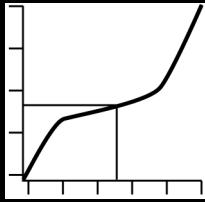


<http://www.nysaes.cornell.edu/ipmnet/sare.mod/>



What is a Threshold?

By James VanKirk

Overview

Concept	Activity	Handouts
The Economic Injury Level and the Action Threshold (<i>also known as the Economic Threshold</i>) are the cornerstones of IPM.	#1: Threshold and Injury Calculations—the Theory	A. <i>Data Sheet for Threshold Calculations</i>
To know <i>whether</i> it makes sense to manage a pest, we need to understand Economic Injury Level.	#2: Putting Economic Injury Levels and Action Thresholds to Use	A sampling card for any pest... you choose which one
To know <i>when</i> it makes sense to manage a pest, we need to understand Action Thresholds.		
Some costs and benefits of management actions are easily known. Others are harder to record. All should be considered in management decisions.		
Resources	Related Topics	
Cornell Field Crops and Soils Handbook, p.60 Penn State Field Crop IPM, pp. 22-36	Module 3: Principles of Scientific Sampling Module 5: Economic Implications of IPM	

Here's What You'll Do:

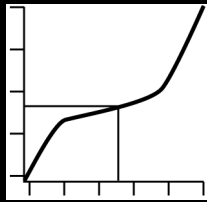
Beforehand:

- ◆ Go through the worksheets ahead of time. Ask participants to bring crop value and control cost data (for *Data Sheet for Threshold Calculation*) with them (be ready to supply figures if they forget). Be ready to explain the substitution of “Economic Threshold” (ET) for “Action Threshold” (AT) if this term is commonly used in your state.

Today, in class:

- ◆ learn what a threshold is;
- ◆ learn how to calculate maximum allowable loss for a crop, describe its relationship to Economic Injury Level, and discover how thresholds are arrived at for specific commodities;
- ◆ learn how action thresholds predict the need to control pests;
- ◆ learn how to make decisions using threshold charts;
- ◆ understand the factors that influence control decisions.

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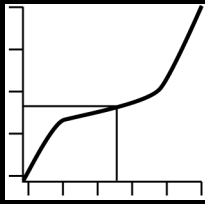
What Is a Threshold?

ACTIVITY #1: Threshold and Injury Calculations the Theory

Setting	Time Required	Materials	Handouts
<i>Inside, when field work isn't important.</i>	<i>15-20 minutes</i>	<i>Overhead projector, calculators, transparencies, scrap paper, clipboards as needed</i>	<i>A. Data Sheet for Threshold Calculations</i>

Q:	Pose a series of questions:	A:
<p><i>Announce that you will be learning about two of the cornerstones of IPM: Economic Injury Levels and Action Thresholds.</i></p> <p><i>Divide group into teams of up to four members. Hand out Data Sheet for Threshold Calculations.</i></p> <p><i>Ask the group to choose a crop, then have people supply the numbers to complete Section A: Estimate Crop Value.</i></p> <ul style="list-style-type: none"> ◆ <i>If you keep the numbers rounded, they're easier to multiply and divide.</i> ◆ <i>Fill in the overhead while groups fill in their data sheets.</i> <p><i>Ask for prices on control costs for primary crop pests. Have each person complete Section B: Estimate Control Costs.</i></p> <ul style="list-style-type: none"> ◆ <i>Numbers and percentages will vary according to the crop and pest or weed under consideration.</i> <p><i>What is your maximum allowable loss? Everyone complete Section C: Calculate Maximum Allowable Loss.</i></p>		
<i>If your projected loss is less than this percentage, should you use a control?</i>		<i>No. You are below the ECONOMIC INJURY LEVEL (EIL). You likely will spend more on controls than the value of the crop you preserve.</i>
<i>What if your projected loss is greater than this percentage?</i>		<i>You are above the ECONOMIC INJURY LEVEL. You need to act, and applying a control is a good investment.</i>
<p><i>Plot the Economic Injury Level using the Density/Damage Graph.</i></p>		
<i>What does the Economic Injury Level tell you?</i>		<i>Once pests reach the Economic Injury Level, your fields are in danger of suffering losses.</i>

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What Is a Threshold?

ACTIVITY #2: Putting Economic Injury Levels and Action Thresholds to Use

Setting	Time Required	Materials
A farmer's home table for working on, or clipboards if not.	10-15 minutes	A sample sampling card for any pest your choice; transparency or flip chart.; clipboards as needed

Q:	Pose a Series of Questions	A:
Can you predict if pests will surpass the EIL? How?	Researchers have developed an ACTION THRESHOLD (AT) for each pest.	
What do Action Thresholds tell you?	Action thresholds are <i>conservative estimates that reliably predict</i> whether or not you will reach the Economic Injury Level. You can manage the pest BEFORE your losses exceed your control costs... OR, if predicted losses won't exceed control costs, you can leave the bugs alone—and save.	
<i>Pass around your sample Sampling Card ask people what they would do with it.</i>		
What do researchers need to know in order to set action thresholds?	<ul style="list-style-type: none"> ◆ How long does it take the little guys (larvae) to become big guys (adult insects)—and how much damage will these little guys do? 	
What are some of the uncertainties that researchers have to factor in as they determine Action Thresholds for each crop and pest? (Give hints once participants get the first couple, they may come up with the rest.)	<ul style="list-style-type: none"> ◆ Do we really know the crop value at the time of control decisions? ◆ How is the relationship between pest density and crop damage affected by field conditions (moisture, temperature, fertility, crop stage)? ◆ Is the cost of control fixed? ◆ If the pest population is increasing when you sample, how can you ensure that it does not exceed the EIL before the next sample date or before you have a chance to take action? 	
How would any of these factors influence the Economic Injury Level?	<ul style="list-style-type: none"> ◆ Switching a more expensive (or cheaper!) control method. Ask for examples (Bt corn, resistance to common control, consequences of Food Quality Protection Act shakedowns). ◆ The control tactic used is only 75% effective. ◆ Many predators of the pest are found in the field. ◆ Markets shift and the crop price goes up (or down). 	

Mini-lecture: The EIL and AT for each pest originate in scientific field research involving hundreds of trials and replications spanning many years. Over and over, this research has proven the value of the economic injury level and the action threshold as conservative and trustworthy indicators of possible economic loss or gain.

Encourage participants to trust the work of the researchers.

Pest Management Options: Costs and Benefits

Pest Management Options	Costs	Benefits
Spraying for pests Cultivating for weeds ...etc. etc. etc....	<div style="border: 1px solid black; border-radius: 15px; padding: 10px; width: fit-content; margin: 0 auto;"> <p><i>Make a flip chart or transparency that looks sort of like this only with much longer columns</i></p> </div>	

What are other costs involved in pest control? What are some of the benefits? Examples:

What are the costs and benefits of spaying for pests?

- ◆ Costs: Soil compaction; health and environmental risks, spray equipment may damage crop
- ◆ Benefits: Save crop value

What are the costs and benefits of cultivating for weeds?

- ◆ Costs: Soil compaction; fuel consumption
- ◆ Benefits: Save crop value; avoid costs of sprays

What are the costs and benefits of early forage harvest to control for example alfalfa weevil)?

(Ask for examples for other crops)

- ◆ Costs: May delay corn planting
- ◆ Benefits: Controls alfalfa weevil; forage is at optimal feeding value; spray equipment won't flatten crop; save on chemical/application costs; avoid health and environmental risks

What are the costs and benefits of parasite release, early harvest, or other non-chemical controls?

- ◆ Cost: Parasite and release procedure
- ◆ Benefits: Save crop value, avoid costs of sprays. *Besides the obvious:* Low infestations of pests may stimulate crops to "outgrow" the pests, often increasing yields. And low infestations provide a reservoir of parasites and diseases to prey on future generations of pests.

Other costs? Benefits?

- ◆ Costs: Drift to neighboring properties may lead to complaints or litigation (give other examples)
- ◆ Benefits: Aesthetics, economies of scale, neighborly relations, advertising value

Ask everyone to fill out an evaluation form before they go and remind them about the next class.

A. Data Sheet for Threshold Calculations

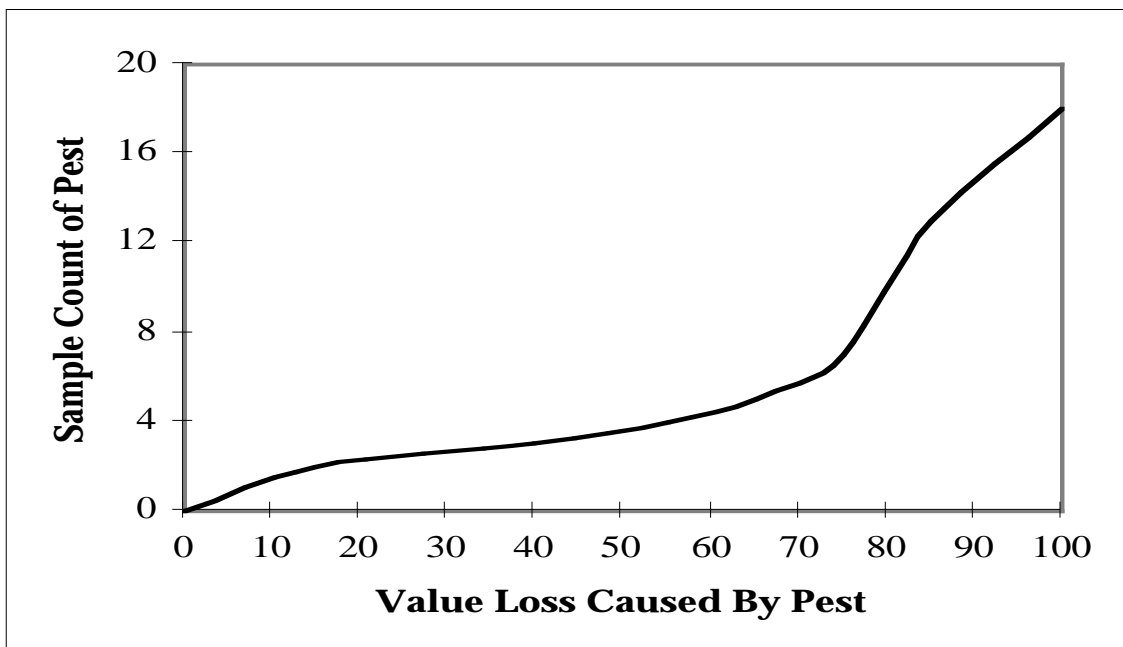
Worksheet for Activity 1

Calculating an Action Threshold

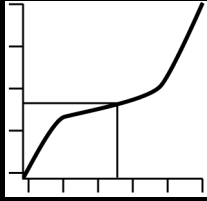
A: Estimate Crop Value	B: Estimate Control Costs	C: Calculate Maximum Allowable Loss
<p>\$ per bushel _____</p> <p style="padding-left: 40px;">x</p> <p>bushel per acre _____</p> <p style="padding-left: 40px;">=</p> <p>crop value \$ _____ /acre</p>	<p>primary costs</p> <p>e.g. pesticide @ _____ lb./a.</p> <p style="padding-left: 40px;">x price \$ _____ / lb.</p> <p style="padding-left: 40px;">= cost \$ _____ / a.</p> <p>+ secondary costs</p> <p>e.g. application costs</p> <p style="padding-left: 40px;">\$ _____ / a .</p> <p>= total control cost \$ _____ / a .</p>	<p>control cost \$ _____ / a.</p> <p>crop value \$ _____ / a.</p> <p style="padding-left: 40px;">=</p> <p style="padding-left: 40px;">_____ % loss</p>

Density/Damage Graph

Find the maximum allowable loss on the horizontal axis (Percentage Value Loss Caused by Pest). Draw a vertical line up to the plotted line. Then draw a horizontal line from that point to the vertical axis (Sample Count of Pest).



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Module Feedback

What Is a Threshold?

Adapt the questions as needed.

Tell us a little about yourself:

<p><i>I m a</i></p> <ul style="list-style-type: none"> ◆ Farmer _____ ◆ Crop advisor _____ ◆ Industry rep _____ ◆ Extension educator _____ ◆ Other _____ 	<p><i>My commodity area is:</i></p> <ul style="list-style-type: none"> ◆ Dairy and field crops _____ ◆ Vegetables _____ ◆ Fruits and berries _____ ◆ Greenhouse and nursery stock _____ ◆ Other _____
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Let us know what you think:

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

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