

SMALL RNA RESPONSES TO APHID FEEDING IN RESISTANT AND SUSCEPTIBLE INTERACTIONS

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Plants respond to insect herbivory with a complex array of induced physiological changes including defense mechanisms that result in decreased herbivore fitness. A single dominant resistance gene (*Vat*) determines resistance to *Aphis gossypii* (cotton-melon aphid) and *A. gossypii* transmission of non-persistent mosaic viruses in *Cucumis melo* (melon). Resistance reduces aphid fitness; shortening aphid lifespan and resulting in smaller aphids that produce significantly fewer progeny. Genome expression analyses have identified specific patterns of gene expression in nearly isogenic aphid resistant and susceptible melon plants in response to *A. gossypii* feeding. Experiments were designed to determine whether small RNAs regulate gene expression under the biotic stress caused by aphid feeding and are components of the resistance mechanism both as gene expression regulators and as plant defense molecules. To this end small RNA libraries were constructed and analyzed and small regulatory RNAs were identified in both melon and *A. gossypii*. Quantitative real-time PCR experiments identified microRNAs that were simply aphid responsive, and a smaller number that showed a differential response in the resistant interaction. Analysis of the *A. gossypii* library data showed a number of plant phloem microRNAs were transferred to aphids during feeding. These data support the hypothesis that smallRNAs play an important role in host plant responses to phloem feeding insects, in both resistant and susceptible interactions.

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