Protecting Plants: Investigating the Relationship Between Fertilizers and Insect Damage in an Urban Garden

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Plants have evolved diverse and complex defense systems in response to insect herbivory. Insect herbivory initiates signal transduction pathways in plants, leading to the creation of defense compounds that discourage herbivory. Because these secondary metabolites require significant resources and energy, plants may be better able to produce them if they have increased access to nutrients. Previous studies examining the impact of fertilizer on insect herbivory yielded conflicting results, and none address this question in urban agriculture. This paper examines the effect of different fertilizers on insect herbivory on the leaves of bush beans and bell peppers grown in an experimental urban garden, consisting of 32 raised plots. Each plot was treated with one of six soil amendments: high and low levels of municipal compost, high and low levels of manure, synthetic fertilizer, and no additives. Each week, for six weeks, two leaves of each type of plant per plot were randomly selected and imaged using an iPhone. Percent herbivory for each leaf was measured using the app Leafbyte to determine whether there was a significant difference in herbivory between soil amendments. Average chlorophyll measurements for each plot were obtained from other researchers as a measure of available nitrogen. Increased chlorophyll significantly correlated with increased insect damage for both beans and peppers. Contrary to the initial hypothesis, these results suggest that insects preferentially eat healthier plants. It may be that high nutrient fertilizers help plants withstand insect damage, instead of helping plants defend themselves from insects.

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