OXYLIPINS IN PLANT DEFENSES AGAINST APHIDS

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Oxylipins represent a large, diverse group of compounds generated through oxidation of polyunsaturated fatty acids, and a variety of plant oxylipins have been implicated in signaling and defense. The objective of this project is to investigate the role of oxylipins in plant defenses against aphids using the interaction between tomato (*Solanum lycopersicum*) and the potato aphid (*Macrosiphum euphorbiae*) as a model. Jasmonic acid, which is among the most extensively-characterized plant oxylipins, activates induced defenses against caterpillars and other chewing insects; however, we have found that inhibiting jasmonic acid synthesis does not significantly impair plant defenses against aphids. Surprisingly, reducing production of C6 volatiles through antisense suppression of a 13-lipoxygenase (LOXC) in tomato also did not influence aphid population growth. Aphid infestation induced production of 9-lipoxygenase products in tomato foliage, suggesting that 9-LOXs may play a role in induced defenses against aphids. Aphids also upregulated expression of an α-dioxygenase involved in oxylipin synthesis, α-DOX1; furthermore, virus-induced gene silencing of α-DOX1 enhanced aphid population growth, indicating that this gene plays a role in limiting aphid infestations. These results provide novel insights into the contribution of oxylipins to plant defenses against sap-feeding insects.