Occurrence, distribution, incidence, and severity of common bean viral diseases in resource-limited smallholder farms of western Kenya

Abstract

The common bean (*Phaseolus vulgaris* L.) is a vital pulse crop in Kenya, supporting over 300 million people in East Africa and Latin America with its high protein and starch content. However, bean production in Kenya is declining, particularly in Western Kenya, which contributes about 24 % of the country's dry bean production. The region faces significant challenges from biotic and abiotic factors, notably viral diseases that can cause crop losses of up to 100 %. Currently, there is limited information about these viruses, prevalence, and their distribution in the region A comprehensive disease diagnostic survey was conducted, during which a total of 135 Leaf samples were collected primarily to identify and delineate the distribution of viruses that impact bean crops in the region. Using serological techniques, eight viruses were identified: BCMV (59.3 %), CPMMV (47.3 %), BGMV (44.0 %), BCMNV (25.3 %), BYMV (24.2 %), MCMV (16.5 %), CMV (14.3 %), and CABMV (7.7 %). BCMV was the most prevalent, affecting 60 % of surveyed fields, while CABMV was the least common at 9 %. Importantly, MCMV, previously unreported in common beans, was also observed. Viral infections affected entire fields in 72.5 % of cases. Vihiga County had the highest average incidence and severity of viral diseases at 41.92 %, while Nandi and Bungoma had the lowest at 14 %. The study found no significant differences in viral disease severity or incidence across agro-ecological zones. The findings of this study are crucial for identifying potential outbreaks, understanding virus-host interactions, informing policy formulation, and developing effective prevention strategies for future antiviral research and breeding initiatives in this region.

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