Monitoring aphid population dynamics: towards a better understanding of virus epidemics in melon crops

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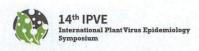
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In France, open field melon crops are regularly impacted by four aphid-borne viruses: cucurbit aphid-borne yellows virus (CABYV), cucumber mosaic virus (CMV), watermelon mosaic virus (WMV) and zucchini yellow mosaic virus (ZYMV). The efficiency of control methods is likely to be enhanced with an accurate knowledge of epidemic drivers in particular those linked with aphid vectors. Field experiments were conducted in Southeastern France between 2010 and 2018 to investigate the relationships between aphid population dynamics and virus epidemics. Winged aphids visiting melon crops were sampled daily using non-biased suction traps and aphid species were identified under a stereomicroscope. Viruses were monitored weekly by DAS-ELISA. Gompertz models were fitted to virus incidence data sets by nonlinear regression and AUDPCs (Area Under the Disease Progress Curve) were calculated. A statistical analysis was performed to explore the relationships existing between several "aphid" variables (total aphid abundances and specific abundances over different periods of time) and several "virus" variables (cumulative total of infected plants over different periods of time, newly infected plants per week, AUDPCs, Gompertz model parameter estimates). No significant relationship was highlighted between aphids and non-persistent viruses (CMV, WMV, ZYMV). Interestingly, a predictive relationship was established between *Aphis gossypii* population dynamics and CABYV epidemics suggesting that an early control of the population of *Aphis gossypii* could impact favourably the epidemic onset and progress of this persistent virus in melon crops.

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