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COMBINING GENETIC RESISTANCE AND MANAGEMENT OF FIELD MARGINS TO CONTROL VIRUS EPIDEMICS IN MELON CROPS

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BACKGROUND and OBJECTIVES

The melon *Vat* gene confers resistance to the aphid species *Aphis gossypii* and resistance to non-persistent viruses (CMV, WMV…) when inoculated by this species (1). It is however ineffective in blocking the transmission of viruses inoculated by other aphid species. Its effect on non-persistent virus epidemics is thus expected to be limited when *A. gossypii* is not the main aphid species visiting the melon crop. On the contrary, although not documented, its effect on the persistent virus CABYV mainly vectored by *A. gossypii* is expected to be strong.
The first objective of the study was to evaluate the effect of *Vat* on virus epidemics and on the genetic structure of virus populations in field conditions.
The second objective was to investigate the benefit of combining *Vat* resistance and an appropriate management of field margins to regulate the populations of aphids and/or their virus load. Indeed, literature suggests that flower strips can participate in pest biological control by favoring natural enemies (2), and strips of non-host plants can protect crops from non-persistent viruses by allowing aphids to probe on healthy plants and thus to lose their virus load before reaching the crops (3).

MATERIALS and METHODS

A five-year field experiment was conducted to compare two types of field margin management (bare soil and flower strip) on the efficiency of *Vat*. Virus epidemics were monitored by DAS-ELISA and genetic structures of virus populations characterized by RT-PCR with specific primers and sequencing. The effect of *Vat* and field margin management on the infection probability of a plant by a given virus was calculated with a generalized linear model (binomial distribution and logit link function).

RESULTS

Vat reduced the development of CABYV epidemics significantly every year. Concerning non-persistent viruses, it had no effect on WMV epidemics, but allowed to reduce CMV epidemics some years, confirming the role of *A. gossypii* in CMV transmission. The genetic structure of virus populations was not affected by *Vat*.
The presence of flower strips had a dual effect on virus epidemics: mostly beneficial for WMV but sometimes detrimental for CMV.

CONCLUSIONS

Combining genetic resistance and management of field margins appeared generally as a promising way to decrease the risk of viral epidemics. Nevertheless, the presence of natural enemies enhanced by flower strips may also have a detrimental effect on non-persistent virus dispersion through a modification of aphid behaviour.

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