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TRANSMITTED PLANT VIRUSES CAN AFFECT PERFORMANCES OF STARVING APHID VECTORS

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BACKGROUND AND OBJECTIVES

Manipulation of insect vectors by transmitted plant viruses is intensively studied in our scientific community. Viruses operate this manipulation either directly in insect vectors, or indirectly via physiological changes induced in the infected host plant. In all cases, the analyzed parameters are the altered attractiveness of the infected host plant, the settlement of insect vectors onto these plants, their feeding behavior, and their growth rate estimated through generation time and number of offspring. It is remarkable that all analyzed parameters describe the relationship between the insect vectors and the host plants, and that the phase when vectors are starving “off plant” is seldom considered. Yet, the capacity of the vector to successfully find another plant -- its survival time during starvation and the distance or surface area the vector can explore -- is obviously key for the virus epidemiology.

MATERIAL AND METHODS

We thus decided to explore whether a virus (FBNSV, *Nanoviridae*) can modify the performance of its aphid vectors (*A. pisum*), when starving away from host plants (*Vicia faba*). We primarily targeted the survival time, since it is obviously an important property that could be manipulated by the virus. Indeed, surviving longer when starving would increase the chances of the vector finding a new host and the distance at which this host could be found.

RESULTS

Our results demonstrate that aphids previously fed onto infected plants are very significantly longer lived when removed from these plants and kept away from new ones. Long-lived aphid survivors are perfectly able to transmit the virus and to found new colonies when finally transferred onto host plants.

CONCLUSIONS

Though at this stage we do not understand the underlying mechanisms, our results reveal that viruses may manipulate the individual performances of their insect vectors when travelling off host plants. This aspect of vector manipulation by transmitted viruses has thus far been largely overlooked and deserves increased attention, as it might be an important trait for epidemiology.