Weather and insect development

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Some years we have very cool spring temperatures. Just how does the cool weather affect insect pests? The answer is, it depends on the insect. In general, we can separate insects into those who spend the winter in Michigan, and those that migrate up each year from southern areas.

Several insect pests are not able to survive Michigan winters. These survive in more southern regions and migrate into Michigan each year. For example, potato leafhoppers, black cutworm, and some of the grain aphids are carried into Michigan on weather fronts each spring, and tend to arrive in May or June. Cold weather delays their arrival only to the extent that there may be fewer winds from the south. Once here, the insects may or may not find suitable plants to survive.

Most insect pests of field crops overwinter in Michigan. The timing of their emergence in the spring depends on two things: which life stage they are in during the winter and the weather (mostly temperature and precipitation). In general, and all other things being equal, insects that spend the winter as eggs or young larvae take longer to emerge in the spring than those that spend the winter as mature larvae or pupae. And insects that spend the winter as adults can appear rather suddenly in response to warm air or soil temperatures. This is because insect growth and development is dependent on weather and, in particular, temperature. Insects are "cold blooded," which means their growth and physiological processes depend on the external temperature. Below a certain threshold (which varies from insect to insect, but ranges from about 38° to 50° F) all growth and metabolism stops.

An insect that overwinters as an egg, larva or a pupa must experience a certain amount of time at temperatures during which they can grow and develop. The term "degree day" is an expression of accumulated heat, which depends on the amount of time and the temperature above the lower threshold. This is used to estimate the relative amount of temperature-dependent growth that can occur in an insect.

For example, European corn borers overwinter as mature larvae. As temperatures increase in the spring, they undergo physiological changes to pupate and become adult moths. These processes occur at temperatures above 50° F. When the temperature dips below 50, these processes halt. The higher the temperature above 50 degrees, the faster these processes occur. So, the time it takes for a European corn borer larvae to turn into an adult moth depends both on how high the temperature is and the number of hours over 50° F. Degree-days measure both these things.

In most areas of Michigan, degree-day accumulations as of May 23 are almost half of what they were a year ago at the same time. Insects that normally emerge during this time will be delayed. European corn borer moths, for example, typically begin laying eggs around 450 to 500 degree days. In most of Michigan, this degree day accumulation will probably not occur until June.

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