



First report of cowpea mild mottle virus infecting *Carica papaya* in Brazil

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Papaya (*Carica papaya* L.) is a major tropical fruit crop globally, and Brazil stands out as the world's second-largest exporter. Cowpea mild mottle virus (CPMMV, *Carlavirus vignae*, family *Betaflexiviridae*) primarily infects legumes, but its host range has recently expanded to species such as *Macroptilium* sp. and *Euphorbia heterophylla* (Silveira et al. 2026). In July 2024, mosaic and sticky disease symptoms were observed in approximately 30% of 15,800 plants in a papaya field (cv. Tainung) in northern Minas Gerais state, Brazil. Total RNA was extracted from 21 leaf samples and sequenced using the Illumina MiSeq i100 platform. Quality control was performed with FastQC v. 0.11.9 and trimming with Trimmomatic v. 0.36, resulting in 2,245,237 high-quality reads (97.6%). The reads were assembled using SPAdes v. 4.0.0, resulting in 46,073 contigs, including two overlapping fragments (3,036 bp and 1,928 bp) identified as CPMMV through BLAST tools searches against the NCBI viral RefSeq database. Reads were mapped using Bowtie2 and visualized with Tablet v. 1.21.02.08. The isolate, CPMMV_BR_Papaya (PX963074), shares 98.1% nucleotide identity with the Brazilian soybean isolate CPMMV:BR:GO:10:5 (KC884249). The partial genome sequence (83.4% coverage) encompasses six open reading frames (ORFs). To validate HTS findings, RT-PCR was performed on all 21 samples using primers specific to Brazilian CPMMV isolates (Zanardo et al. 2014), and two newly

designed primer pairs targeting ORF2 (5'-TCGACTGGG CAGCAAAGTAG-3' / 5'-TAGCAAGTCACTGTGCCTG G-3'; triple gene block, 613 bp) and ORF5 (5'-GCATGT GGCTGAGGTTCTCT-3' / 5'-AACGCCCAATTGTCTTT GCC-3'; coat protein, 664 bp). Amplicons were obtained from six symptomatic samples. To our knowledge, this is the first report of CPMMV infecting papaya in Brazil, following a report in Kenya (Mumo et al. 2020). This finding expands the known geographical and host range of the virus, and it underscores the need for further investigation into its epidemiology, potential synergism in mixed infections, and impact on papaya production.

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Data availability The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethical approval Not applicable.

Conflict of interest There is no conflict of interest.

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