

Occurrence of Cowpea mild mottle virus in Common Bean and Associated Weeds in Northeastern Brazil

APS apsjournals.apsnet.org/doi/full/10.1094/PDIS-04-17-0562-PDN




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October 2017, Volume 101, Number 10


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<https://doi.org/10.1094/PDIS-04-17-0562-PDN>

DISEASE NOTES

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Cowpea mild mottle virus (CPMMV - *Carlavirus*, *Betaflexiviridae*) is a positive single-stranded RNA virus transmitted by the whitefly *Bemisia tabaci* (Adams et al. 2012). Common bean is a staple food in Brazil, and virus-associated diseases can cause important crop losses. The first report of CPMMV in Brazil was in common bean (*Phaseolus vulgaris* L.) in the states of São Paulo and Paraná, causing angular yellow mosaic (Costa et al. 1983). More recently, CPMMV has re-emerged and was frequently found infecting beans in Goiás State and Distrito Federal, located in central Brazil. However, in the northeastern region, CPMMV infection in common bean plants has not been reported. During a virus survey in common bean and associated uncultivated plants in experimental fields, plants presenting virus-like symptoms such as yellow mosaic, leaf deformation, and leaf curling were collected in plots at the Instituto Agronomico de Pernambuco experimental stations in Arcoverde, Caruaru, and Ibimirim in August 2013. Total RNA was extracted, and cDNA was synthesized with M-MLV reverse transcription using random octamers and oligo-dT primers. PCR reactions were performed using CPMMV specific primers CPMMV-4000F (5'-AACTGGCCTTAGTGAAGTCTACA-3') and CPMMV-4500R (5'-ATTAGCTGTGCCTGGGGT-3'). Expected fragments of 500 bp were amplified, and PCR products from selected isolates were cloned into PCRII-TOPO-TA vector and sequenced to confirm the identity of the virus. A high incidence of CPMMV infection in beans was observed in all locations with 80% (4/5) of virus-positive samples in Ibimirim, 92.3% (12/13) in Caruaru, and 100% (21/21) in Arcoverde, updating the geographical distribution of CPMMV in beans in Brazil. The CPMMV amplicon sequences recovered from bean plants (GenBank KY930609–KY930611) were nearly identical and shared 99% identity with the corresponding sequence of a CPMMV isolate from whiteflies from Florida (KC774019.1) (Rosario et al. 2014), and 98% identical to a CPMMV isolate from soybean from Brazil (KC884246.1) (Zanardo et al. 2014). CPMMV was also detected in *Sida* sp. (Malvaceae), confirming the earlier observations made by Costa et al. (1983), and for the first time CPMMV was found in uncultivated plants belonging to several botanical families, including Fabaceae (*Macroptilium* spp., *Senna* spp., *Desmodium glabrum*, *Rhynchosia minima*), Nyctaginaceae (*Mirabilis jalapa*), Cleomaceae (*Cleome affinis*), and Asteraceae (*Blainvillaea rhomboidea*). The CPMMV amplicons recovered from these uncultivated plants (KY930606–KY930608 and KY930612–KY930618) shared an identity of 96.8 to 99% with those retrieved from beans. This is the first report of CPMMV found in common bean and a wide range of uncultivated hosts in the state of Pernambuco, Brazil. Our results show the importance of

- Issue Date: 14 Sep 2017
- Published: 16 Aug 2017
- First Look: 31 May 2017
- Accepted: 28 May 2017

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monitoring re-emerging viral pathogens such as CPMMV in both common bean and uncultivated plants as increase in the incidence, host range, and geographical distribution of CPMMV brings a new perspective to the study and development of common bean cultivars resistant to this virus.

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This study was supported by grants from Embrapa, CNPq and FAPDF. N. S. Lamas and D. M. T. Alves-Freitas are recipients of fellowships from CNPq.

- Citation

