“The Influence of Sub-lethal Herbicide Stress on Host-plant Defenses”

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Abstract:

Because of intensive reliance on a single herbicide and its associated herbicide-resistant crop plants, approximately 5 million ha of US farmland are currently infested with weeds that are resistant to glyphosate, the active ingredient in roundup. Not surprisingly farmers with populations of these resistant weeds are desperate for new control options. In response to this resistance epidemic, agricultural industry is developing crops that are resistant to plant growth regulator (PGR) herbicides. As with glyphosate-resistant crops, growers are likely to adopt this new herbicide-resistant technology because it will facilitate weed control, saving time and money. However, PGR herbicides pose a unique challenge because they are highly volatile and drift-level concentrations can cause direct damage to crops, reducing yield long distances from target fields. Moreover, this vapor drift also has strong potential to cause indirect, non-target effects in agricultural ecosystems. For instance, sub-lethal drift-level doses of PGR herbicides can increase pest populations on stressed plants, inducing ecological changes that are likely to influence natural-enemy communities that provide valuable ecosystem services. My research is assessing two potential mechanisms that these ecological changes might be induced through; the release of host-plant volatiles for plant defense and natural enemy attraction, and the nutritional content of herbicide stressed plants. Through a series of lab experiments, my research will attempt determine what is causing pest population flares due to herbicide stress on plants.