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Timing Corn Earworm Control

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The corn earworm is present in the Treasure Valley area of southwestern Idaho every year. Sporadic outbreaks occur: possibly 2 years in 6, insecticidal control would not be economic; another 2 of those 6 years, control would be economic in about half of the fields; for the remaining 2 years, insecticidal controls would be economic on almost every field. This means that, if the grower applies insecticidal controls every year, he wasted half of his application money over a 6-year period. If he doesn't apply controls, he sustains heavy losses at least 2 years in every 6.

Thus, the main questions for southwestern Idaho sweet corn growers each year are: Will earworms require control? If so, when? Growers, processors and fieldmen have had few guides to help them make accurate decisions. However, recent research at the University of Idaho Research and Extension Center, Parma, indicates we now have techniques which may be useful in predicting earworm infestations in the Treasure Valley. These predictions are related to the corn earworm's life cycle and are based on temperature, or **Growing Degree Days.**

Life History of Corn Earworm

Corn earworm usually has three generations per year in Idaho's Treasure Valley. The earworms overwinter as pupae, changing to adult moths by late spring. These moths lay eggs on a variety of host plants, but the resulting first generation caterpillars do little damage to corn because most corn is not yet in the silking stage. However, early corn may be infested 100 percent by this generation.

The first generation caterpillars become first generation moths by early July. These moths are attracted to silking corn and deposit eggs on the silks. The eggs are laid between the time the silk first appears and the time it turns brown. The eggs hatch in 2 to 5 days, producing the second generation caterpillars which infest corn from silking to maturity and do the most damage.

As summer progresses, a third generation of caterpillars develops. These may also be economically important, particularly in late processing corn fields and early seed fields. This generation overwinters as pupae.

Current Research

Recent research at the Parma Research and Extension Center indicates that levels of earworm population can be predicted from one generation to the next. For example, the damaging second generation populations can be predicted with fair accuracy by monitoring first generation earworm levels on very early corn test plantings. This early test corn must be transplanted so that the silks will be available by June 1. By July 1, second generation levels can be estimated. Preliminary research also indicates that the population in one year can be forecast from the previous years' population density and time of oviposition.

Once we predict a potentially damaging infestation, the question of control then becomes one of timing sprays to be most effective on the damaging second generation earworms in the field. In the past, most growers have started spraying fields as they silk beginning about the middle of July. This procedure is often unsatisfactory since the onset of damaging earworm population varies — by as much as 16 days in the five years 1971-1975. Timing spraying by the average calendar date for the second generation may result in an application 7 to 10 days early or late.

Much more precise timing can be achieved by using daily maximum and minimum temperatures to calculate growing degree days (GDD). A system based on GDD can estimate the beginning of the second generation within 3 or 4 days.

Calculating and Using Growing Degree Days

Development of the corn earworm is controlled mainly by temperature. Little development occurs under 55° F and development reaches a peak at 95° F. The earworm will not develop faster above 95° than it will at 95° F. Therefore, these temperature limits are used in the GDD calculation.

Growing degree days are calculated by adding the maximum and minimum temperatures for the day — but only those between 55° and 95° F. If the maximum is **55° or less,** forget that day. If the maximum is over 95° F, use only 95°.

If the minimum is below 55°F, use 55°. Add these figures each day, divide by 2, then subtract 55 from that. The answer is the number of GDDs accumulated that day.

Examples of Calculating Growing Degree Days (GDD)

Example #1: Maximum = 81°, minimum = 45°

$$\frac{81 + 55 \text{ (substitute 55 for 45)}}{2} = \frac{136}{2} = 68 - 55 = 13 \text{ GDD}$$

Example #2: Maximum = 97°, minimum = 50°

$$\frac{95 \text{ (substitute 95 for 97)} + 55 \text{ (substitute 55 for 50)}}{2} = \frac{150}{2} = 75 - 55 = 20 \text{ GDD}$$

Example #3: Maximum 100°, minimum 60°

$$\frac{95 \text{ (substitute 95 for 100)} + 60}{2} = \frac{155}{2} = 77.5 - 55 = 22.5 \text{ GDD}$$

Each day's GDD are calculated and accumulated from January 1.

Few, if any, earworm eggs are laid on silk of corn which silks between 1100 and 1300 accumulated growing degree days. Only the earliest fields will silk before 1100 GDD and these may be subject to moderate attack. Usually only those fields which silk after 1300 GDD will be subject to heavy attack. Therefore, the grower should use insecticides only on those fields which silk after 1300 GDD, and then only if warranted by corn earworm population trends for the year.

Daily maximum and minimum temperatures can be readily obtained from a maximum-minimum thermometer, usually available for about $14. It may be a very valuable investment. If the grower misses reading the thermometer for the day, or for two or three days, estimates of the GDD values can be made, especially if maximum-minimum temperatures are available for a recording station close by.

U.S. weather reporting stations in the southwest Idaho corn growing area from which maximum and minimum temperatures can be attained are:

7 N Boise	Emmett	Parma Exp. Sta.
Airport - Boise	Glenns Ferry	Payette
Bruneau	2 W Grandview	Swan Falls Power House
Caldwell	2 NNE Kuna	Weiser
Cambridge	Mountain Home	Malheur Exp. Sta.
Council	4 S Ola	Ontario
Deer Flat Dam		

In summary, the individual grower should:

1. About July 1, consult the County Extension Agricultural Agent for the latest earworm forecast.

2. With this forecast, and his own knowledge of earworm incidence on his place relative to other areas around him, decide whether to control.

3. If he decides to control the earworm, he should calculate the growing degree days, base 55° - 95°, for his area for proper timing.

4. Apply controls on all fields which silk after 1300 GDD have accumulated. If in doubt as to best control, the grower should consult his Extension Agricultural Agent.

Chemical Control

No chemical will control worms in the ears, so sprays must be timed to control the larvae on the silk before the worms enter the ears. Make the first application when the plants are 50% silk and repeat in 5 to 7 days or as necessary. For sweet corn seed silking during this period, follow the same schedule. For seed corn silking earlier, an application or two during the peak of the second generation egg-laying period (1450 to 1650 GDD) might be advisable in heavy earworm years.

Chemical recommendations are:

Insecticide	Rate	Days to harvest
Methomyl (Lannate or Nudrin)	.25 to .45 lb. actual per acre	0 Ears 3 Forage
Sevin	1 to 2 lb. actual per acre	0

Both Methomyl and Sevin are extremely toxic to bees that normally forage on corn pollen. If Methomyl is used, do not apply to tassels because the residue will kill bee colonies that forage upon the corn pollen.

WARNING

These recommendations are based on the best information currently available for each chemical listed. If they are followed carefully, residues should not exceed the tolerance established for any particular chemical. To avoid excessive residues follow label recommendations carefully with respect to dosage levels, number of applications and minimum interval between applications and harvest. The grower is responsible for residues on his crops as well as for problems caused by drift from his property to other properties or crops.

Brand names have been used for convenience only. No preference is intended or implied. Destroy container in accordance with label instructions. If label requires, restrict movement in and out of sprayed area.

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