

## Alma Saucedo

Carter, P.E., A.L. Rypstra (1995). Top-down effects in soybean agroecosystems: spider density affects herbivore damage. *Oikos* 72(3):433 – 439.

The authors examined whether spider predators affect plants by reducing herbivore activity. They added and removed spiders from blocks of soybean crops in order to assess changes in crop damage. Leaf damage was reduced in two years where spiders were added and increased one year where spiders were removed. Prey biomass was positively correlated with spider mass. Leaf damage in areas where spiders were added was negatively correlated with biomass of prey killed. However the most abundant spider species was probably introduced during the study and was not actually found on the crops themselves. A more appropriate method may have been to inventory the resident spider species and augment the most abundant species of those already present.

Finke, D.L., R.F. Denno (2002). Intraguild predation diminished in complex-structured vegetation: implications for prey suppression. *Ecology* 83(3): 643 – 652.

The authors investigated the effects of antagonistic interactions among predators (mirid *Tytthus vagus* and wolf spider *Pardosa littoralis*), specifically intraguild predation, on shared prey populations (planthopper *Prokelisia dolus*), and whether vegetation structure complexity may moderate these effects by providing more hidden refuges. They found that antagonistic predator interactions (spider predation on mirids) were present in habitats with simple vegetation structure, thus increasing prey populations. Complex vegetation allowed mirids to avoid spiders, and the prey populations decreased due to the combined effects of both mirid and spider predation.

Gastreich, K.R. (1999). Trait-mediated indirect effects of a Theridiid spider on an ant-plant mutualism. *Ecology* 80(3): 1066 – 1070.

The author attempted to determine whether the spider *Dipoena banksii* (as a top predator) indirectly affected damage to the plant *Piper obliquum* by reducing lower level predator *Pheidole* ant activity. *Pheidole* preys upon herbivores present on *Piper* plants. The presence of *Dipoena* correlated with herbivore damage because *Pheidole* avoided areas in which spiders were present. The author concluded that because this reduction in damage occurred as a result of changes in ant behavior, this is a trait-mediated indirect interaction.

Halaj, J., D.H. Wise (2001). Terrestrial trophic cascades: How much do they trickle? *The American Naturalist* 157(3): 262 – 281.

By analyzing published studies, the authors evaluated the significance of trophic cascades and in which circumstances they have the strongest influence. Overall, they found that predator removal increased herbivore density, and thus increased plant damage. However, they could not generally conclude that reduction in plant damage increased plant biomass, although stronger correlations were found in agricultural systems than natural systems. Overall, trophic cascades are stronger in aquatic communities than terrestrial communities.

Letourneau, D.K., L.A. Dyer (1998). Density patterns of piper ant-plants and associated arthropods: top-predator trophic cascades in a terrestrial system? *Biotropica* 30(2): 162 – 169.

The authors present evidence of trophic cascades through four trophic levels. They examined the top-down effects of top predators *Diplocephalus* spiders and *Phyllobaenus* beetles through lower-level predator *Pheidole* ants and several species of specialist herbivores on *Piper* ant-plants. The beetles were effective top predators and reduced the populations of the lower trophic levels. However the spiders were less effective top predators and did not significantly influence lower trophic levels. In addition, spider density may be influenced by bottom-up effects.

Riechert, S.E., L. Bishop (1990). Prey control by an assemblage of generalist predators: spiders in garden test systems. *Ecology* 71(4): 1441 – 1450.

The authors investigated the effect spiders had on herbivores in agrosystems by adding mulch and/or flowers to separate plots in order to increase spider abundance. Spider density increased most in plots in which mulch and flowers were added, which correlated with reduced herbivore occurrence in plots with the same manipulations. Herbivore damage was highest in plots where spiders were removed. In addition, broccoli and herbivores were placed in bags with and without spiders added. Herbivore damage was tripled in bags without spiders added.

Romero, G.Q., J. Vasconcellos-Neto (2004). Beneficial effects of flower-dwelling predators on their host plant. *Ecology* 85(2): 446 – 457.

The crab spider *Misumenops argenteus* preys on both pollinators and herbivorous insects. The authors investigated whether *M. argenteus* influences (1) flower herbivore populations and the damage they cause to the flowers, and (2) the plant's reproductive output. They set up two blocks of paired *Trichogoniopsis adenantha* plants, one in which the spider was present and one in which it was not present. *M. argenteus* decreased herbivore populations and reduced the number of damaged achenes. They found a higher percentage of fertilized achenes in damaged capitula than in undamaged capitula. This indicates *M. argenteus* has a double positive effect on *T. adenantha*.

Romero, G.Q., P. Mazzafera, J. Vasconcellos-Neto, P.C.O. Trivelin (2006). Bromeliad-living spiders improve host plant nutrition and growth. *Ecology* 87(4): 803 – 808.

The jumping spider *Psecus chapoda* lives strictly on the bromeliad *Bromelia balansae*. The authors used stable isotopes to examine whether *B. balansae* obtains nutrition from *P. chapoda* debris. They fed the spiders isotopically labeled fruit flies and placed their feces and consumed fly carcasses in the center of the plant rosettes. The plants that had spiders present grew leaves 15% longer than the control plants. Because many other invertebrates are associated with bromeliad rosettes, this nutrient supplementation may be more common than realized.

Rypstra, A.L., P.E. Carter (1995). The web-spider community of soybean agroecosystems in southwestern Ohio. *Journal of Arachnology* 23(3): 135 – 144.

The authors observed the changes in spider abundance in a soybean agrosystem over the growing season and investigated whether spider density was associated with habitat availability, weed biomass or herbivore damage. Spider abundance was positively correlated with weed biomass, as well as habitat availability one year only. Spider abundance was negatively correlated with herbivore damage on crops.

Rypstra, A.L., P.E. Carter, R.A. Balfour, S.D. Marshall (1999). Architectural features of agricultural habitats and their impact on the spider inhabitants. *Journal of Arachnology* 27(1): 371 – 377.

Review of how the structural complexity and diversity of vegetation habitat influences predator diversity by changing foraging efficiency and nutritional quality of herbivores. This, in turn, increases predatory diversity and density. Some studies indicated a clear top-down effect, linking habitat complexity, spider density, and plant productivity. However the mechanisms by which this occurred were not as clear.

Schmitz, O.J., A.P. Beckerman, K.M. O'Brien (1997). Behaviorally mediated trophic cascades: effects of predation risk on food web interactions. *Ecology* 78(5): 1388 – 1399.

The authors evaluated the relative importance of trophic cascades produced by two mechanisms: (1) predators' influence on reduced prey populations and the resulting benefit to plants, and (2) a change in prey feeding behavior in the presence of predators, resulting in increased starvation mortality, and thus reduced herbivory. They created two treatments, one in which they glued the chelicerae of spider predators (risk) and one in which they did not (predation). The grasshopper prey responded strongly to the presence of both treatments, but less to the presence of fake spiders. Grasshoppers spent significantly more time feeding in the absence of spiders. Starvation mortality rates were similar in both treatments, and significantly greater than in the control (no spiders), indicating that risk effects were comparable to actual predation effects.

Schmitz, O.J., P.A. Hambäck, A.P. Beckerman (2000). Trophic cascades in terrestrial systems: a review of the effects of carnivore removals on plants. *The American Naturalist* 155(2): 141 – 153.

Review of 41 studies involving potential trophic cascades. The authors concluded that predators' direct effects on herbivores were stronger than indirect effects. Vertebrate predators had stronger effects than invertebrate predators. However, top-down effects appeared stronger when measured as plant damage rather than plant biomass or reproductive output. Therefore, the strength of predator effect may be skewed depending on how plant response was measured.

Snyder, W.E., D.H. Wise (2001). Contrasting trophic cascades generated by a community of generalist predators. *Ecology* 82(6): 1571 – 1583.

The authors examined whether intraguild predation (3 genera of carabid beetles and 2 genera of lycosid spider) includes antagonistic interactions that reduces their total effectiveness in reducing herbivore populations. In general, these predators did not reduce herbivore densities, yet each did affect different herbivore populations at different times of the season, which indirectly increased fruit production.

Whitney, K.D. (2004). Experimental evidence that both parties benefit in a facultative plant-spider mutualism. *Ecology* 85(6): 1642 – 1650.

The author investigated whether mutualistic interaction occurs between *Acacia ligulata*, which produces extrafloral nectaries, and the subsocial spider *Phryganoporus candidus*. Spiders reduced seed predators, which increased seed production, particularly during years of overall low seed

production. Spiders performed better on live plants than dead plants. Stable isotope analysis determined that the spiders on live and dead *Acacia* and live hopbush had different diets, which may be a mechanism for their success on live plants only. Extrafloral nectaries were not a significant form of reward for the spiders.