

ABSTRACT OF THE DISSERTATION

The Effects of Biotic and Abiotic Factors on Predator-Prey Interactions in Old-Field Flower-Head Communities.

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A series of laboratory and field experiments was undertaken to determine the effects of two biotic factors, plant species and patch size, and two abiotic factors, temperature and wind speed, on the interactions between the inflorescence spiders *Misumenoides formosipes* and *Misumenops asperatus*, and their prey. In the laboratory, spiders hunted equally well over a broad temperature range (15° - 40°C), but prey performance was strongly positively affected by temperature. In the field, spider per-capita hunting success was unaffected by changing temperature or wind speed. Also, hunting-site selection by spiders seemed to be relatively unconstrained by abiotic factors. When floral architecture permitted, spiders chose hunting sites that were sheltered, otherwise they remained in exposed locations to retain access to prime hunting sites. *Misumenoides formosipes* foraging on *Bidens* constructed shelters by tying two petals together with silk. "Tenting" ameliorated the thermal environment of the upper surface of *Bidens* inflorescences, but time, rather than temperature, explained most of the variation in the proportion of *M. formosipes* found to construct shelters. Prey responses to abiotic

factors varied with season. In spring, the rate of prey visitation to flowers declined with increasing wind speed, whereas in summer, visitation rates responded positively to increasing temperature. Apparent effects of abiotic factors on spider foraging success and hunting performance were indirect effects mediated through the spiders' prey.

In each season, prey preferred one of the two plant species offered (i.e. the plant with a larger intrinsic floral-signal), but spiders did not always realize greater foraging success on the plant species preferred by their prey. *Misumenoides formosipes* did better on *Bidens* than on *Solidago* (matched prey preferences), and *M. asperatus* tended to do better on *Euphorbia* than on *Chrysanthemum* (contrary to prey preferences). In general, the size of patch a spider hunted in did not affect its foraging success. This was attributed to a general failure of the prey to discriminate between large and small patches. Only *M. formosipes* hunting on *Solidago* showed a positive effect of increasing patch size on spider foraging success, however prey, particularly large hymenopterans, discriminated strongly against small *Solidago* patches.