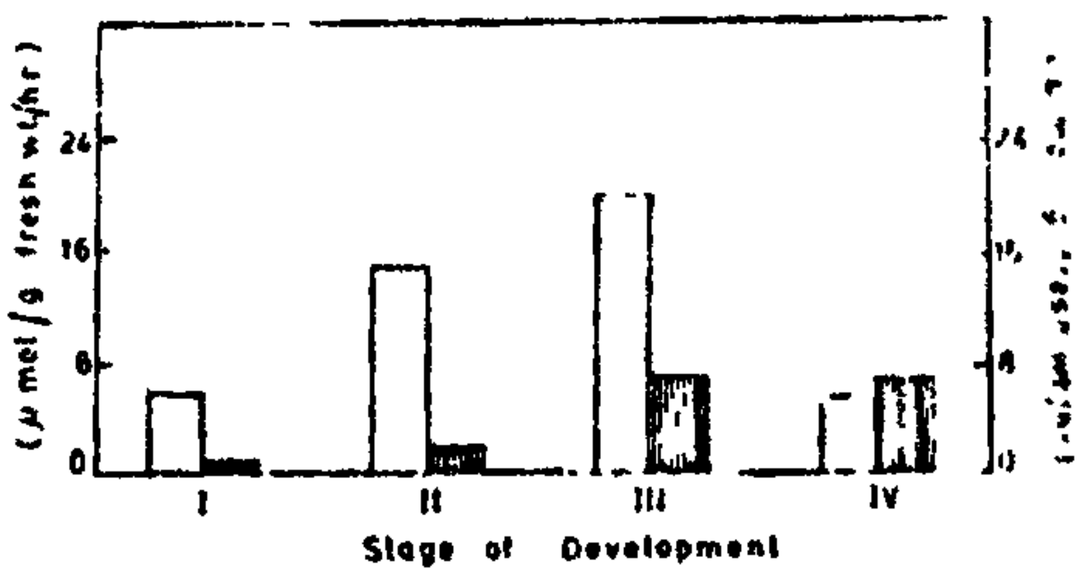

Figure 1. Activities of PEP carboxylase and glutamate-oxaloacetate transaminase in the maize silks at four phases of development. [□, PEP carboxylase; ■, Glutamate-oxaloacetate transaminase.]