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### ► To cite this version:

Alexandra Schoeny, Patrick Gognalons, Gregory Girardot, Pauline Millot, Karine Nozeran, et al.. Exploring the relationships between aphid population dynamics and virus epidemics in melon crops. International Advances in Plant Virology 2019, Association of Applied Biologists. GBR., Oct 2019, Rome, Italy. 128 p. hal-02734767

**HAL Id: hal-02734767**

**<https://hal.inrae.fr/hal-02734767v1>**

Submitted on 2 Jun 2020

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## Exploring the relationships between aphid population dynamics and virus epidemics in melon crops

A SCHOENY, P GOGNALONS, G GIRARDOT, P MILLOT, K NOZERAN,  
C WIPF-SCHEIBEL and H LECOQ

*Pathologie Végétale, INRA, Montfavet, France*

### ABSTRACT

Melon, particularly the Charentais-type (*Cucumis melo* var. *cantalupensis*), is a very popular fruit in France. It is cultivated between March (early tunnel plantings) and September (late open field plantings) in three main production areas: South-East, South-West and Centre-West. South-East represents nearly 40% of the national production (286 000 t, 14000 ha in 2017<sup>1</sup>). 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 2019 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.

<sup>1</sup>[www.agreste.agriculture.gouv.fr](http://www.agreste.agriculture.gouv.fr)



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# International Advances in Plant Virology 2019

at Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria,  
Centro di ricerca Difesa e Certificazione Via C.G. Bertero 22, 00156 Roma, Italy

## PROGRAMME, ABSTRACTS & DELEGATE LIST

### 29-31 October 2019



Association of Applied Biologists

Warwick Enterprise Park, Wellesbourne, Warwick, CV35 9EF

Registered Charity No. 275655 Contact: john@aab.org.uk. Tel: +44 (0)2476 999485 <http://www.aab.org.uk>