VIRTIGATION – Emerging viral diseases in tomatoes and cucurbits: Implementation of mitigation strategies for durable disease management

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Reports on the role of different whitefly species and weed hosts on viral disease epidemics (M36, R, PU).

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1 PUBLISHABLE SUMMARY

In this task, we carried out diverse sets of experiments to investigate the potential spread of the two emerging plant viruses in Europe: tomato brown fruit rugose virus (ToBRFV) tomato leaf curl New Delhi virus (ToLCNDV). First, we investigated the competence of different whitefly species transmitting ToLCNDV using the native Indian whiteflies with the native Indian virus and found that the native whitefly species transmitted the virus better than the invasive species. This supported the co-evolution hypothesis where the viruses, vectors and their host plants are better adapted to each other. Thus, strategies for controlling ToLCNDV should also include controlling the native Indian whiteflies. Similar experiments were carried out in Spain where the native SSA2 was shown to transmit ToLCNDV equally efficiently as the invasive MED species. These slightly contrasting results could be the wide-spread establishment of the MED in Europe now for more than two decades while the MED or MEAM1 are not widely established in India. Controlling both native and invasive species is essential for controlling ToLCNDV in Europe. Moreover, we also investigated the transmission potential of ToLCNDV by the glasshouse whitefly, *Trialeurodes vaporariorum*, but luckily this species does not transmit ToLCNDV.

In a second set of experiments, we investigated the alternative host plants for ToLCNDV and ToBRFV. We found a very few alternative host plants for both viruses; Three plants each were infected by each virus. Ecballium, bryony and jimsonweed were confirmed to be alternative hosts for ToLCNDV although the former does not contribute to disease spread as the virus was not transmissible from Ecballium to zucchini. *Solanum nigrum*, *S. elaeagnifolium* and *S. rostratum* were found to be the alternative hosts of ToBRFV. All the alternative hosts should be removed from tomato and cucurbit fields for minimizing the spread of the viruses into the main crop. The implications of our findings for disease control are presented in this report.

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