MECHANISMS OF NON-CONSUMPTIVE EFFECTS OF PARASITOID WASPS ON APHID POPULATIONS: ENHANCING APHID SUPPRESSION BY INCREASING NATURAL ENEMY AND PLANT DIVERSITY

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ABSTRACT

The relationship between predators and prey are described by consumptive interactions, but prey populations are also influenced by behavioral non-consumptive effects of predators. Because non-consumptive interactions are behavioral, they can be independent of direct consumption and can occur between any two organisms in a community. Any non-lethal organism in a community can influence herbivores that they do not consume if the herbivore inaccurately perceives the non-enemy as a threat and engages in a defensive response. The goal of my dissertation research was to determine whether non-enemies contribute to biological control and enhance herbivore suppression beyond levels accomplished by consumptive natural enemies alone through evaluating consumptive and non-consumptive interactions between two species of parasitoid wasp and two species of aphid. My research documents that 1) the non-consumptive interactions are unique to each aphid and parasitoid wasp pairing, 2) a non-enemy parasitoid not capable of consuming a species of aphid can contribute to long-term aphid suppression by its lethal, consumptive enemy, and 3) increasing the plant and herbivore diversity in a field setting led to greater suppression of aphid population size through increased behavioral interactions between aphids and multiple species of non-enemies. My work demonstrates that non-lethal organisms, or non-enemies, in the environment have an important role to play in influencing herbivore abundance, and that the addition of non-enemies to a community of lethal predators can lead to greater and more consistent suppression of herbivores in the long term.