

## **Physiological Tolerance of *Medicago* Plants to Potato Leafhopper Injury.**

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Plant tolerance to herbivory is a key approach for managing pests. In alfalfa, *Medicago sativa*, the potato leafhopper, *Empoasca fabae*, is a major pest as a result of the cascade of plant responses to sap feeding. To identify tolerance to its injury based on alfalfa physiology, experiments were conducted in the field and greenhouse. In my comparison of the response of field-grown alfalfa cultivars to standardized leafhopper densities, net photosynthesis and transpiration rates of 'Geneva' leaves were reduced by 18% and 21%, respectively, by leafhopper presence, compared to a rate change of less than 1% of 'EverGreen' leaves. Under greenhouse conditions, alfalfa clones varied in their level of gas exchange (net photosynthesis and transpiration) and stem elongation responses to leafhopper injury. For example, in the comparison of 7 clones, net photosynthesis declined 40.7% with leafhopper injury, although individual clones varied from 26.6% to 74.3% reduction. Internode elongation after 2 days was 60.3% less on injured stems compared to healthy stems, but again the individual clones varied from 17.3% to 91.9%. In a time course study of selected clones, clones varied in their level of injury just after and 3 days after cage removal. Gas exchange responses of all clones recovered by 7 days following cessation of injury. In a choice test, leafhoppers spent similar amounts of time on the susceptible clone and the most tolerant clone, suggesting that feeding behavior was similar on the two clones. The study demonstrated physiological tolerance to leafhopper injury among alfalfa genotypes, suggesting that tolerance could be the basis for crop protection in alfalfa from potato leafhopper injury. In subsequent studies, I have tested accessions of *Medicago truncatula* for physiological tolerance to leafhopper injury as well, with the goal of investigation of the molecular basis for tolerance in this model plant.