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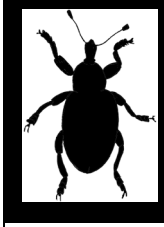

IPM For Alfalfa Weevil

By Philip Sutton and James VanKirk

Overview

Concept	Activity	Handouts
To know how to control alfalfa weevils, we need to understand their life cycles, the kind of damage they cause, and the potential for economic loss.	#1: Understanding Alfalfa Weevil Life Cycle and Damage	Copy of your state's alfalfa weevil ID guide A. *Alfalfa Weevil Life Cycle and Characteristics*
To determine which method of control is best, we need to compare the value of early harvest and pesticide sprays—and we must balance the crop demands of the season.	#2: Sampling and Management: Alfalfa Weevils	Your state's *Alfalfa Weevil Scouting Forms* B. *Management Options for Alfalfa Weevil*
Sampling and scouting information —properly recorded— forms the basis for sound decisions on weevil control for coming years.		

Resources

A Pest Management Program for Alfalfa in Pennsylvania

Growing Alfalfa the IPM Way (NYS #305)

Related Topics

Module 2: Principles of Scientific Sampling

Module 3: What Is a Threshold?

Module 4: Economic Implications of IPM

Module 12: Corn Seed Rates and Maturity Selection (discussion of Growing Degree Days)

Here s what you ll do:

Beforehand:

- set this up with a farmer who anticipates having problems with alfalfa weevils. Schedule the meeting for two or three weeks before anticipated first harvest—or, for crown counts, just after first cutting.

Today, on-site: discuss the kinds of weevil damage participants have now

- learn how to distinguish and identify alfalfa weevils;
- learn their life cycle;
- practice alfalfa weevil sampling technique;
- discuss what to do before sampling;
- scout a field for weevil presence;
- discuss management options.

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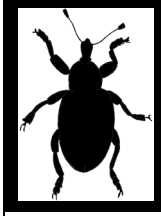

IPM for Alfalfa Weevil

ACTIVITY #1: Understanding Alfalfa Weevil Life Cycle and Damage

Setting	Time Required	Materials	Handouts
A farmer s field, two or three weeks prior to first cutting. Try to schedule 2 or more fields.	*30-45 minutes per field.*	*Clipboard, pencils.* *Optional: yard stick* *calculator* *10X hand lens* *sampling frames*	Copy of your state s Alfalfa Weevil ID Guide A. *Alfalfa Weevil Life Cycle and Characteristics*

Q:	Pose a series of questions:	A:
Did your dad or granddad have alfalfa weevils? How did they deal with them?	*Answers will vary* *Mini-lecture: Alfalfa weevils originally came from Europe. They were first noted in Utah in 1904, spread to the West Coast, and appeared in the east in 1951. At one time the weevil was perhaps the worst pest of alfalfa.*	
Didn't the USDA release a parasite that wiped out alfalfa weevils in the Northeast?	Several parasitic wasps, a handful of predators, and a couple fungal diseases have made a tremendous difference in the losses farmers suffer from the weevil. The USDA began releasing controls in the late 50s, and by the late 70s they had just about done their job.	
So why are we here?	These days up to 15% of fields in parts of the Northeast show alfalfa weevil damage each year. You aren't used to seeing the weevil as often… so it can catch you by surprise, and if it does, it can severely damage your crop.	
Hand out copy of your state s alfalfa weevil ID guide and discuss		
What do alfalfa weevils look like? What other insects could be confused with the alfalfa weevil?	*Take a look at the ID sheets.* If we're talking about adults… ♦ Clover root curculio is about 2/3 the size of the weevil—but it's not active this time of year. ♦ Clover leaf weevil is half again as big as the alfalfa weevil… it has a white racing stripe down its back. As for the larva … clover leaf weevil larva look similar—but they're much larger. This time of year, they are relative monsters when compared to alfalfa weevil larva at 1/4- to 1/2-inch long. *Refer to the ID sheets again whenyou start scouting.*	

Q:	***Continue Asking Questions***	***A:***
Pass out the Alfalfa Weevil Life Cycle and Characteristics *handout and discuss*		
At which stage in its life cycle is the weevil most harmful?	The larval stage.	
What do larvae feed on? And what do feeding signs look like?	Larvae feed on alfalfa leaves. They need a tight cluster for protection and food. At first, on the leaf tips of new growth, they chew tiny pinholes. This is called "tip feeding." See how holes are often aligned opposite each other, sort of like cut-outs in a chain of paper dolls? Weevils eat through the buds—and when the leaves unfurl, the feeding holes all line up. As they grow, the larvae move down the stem, feeding along the edges of fully expanded leaves. Heavy infestations of AW may consume all the foliage, leaving a field of bare stems. Unfortunately, weevil damage happens just as most farmers are busy planting corn. It is easy to ignore.	
What is the consequence of weevil damage?	Yield loss, of course, but protein content and digestibility also go way down. AND the plants lose both vigor and crown density, causing yield loss on the 2nd, 3rd, and 4th cuttings. Although the larva is normally a first-cutting pest, it may stick around long enough to badly damage regrowth on the second cutting.	
Can the adults cause damage?	Adults "bark feed" on stems or regrowth. They usually cause no concern because they leave the field. After feeding (outside the field) for a few weeks, they go into "summer hibernation" (aestivation).	
How can you tell if you've got a bad enough case to cause damage to your crop?	Sampling is the only way.	

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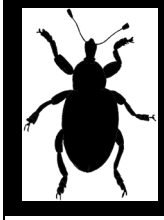
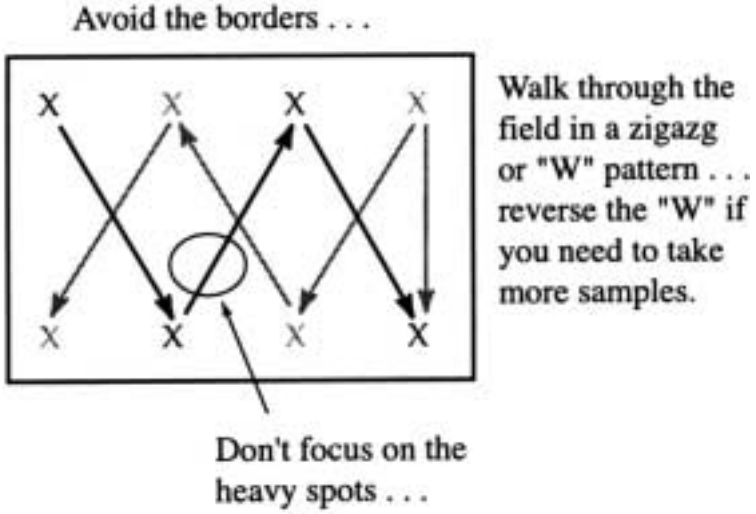


IPM for Alfalfa Weevil

ACTIVITY # 2: Sampling and Management for Alfalfa Weevils

Setting	Time Required	Materials	Handouts
A farmer s field, two or three weeks prior to first cutting. Try to schedule two or more fields.	*30-45 minutes per field.*	*Clipboard, pencils, a couple 2- to 3-gal. buckets (optional, depending on sampling method read on!)* *Optional: yard stick, calculator, 10X hand lens, sampling frames*	*Your state s* Alfalfa Weevil Scouting Forms *B.* Management Options for Alfalfa Weevil

Q:	Pose a series of questions:	A:
What's the best way to control alfalfa weevils?	Get an accurate estimate of the pests in the field, then determine whether or not they pose a threat. After that—decide what control to use. *Infestation levels will vary from field to field! Don t base management decisions for your whole farm on the results for one field.*	
When is the best time to begin sampling?	Shortly after alfalfa breaks dormancy in the spring. Pay attention to your fields; if you notice tip feeding, start monitoring right away and continue weekly.	
Distribute buckets, clipboards, pencils, and your state s scouting forms. Have growers fill out the top of the form. And now it s time to start sampling.		
What should we do to be certain that we are getting an unbiased sample from this field?		

Q:	Sampling, and more questions	A:
Why are these techniques important?		People tend to notice the worst infestations and sample more of them. These techniques help us "randomize" our sample.
Is there anything else we can do to avoid bias while we are picking stems?		Pick stems from the base to avoid height bias.
Why is this important?		Taller plants will likely show more damage, but plants are at many stages of growth. We need a representative sample of all the plants.
Anything else?		Yes. Look away while picking the stems! Even when we don't focus on the heavy spots, we're tempted to pick the most damaged stems.

As a group, move through the field.

Randomly pick an entire stem from 30 (PA) / 50 (NY) locations (follow your state s guidelines) as you zigzag through the field. (Divvy up those 30 or 50 stems among your group be sure everyone participates.)

Point out examples of tip feeding those little pinholes in the new growth.

NY: You won't be collecting or counting larvae, so don't worry if some tumble off. Examine just the top 3 inches of stem, looking for evidence of feeding. There should be some "complete" holes. Action threshold: 20 out of 50 stems—or 40% of collected stems—show tip feeding.

PA: Cup one hand carefully around the top of the stem before you pick so as to contain the larvae. Put the stem top first into the bucket.

Once you ve picked all your stems:

- *beat small bundles of three to four stems 10 or 15 times against the side of the bucket to dislodge the larvae;*
- *count the larvae and record on your field sheet;*
- *measure 10 stems, average the height, and record;*
- *using those same 10 stems, record what percentage has flower buds;*
- *estimate crop value ($/ton) AND the cost to spray an acre;*
- *use the table on the field sheet to decide if you are at the action threshold.*

WV, MD, DE, NJ: Pick into a bucket and use PA's field sheet, but the rule of thumb is: treat fields if 50% of stems show feeding damage before full-bud stage.

Do the weevils damage the regrowth?	In most years only fields that were at or near threshold at first cut will suffer damage on the regrowth.
How will we assess damage on regrowth?	The procedure is a little different…

When sampling on regrowth, use the opportunity to do a STAND (CROWN) COUNT.

How many plants do you have? Fewer but more vigorous crowns may give a higher yield than many crowns with few stems. Should you consider rotating or reseeding next year?

Following the usual zigzag pattern, etc., show participants how to throw the sampling frame. Count weevils and damaged stems

Hand out Management Options for Alfalfa Weevil *and discuss. Then have everyone fill out an evaluation form and remind them about the next class.*

A. *Alfalfa Weevil Life Cycle and Characteristics*

Handout for Activity 1

*Because weevils are cold-blooded, their entire life cycle depends on temperature. In a chilly spring, weevils won t emerge as early as they will in a mild spring and a prolonged warm spell might push them way ahead. So you can t predict exactly when they ll hatch, or pupate, or peak.**

Adults overwinter in woods and hedgerows.

(A few eggs may overwinter too. They hatch early in the spring and may cause growers and scouts to get excited about spraying, but the alfalfa usually outgrows their feeding.)

Adults move to alfalfa fields during warm spells in mid-March through May (depending on your geographic region) to lay eggs inside the stems of alfalfa or in leaf litter and stubble.

Eggs hatch roughly 7 to 14 days later.

Larvae develop through four stages between molts, called ***instars*.** Each instar is larger, eats more, and becomes a brighter green color than the previous one. Just 1/16 inch long when they hatch, weevil larvae grow to be 3/8 inch long.

Larvae begin to spin a fishnet cocoon about three weeks after hatching. *The cocoon is round and about 1/4 inch in diameter. It's found in leaf litter near alfalfa crowns, or attached to the base of the stems.*

Many pupae will be parasitized…. parasitized pupae look brown…. unparasitized pupae appear green.

Adults emerge roughly 10 days later. They are about 3/16 inch long.

***Mini-lecture:**

An insect s development and metabolism slows down or speeds up depending on the temperature (and hormones, but we won t get into that now.) When it s below 48¡F, most insects are practically immobilized. An egg, larva, or pupa held below 48¡F is unable to develop to the next stage in its life cycle.

The way to know when pests will reach their most damaging stage is to measure Growing Degree Days (GDDs). These are the total number of hours from day to day and week to week that the temperature is above baseline: for most insects, as we said, that s 48¡F.

Thus an insect might hatch at 300 GDDs, pupate at 700 GDDs, and lay eggs at 850 GDDs. This varies greatly, of course, from insect to insect. But whatever the amount is, once you get close to that number, you know your pest is going to do its next thing.

Some state agriculture programs keep track of GDDs and issue pest forecasts based on their calculations.

B. *Management Options for Alfalfa Weevil*

Handout for Activity 2

Considering your options	
What do you need to consider as you decide whether or how to manage weevils?	♦ The development of plants and the lateness of the season… larger plants may be outgrowing the weevil. ♦ The value of the crop… the higher the value, the less damage it can tolerate. ♦ The cost of the control… at higher control costs, pest losses can be higher (shy of damaging the crop) before a spray application is warranted.
What are the management options for alfalfa weevils on first cut hay?	You can bump up the harvest by a few days… or you can spray with an insecticide.
Choosing early harvest	
Why is early harvest preferred?	It grinds up the larvae. The survivors are exposed to predators, parasites, and sun. And harvest removes the food source of any remaining larvae, as well as the adults. Also… heavy spray equipment may damage the crop, especially if soils are very wet. Try to identify the problem while hay is still short.
But what if I haven't gotten my corn in yet?	In some years the potential value of a timely hay harvest may outweigh the loss of value on corn. And often what "early harvest" really means is you get the hay in on time, instead of late.
Choosing insecticide	
♦ Check harvest interval restrictions. ♦ Use current recommendations from your state's agriculture experiment station or Cooperative Extension Service. ♦ Choose the proper rate for alfalfa weevils, not other pests. ♦ Use the proper gallonage and nozzles for coverage. ♦ Be sure nozzles and granular distributors are up to snuff—otherwise you risk control failure. ♦ Apply with proper overlap. ♦ Leave unsprayed portions to help maintain beneficials for the next cutting or next year… you could leave them as check strips to evaluate results of spraying.	
How do I manage weevils on regrowth?	An insecticide is the only treatment at this stage. *But:* Consider that the weevils will soon pupate and *no longer* be a problem… if you're just at threshold but have an exceptionally vigorous stand, it may outgrow the pest. Control is required only if the pest population will significantly delay regrowth.
Good records are essential for planning.	
♦ Record your data! ♦ Maintain your data!	♦ Share your data! ♦ Know where to find it next year!

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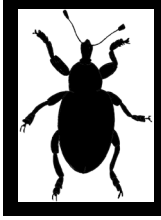

Module Feedback

IPM for Alfalfa Weevil

Tell us a little about yourself:

I m a	*My commodity area is:*
♦ Farmer _____	♦ Dairy and field crops _____
♦ Crop advisor _____	♦ Vegetables _____
♦ Industry rep _____	♦ Fruits and berries _____
♦ Extension educator ___	♦ Greenhouse and nursery stock _____
♦ Other _____	♦ Other _____

Let us know what you think:

What part of the workshop was most interesting for you?
What part of the workshop was most valuable to you?
What two new ideas would you like to try on your farm or in your business?
Do you feel you understand IPM—and how to use it—better now?
What other information should be included in this module?
What other topics would you like us to cover in future modules?

Teachers, please fill out an evaluation as well. Photocopy and send all informative evaluations to:

NE-IPM Modules, NYS IPM Program, Box 28 Kennedy Hall, Cornell University, Ithaca NY 14853