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DISEASE NOTES OR NEW RECORDS

Occurrence of a *Begomovirus* with yellow vein mosaic disease of mesta (*Hibiscus cannabinus* and *Hibiscus sabdariffa*)

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Abstract. A whitefly transmitted *Begomovirus* (*Geminiviridae*: *Begomovirus*) with a satellite β-DNA associated with yellow vein mosaic disease of mesta (*Hibiscus cannabinus* and *Hibiscus sabdariffa*) has been detected for the first time in mesta growing regions of India.

Mesta (*Hibiscus cannabinus* and *Hibiscus sabdariffa*) crops are potentially valuable for industrial use because of their fibre content, medicinal value and effective use in the paper industry (Duke 1983). The crop suffers from many virus diseases (Brunt *et al*. 1996; Jones and Behncken 1980). A yellow vein mosaic disease, not hitherto known, has been observed over the last 3 years in the southern, northern and eastern part of India. The disease causes complete destruction of the crop and the farmers in many regions are showing reluctance to cultivate this economically important crop as a result of this disease. The leaves of the affected plant show yellowing of veins, which leads to complete yellowing of leaves (Fig. 1), followed by defoliation and yield reduction at an advanced stage. A survey was conducted on 50 fields over four districts of West Bengal to record the disease incidence. The survey indicated that the incidence of the disease was higher in *H. sabdariffa* (92.46%) than in *H. cannabinus* (89.04%). Transmission electron microscopy of typical symptomatic leaves of *H. cannabinus* using 2% uranyl acetate revealed the presence of geminate particles measuring 20 × 30 nm. The disease was found to be transmitted by whitefly (*Bemisia tabaci*). The transmission efficiency was determined by providing five whiteflies with an acquisition and inoculation access period of 12 h each. Three separate experiments were conducted with 30 plants in each. The experiments indicated that the whitefly transmission efficiency was 85% to *H. sabdariffa* and 78% to *H. cannabinus*. Typical symptoms appeared after a minimum incubation period of 9 days under glasshouse conditions. The same numbers of healthy plants were inoculated with non-viruliferous whitefly using the same method as a control in each experiment and no symptom expression was observed. Back-inoculation to a new set of healthy plants (30 in each case) produced similar symptoms in both the species tested and, therefore, confirmed the whitefly transmissibility of the disease. The disease is also transmitted by cleft grafting. In the case of *H. sabdariffa*, the transmissibility through cleft grafting was 80%, while in *H. cannabinus* the transmissibility was 60%. Symptoms appeared on *H. sabdariffa* within 7–9 days of grafting, while on *H. cannabinus* the symptoms appeared after 10–12 days of grafting. Plants grown out of 100 seeds obtained from the infected plants did not produce any symptoms. Furthermore, none of the plants mechanically

Fig. 1. Symptoms of yellow vein mosaic disease in (*A*) *Hibiscus cannabinus* and (*B*) *Hibiscus sabdariffa* plants.

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inoculated with the sap obtained from infected leaves showed any symptoms. Hence, the disease was found to be transmitted only by whitefly and grafting.

To identify the virus, we used Southern blot analysis and nucleic acid spot hybridisation tests. α-^{32}P radiolabelled probes (prepared by using Random Primer Labelling Kit, Bangalore Genei, India) to the complete cotton leaf curl Rajasthan virus DNA-A sequence (accession no. NC_003199) and the cotton leaf curl virus β-DNA sequence (CLCuDβ01Ind, accession no. AY083590) gave a positive hybridisation signal and, therefore, confirmed the involvement of a *Begomovirus* with the disease. An expected amplicon of approximately 0.5 kb from infected leaves with Deng Primer (Deng *et al*. 1994) confirmed the presence of DNA-A of *Begomovirus*, and an expected amplicon of approximately 1.3 kb size with primers specific to β-DNA (Briddon *et al*. 2003) confirmed the association of a satellite β-DNA with the disease. However, no amplification was observed with DNA-A specific primers of cotton leaf curl virus, tomato leaf curl virus and mungbean yellow mosaic virus, which indicated that the causal virus might have a difference in the DNA-A component from all these viruses. Hence, this constitutes the first record of a *Begomovirus* having a satellite β-DNA associated with yellow vein mosaic disease of mesta in India.

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