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Dragonfly predators influence biomass and density of pond snails

Studies in lakes show that fish and crayfish predators play an important role in determining the abundance of freshwater snails. In contrast, there are few studies of snails and their predators in shallow ponds and marshes. Ponds often lack fish and crayfish but have abundant insect populations. Here we present the results of field surveys, laboratory foraging trials, and an outdoor mesocosm experiment, testing the hypothesis that insects are important predators of pulmonate snails. In laboratory foraging trials, conducted with ten species of insects, most insect taxa consumed snails, and larval dragonflies were especially effective predators. The field surveys showed that dragonflies constitute the majority of the insect biomass in fishless ponds. More focused foraging trials evaluated the ability of the dragonflies *Anax junius* and *Pantala hymenaea* to prey upon different sizes and species of pulmonate snails (*Helisoma trivolvis*, *Physa acuta*, and *Stagnicola elodes*). *Anax junius* consumed all three species up to the maximum size tested. *Pantala hymenaea* consumed snails with a shell height of 3 mm and smaller, but did not kill larger snails. *P. acuta* were more vulnerable to predators than were *H. trivolvis* or *S. elodes*. In the mesocosm experiment, conducted with predator treatments of *A. junius*, *P. hymenaea*, and the hemipteran *Belostoma flumineum*, insect predators had a pronounced negative effect on snail biomass and density. *A. junius* and *B. flumineum* reduced biomass and density to a similar degree, and both reduced biomass more than did *P. hymenaea*. Predators did not have a strong effect on species composition. A model suggested that *A. junius* and *P. hymenaea* have the largest effects on snail biomass in the field. Given that both pulmonate snails and dragonfly nymphs are widespread and abundant in marshes and ponds, snail assemblages in these water bodies are likely regulated in large part by odonate predation.

Auteurs du document : Andrew Turner M., Michael Chislock F.

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