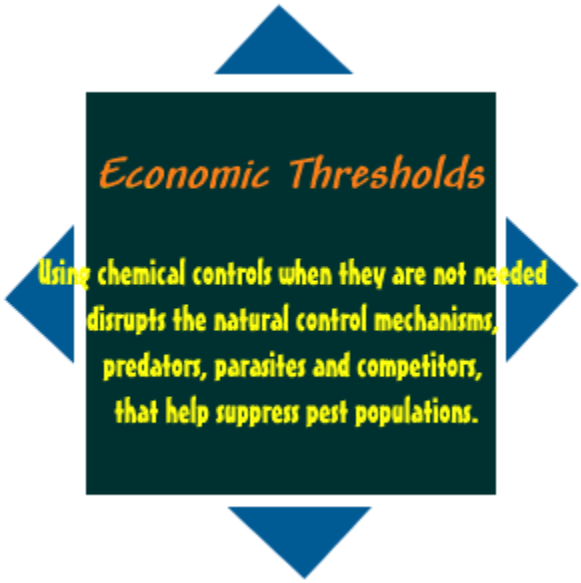
Who Needs Economic Thresholds?

What is an Economic Threshold (Action Threshold)?

In 1959 entomologists came up with definitions for concepts that had been used in pest control for many years. They defined **economic damage** as the amount of injury which will justify the cost of artificial control measures; the **economic injury level** as the lowest population density that will cause economic damage and the **economic threshold** as the density at which control measures should be initiated to prevent an increasing pest population from reaching the economic injury level.



This unique combination of pest biology and economics theoretically gave growers the tool they needed to time pesticide applications to produce the greatest possible profits. Until the advent of the Economic Threshold (ET), sprays were applied in a preventive manner, usually on a calendar basis. For example, today is Monday, so I would spray the beans and tomatoes. The ET allows a grower to time sprays with the build-up of pest populations for more effective pest control. It avoids applying unnecessary sprays, which are not cost effective, at low pest population levels. In some integrated pest management programs, when no alternatives to chemical pest control are available, growers can reduce their pesticide applications by 17-75% by using ETs and still maintain or increase the quality of their produce.

Examples of Some ETs Used In Fruit and VegetableProduction

Some ETs are based on information gained by monitoring a pest population with traps to see when the pest arrives in the state or on your farm. Sometimes the traps simulate the appearance of the fruit we are trying to protect. An example is the use of a sticky, redwood or plastic sphere to simulate a ripe apple and attract the apple maggot fly (AMF). The ET recommends that spraying start when the first AMF is caught on the fake apple, and end when you cease catching the adult flies. Sprays are saved on both ends of the season by knowing when the pest population comes and goes.

Other ETs are based on scouting the commodity directly and quantifying the amount of injury or the number of pests observed in a given field. We recommend waiting to spray sweet corn until 25-30% of the whorl-stage corn plants are infested with live European corn borer larvae. Research has shown that spraying before this ET is reached does not increase control.

Still other ETs are based on indirect methods of assessing if economic damage will occur. In potato late blight management, some states use on-site microcomputers to record temperature,

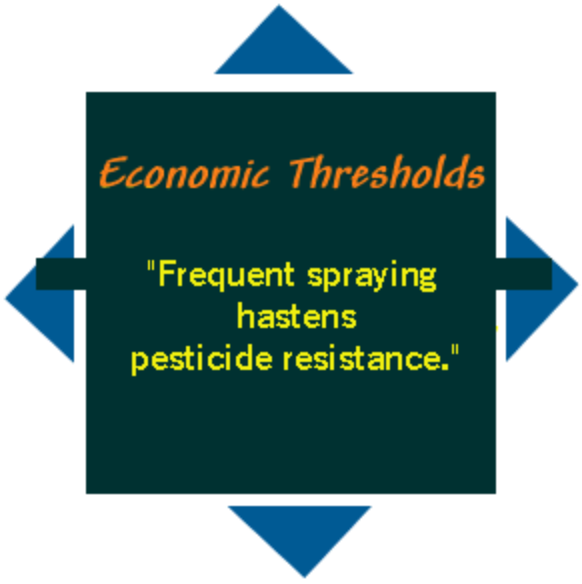
rainfall and relative humidity and give spray alert or no spray recommendations. Conditions that favor late blight spore development include cool temperatures (55-76°F) accompanied by rain, fog, dew or a relative humidity above 90%. If such conditions exist for a specific period of time, the computer will recommend sprays be applied at certain intervals to prevent infection (when spores penetrate the surface of the plant and continue to grow) which occur at slightly warmer temperatures. This eliminates unnecessary sprays when weather conditions are not favorable for disease development and spread.

Some Disadvantages With Applying More Sprays Than Are Needed

First, there are the direct costs associated with extra applications that come directly out of your profits:
the price of the chemical, the labor and the extra machine hours. There are also the opportunity costs associated
with your valuable time (i.e., what you could have been doing instead of wasting time applying a spray that wasn't needed).

In addition, there are costs which are harder to measure but potentially much more expensive. Using chemical controls when they are not needed disrupts the natural control mechanisms, predators, parasites and competitors, that help suppress pest populations. That first spray may make it necessary to apply others because the pest populations often recover much faster than their natural enemies. The use of ETs often delays that first application until closer to harvest, thus avoiding this and other unfortunate scenarios.

By continually removing natural enemies from the crop, you can unwittingly protect other potentially damaging organisms from their natural controls and create a new pest. An example of this type of secondary pest is the European red mite (ERM) in apple orchards. Sprays aimed at other pests remove the ladybugs and predator mites that normally feed on the ERM. A population explosion occurs for this species, creating a new pest that is harder to control than the old ones. Additional expensive sprays are then needed to try to control this highly-resistant Frankenstein.



Frequent spraying hastens pesticide resistance. Continual exposure to a chemical causes the pests on your farm to naturally select (or is it artifically select?) for genes that allow them to detoxify the pesticides. As the pest becomes resistant, more sprays are used and additional costs are incurred in an attempt to maintain control. Many pests are now resistant to every pesticide labeled for use on them. By using chemical controls sparingly and alternating between different families of chemicals, carbamates, pyrethrins, etc., we can prolong the useful life of these valuable tools. Using ETs can

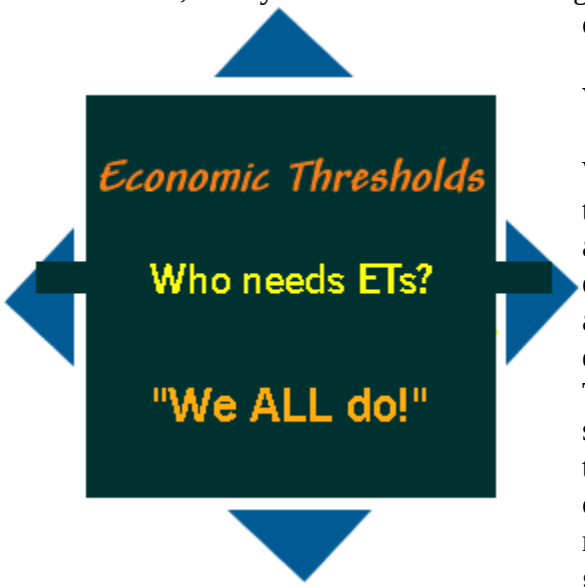
help.

Another cost of pesticide usage is the potential health threat. Spraying is usually the least favorite job on the farm, partly because the applier is often exposed to pesticides during mixing, spraying and cleaning operations. The less sprays applied, the less possibility for exposure to occur. Why spray any more than you have to?

More pesticide applications also increase the risk of environmental contamination in and around the farm. Repeated misuse and overuse of chemicals has produced ill effects on others beyond the boundary of the farm. Now everyone has a stake in designing pest control strategies. Environmentalists and homeowners force pesticide restrictions, legislators may soon require that you notify the public before each spray, and large retailers--afraid of crop residues--restrict what they will allow you to spray. Think about that potential expense to your future farming efforts.

Why Aren't There ETs Available for Every Pest?

According to scientists, ETs are notoriously difficult to determine. At first glance, an ET would appear to
be a straightforward, cost-benefit relationship involving control costs and market values. However, if you consider the influence of multiple pests on a crop , injury per individual pest, crop response to injury at various stages of development, varying climactic conditions, nutritional stresses, varietal differences, the purpose for which the crop is grown and fluctuating market values, then you can see how ETs might be slow in development and constantly changing.



Who Needs ETs?

We all do! ETs are the most effective method of timing pesticide applications. There are ETs available that work quite well in maximizing the effectiveness and minimizing the number of spray applications for many pests. Some are still under development and many more need to be developed. They are all under-utilized. In fact, sometimes ETs seem to be the best kept secret in farming. Maybe this is because they tend to vary from state to state, causing them to be excluded from regional spray recommendation guides. ETs certainly represent a giant step forward in timing pesticide applications when compared to calendar or preventive spray schedules. It is time for ETs to replace them.

Written by: Jude Boucher, University of Connecticut Vegetable IPM Coordinator
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This information was developed for conditions in the Northeast. Use in other geographical areas may be inappropriate.