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Insights into the genetic control of resistance to *Aphis gossypii* in melon: what we learned from the diversity of aphids

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Insights into the Genetic Control of Resistance to *Aphis gossypii* in Melon: What We Learned from the Diversity of Aphids

Plant resistance has been largely used to control aphids in crops with successes and failures. Large screenings have been conducted in several species to identify aphid resistance in genetic resources. The relative high number of resistant plant accessions discovered in certain species should not mask the fact that aphid resistance usually relies on a small number of genes with limited numbers of alleles. In most cases, the genetic studies have still to be done to determine if the identified accessions are sources of novel resistance genes. Moreover, variability of targeted aphids is usually not clearly considered in breeding programs.

We explored the resistance in melon against *Aphis gossypii*, the cotton-melon aphid, taking into account the diversity recently revealed in this species via SSR analyses. Among 500 melon accessions roughly observed for aphid resistance using two genetically distant clones, we selected 13 accessions for biological characterization with 9 genetically distinct aphid clones. The biological characterization was conducted using two types of tests: aphid resistance tests and tests of virus resistance using *A. gossypii* as the vector. The aphid/melon pair NM1/Margot was included in our study: Margot is a melon line carrying the *A. gossypii* resistance *Vat* gene, a member of the NBS-LRR gene family. This gene was shown to confer resistance to both *A. gossypii* clone NM1 and to non-persistent viruses transmitted by this clone.

117 aphid/melon interactions were observed for both tests. Virus resistance to *A. gossypii*-transmitted non-persistent viruses was a qualitative trait that revealed 8 patterns of resistance among the 13 melon accessions and 6 patterns of aphid virulence among the 9 aphid clones. Inheritance of genetic factors that control the 8 patterns of resistance in melon were studied. New *Vat* alleles were revealed, and a new gene may also be involved in resistance in some accessions. Aphid resistance was a quantitative trait that allowed hypothesizing different ways of aphid resistance adaptation in coherence with resistance to *A. gossypii*-transmitted non-persistent viruses.