

## Understanding the epidemics of Golden Mosaic Disease under high whitefly pressure on begomovirus-susceptible tomato plants cultivated for processing.

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An epidemiological study was conducted in three processing tomato fields irrigated by center pivots (CP) in Goiás state, Brazil. These CPs, partially surrounded by dense eucalyptus trees, were adjacent to soybean fields heavily infested with the whitefly *Bemisia tabaci* MEAM-1. Given the potential for a high incidence of Golden Mosaic Disease (GMD) caused by the begomovirus tomato severe rugose virus (ToSRV), the study aimed to evaluate the incidence, spread, and potential sources of the virus. Whitefly infestations were highest in tomato plants, followed by cabbage, soybean, and eucalyptus. While eucalyptus trees provided some protection against whiteflies, they did not completely prevent their spread. Analysis of plant samples indicated a low level of ToSRV detection in soybean, spontaneous tomato, and some weeds. However, high incidence of GMD was observed in the first transplanted CP, coinciding with whitefly migration from senescent soybean plants. Symptomatic plants were mainly found in open areas closer to soybean fields, and fewer near the eucalyptus trees. This pattern was repeated in the second CP. By the third transplantation, whitefly swarms had significantly reduced, but plants showed uniformly high (~100%) GMD incidence and milder symptoms. The average yields for the three CPs were 38.6, 42.4, and 61.0 tons/ha, respectively. The study suggested that (1) soybean, spontaneous tomato, and weeds may have served as virus reservoirs; (2) wind corridors could facilitate whitefly movement, with eucalyptus trees acting as partial barriers; (3) GMD was a major factor for lower yields, particularly in the first two CPs; and (4) the highest incidence of begomovirus was linked to peak whitefly infestations, with proximity to virus sources being a critical factor in disease occurrence. This study underscores the importance of managing whitefly populations and virus sources, and suggests that windbreaker dense eucalyptus cultivation may mitigate the spread of GMD in tomato fields.

Keywords: Epidemiology; *Solanum lycopersicum*; *Bemisia tabaci*; geminivirus; disease spread; ToSRV