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TRANSMISSION STUDIES AND MOLECULAR CHARACTERIZATION OF THE VIRUS CAUSING BEAN YELLOWING DISEASE IN SRI LANKA

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Bean (*Phaseolus vulgaris* L.) is the most cultivated up-country vegetable in Sri Lanka, and bean yellowing disease caused by Horsegram (*Macrotyloma uniflorum* L.) yellow mosaic virus (HgYMV) is the most serious threat to bean production in Sri Lanka. HgYMV is a geminivirus, transmitted by whiteflies (*Bemisia tabaci* Genn.). Biological characterization was aimed at determining the virus vector relationship.

Using 12 day-old bean seedlings grown in microtransmission cages, relative transmission efficiency (RTE), minimum number of *B. tabaci* adults required for transmission, acquisition of access period (AAP) and inoculation access period (IAP) were determined as biological characters related to virus transmission. Viruliferous whiteflies, which were allowed to acquire the virus for 24 hr, were released to healthy bean seedlings at a rate of 10 whiteflies per seedling to determine RTE. Whiteflies exposed to an acquisition feeding for 24 hr were released at rates of 1, 3, 5, 10, 15, 20 and 25 insects per seedling to determine the minimum number of *B. tabaci* adults required for transmission. Whiteflies fed on infected bean twigs for 5, 10, 15, 20 and 30 min and 1, 2, 4, 6, 8, 24 and 48 hr were released to bean seedlings at a rate of 10 to determine AAP. To determine IAP, non-viruliferous whiteflies fed for 24 hr on an infected plant were allowed to feed on bean seedlings for 5, 10,15, 20 and 30 min and 1, 2, 3, 6, 8, 24 and 48 hr at a rate of 10 whiteflies per seedling. Each treatment in all experiments was replicated three times. Plants were treated with Imidachloprid (Admire) after each inoculation period in all experiments to kill the whiteflies.

Relative transmission efficiency was found to be 97% by individual inoculation of seedlings. The virus was transmitted through a single whitefly with an incidence of 37%. The minimum AAP and IAP were found to be 20 min for both. Disease incidence values for minimum AAP and minimum IAP were 30% and 37% respectively. Tej degenerate primer pair, Deng 540 and 541 was confirmed to be efficient in rapid detection of begomoviruses in beans at 58 ^{0}C of annealing temperature. Partial molecular characterization of the core-coat protein gene of the virus, obtained by PCR using Deng 540 and 541 primers, resulted in a 97% sequence identity with a Sri Lankan isolate of Horsegram yellow mosaic virus (HgYMV-[LK: 09]). DNA sequence of the Sri Lankan bean isolate formed a separate cluster with HgYMV-LK:09 when subjected to phylogenetic analysis by neighbor joining method using MEGA 4 software.