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What Does This Warm Winter Mean for Insects?

Erin W. Hodgson
Iowa State University, ewh@iastate.edu

Laura C. H. Jesse
Iowa State University, ljesse@iastate.edu

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Abstract
Iowa has experienced a mild winter. In fact, Des Moines has yet to experience a temperature of zero degrees this winter. This is a record for the latest winter date. In addition to warmer temperatures, the total snowfall for our state has been low (Fig. 1) and below average compared to a normal year (Fig. 2). As a result, many are predicting dry planting conditions for 2012.

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Erin Hodgson, Department of Entomology and and Laura Jesse, Plant and Insect Diagnostic Clinic

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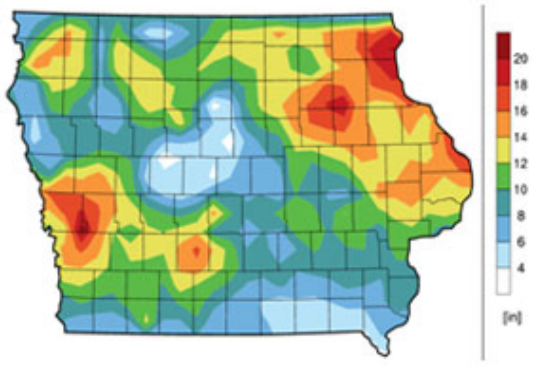

Figure 1. Estimated total snowfall for Iowa (Nov. 1, 2011 – Feb. 6, 2012). *Map generated by Daryl Harzmann, Iowa Environmental Mesonet.*

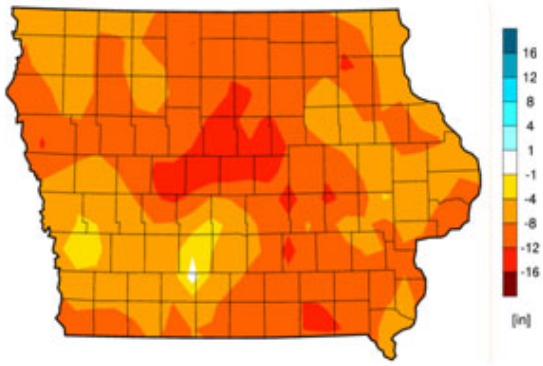

Figure 2. Estimated total snowfall departure from average for Iowa (Oct. 1, 2011 – Feb. 16, 2012). *Map generated by Daryl Harzmann, Iowa Environmental Mesonet.*

With that weather data in mind, how does a dry and mild winter affect overwintering insects? Some might think warmer temperatures would increase the chances of insect survival. Perhaps that is true. But there are many factors that influence successful overwintering and are worth strong

consideration. Some winter survivorship factors are highlighted here:

1. Insects that overwinter above ground (e.g., bean leaf beetle adults) may be more likely to survive with fewer cold days. But a lack of snow cover can expose insects to those days with below-freezing temperatures, and could increase mortality compared to year with insulating snow.
2. Insects that overwinter below ground (e.g., Japanese beetle grubs) will not likely be affected by a mild winter because soil temperatures are more constant. However, there could be more survivors than normal if the frost layer is shallow.
3. All insects develop based on temperature. A warm winter day could cause insects to become active (e.g., woolly bear caterpillars) when they normally would be dormant. Activity uses up stored fats they depend on to survive until the spring. Without access to food, these active insects could starve to death before food becomes available.
4. Most insects adapt to cold winters by slowly preparing in the fall and staying dormant until the spring. Therefore, large temperature swings can be detrimental to insects; the body can be injured or death can occur. We would expect some insect mortality due to cold intolerance when temperatures regularly fluctuate from 0-50 degrees.

Also, there are other factors to understand before we can predict how successful insects will be in the spring and summer. The same survival factors outlined above also apply to beneficial insects, like predators and parasitoids, and insect-killing pathogens. So ultimately it might not matter too much if more pests survive in a mild winter, because more beneficial insects will likely survive and help regulate spring populations. The uncertainty of insect survival in the winter can make predicting pest populations very difficult.

Lastly, there have been questions about how to calculate degree days with winter days that exceed the lower developmental temperatures (i.e., 50 degrees for most insects). In other words, should we include those warm days in estimating insect development? This is a difficult question to answer, given we do not have a lot of experience with predicting insect development with an especially warm winter. Our educated guess is to calculate accumulating degree days from Jan. 1, 2012. As we observe actual insect development this spring and summer, we will see if temperature models are accurate or need to be slightly modified.

Erin Hodgson is an assistant professor of entomology with extension and research responsibilities; contact at ewh@iastate.edu or phone 515-294-2847. Laura Jesse is an entomologist with the Iowa State University Extension Plant and Insect Diagnostic Clinic; contact at ljesse@iastate.edu or by phone 515-294-5374.