# Once We Kill All Of The Bad Bugs, Then What?

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I frequently hear people say, "Once I take care of the problems, it'll be easy from then on." I have even uttered it. Quite simply, it makes sense that if you remove the problem, there will be no further problems.

When growing a crop, if all of the insect pests were removed, the farmer would simply never have to consider insects when making decisions about what to plant, when to plant, monitoring the crop for the presence of insect pests, applying pesticides when that pest threatens the crop, etc. etc. Problem is, insects and other pests are living organisms and, when it comes to life, there is never anything simple.

I frequently use clichés; the one that fits here is that "nature abhors a vacuum." So, what is meant by this phrase? In living systems, it means that once one organism that is filling an ecological niche is removed, this niche will soon be filled by something, often in a new, unforeseen way.

Let's examine a situation where this has occurred. In cotton production, the boll weevil was a major problem until the mid- to late 1980s. Often, 16 or more pesticide applications were required per season to keep boll weevils at bay.

The boll weevil eradication program was successful at eradicating boll weevils from much of the U.S. This program started in North Carolina and Virginia in 1978. Successful efforts there were then expanded to other states. The eradication effort was successful because of the weevil's biology and by using a three-prong attack of pheromone traps to detect the beetle, cultural shifts to reduce the weevil's food supply and pesticide applications timed to provide maximum control.

This approach drastically reduced the number of pesticide applications that were made to cotton fields. Genetic engineering brought Bt cotton during the 1990s and further reduced the need for insecticides since the Bacillus thuringiensis could control Lepidopteran pests like tobacco budworm and corn earworm.

Stink bugs were never considered a problem in the past; however, they are now a major problem. Stink bugs damage maturing bolls by sucking plant juices and feeding on developing seeds within the bolls. While doing this, they inject digestive enzymes and contaminate the boll with other organisms that result in rotted bolls and poor seed development.

Stink bugs were present for many years before the niche occupied by the boll weevil was opened by the concerted eradication effort. Stink bugs simply filled that empty niche. This principle can be applied to virtually any system though. Once a niche becomes vacant, it may be unfilled for a while, but be assured that something will fill that niche.

A similar situation that involved emptying a niche resulted in releasing a different pest, the Japanese beetle. Only recently has it become a pest in soybean fields in the Midwest. Through the use of Bt corn introduced in the late 1990s, the niche occupied by corn rootworm was opened up. However, that niche has yet to be filled. What has happened is that Bt corn greatly reduced the need to apply pesticides to the soil to control corn rootworm and similar ground dwelling pests of corn.

Those soil-applied pesticides were not only controlling the known pests, but they were also helping prevent Japanese beetles from spreading into the rural areas of the Midwest from urban areas where they had been present since the early 1930s. Now, Japanese beetles are widespread and causing damage to many crops.

The moral of these tales is that we may win on the short-term against life, but living organisms put under selective pressure will find a way to overcome that pressure and refill all of the available niches. Δ

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