2-9. Distance Modeling of Aerial Dispersal of Predatory Mites (Acari: Phytoseiidae)

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Aerial dispersal is important to immigration and redistribution of phytoseiid mites that often can provide biological control of spider mite pests. Falling speed of a mite and wind largely determine dispersal distance of such a passively blown organism. A diffusion model of wind-blown phytoseiids could provide insight into their dispersal. To this end, we measured morphologies, body weights and falling speeds of adult females of 13 phytoseiid and one tetranychid mite species. These data were then incorporated into seed dispersal models (Greene and Johnson 1989, Okubo and Levin 1989) and results were compared to mite dispersal distances in wind tunnel, greenhouse and field.

Weights of phytoseiid species ranged from 5.25-21.7 μg; starved mites weighed less than fed mites. Geometric diameters (dg) of idiosomas were correlated to weights. Falling speeds for phytoseiids were 0.39-0.73 m/s, and less than for *T. urticae* (0.79 m/s). In some species, active mites had slower falling speeds than inactive (anesthetized) mites implying that behavior influenced falling. Starved mites had significantly slower falling speeds than fed mites and dispersed farther. Equation-based estimates of falling speed were close to measured ones (2-8% deviation) for some species. There were significant relationships between falling speed and body weight and morphological traits. Greene and Johnsons seed dispersal model (1989) provided better fits to dispersal of mites in the wind tunnel, greenhouse and field studies than Okubo and Levins (1989) model. Limits of models in describing mite dispersal distance and applications to IPM are discussed.