

Good, Bad, and Indifferent: Insects that help, hinder, and are just there

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When we think of insects, we often focus on their destructive potential. And, while insects can be a serious detriment to agriculture and potato production, an understanding of basic insect biology allows one to take advantage of the benefits that they provide as well as developing more efficient management schemes. Of the many species of insects found in the Pacific Northwest, few have the potential to cause damage while many are beneficial. Actually, most insects have little direct effect on agriculture and humans in general but are very important to the overall environment.

Why is it that some insects become serious pests? Again, we must look to their biologies. Populations of all plants and animals are naturally regulated by factors such as weather, diseases, and parasites and predators. In the natural world, most insect populations revolve around a certain level that is called the Carrying Capacity. In nature, some insects are rare while others are common and these levels depend on environmental regulating mechanisms. Agriculture creates very unnatural situations and some insects are excellent at taking advantage of these situations – these are the insects that become pests and can be extremely damaging. The fact that most insects reproduce very rapidly, have very short life-cycles (egg to adult period may be a week or less for insects such as aphids), and are able to take advantage of environmental changes and build their populations quickly allows them to become “pests” in certain situations such as agricultural monocultures. Because of the nature of manipulation, many regulating factors are removed or disturbed in agricultural monocultures so that they do not have a significant impact. The question becomes can we take these unnatural agricultural situations and make them more like natural environments where environmental and biological factors can help manage pest populations. We do this through a process called Integrated Pest Management (IPM). IPM has become the standard by which we manage pest insects. IPM requires an in-depth knowledge of the environment, the pests, and the beneficial aspects that are available to us. Integrated Pest Management is a process by which as many methods as appropriate and efficient are used to manage pest populations

Most individuals practice IPM even if they do not recognize it. Crop rotation, healthy crops, proper watering and fertilization, field cleanliness, and timing of planting and management techniques are all components of IPM. Another component is the use of beneficial insects and arthropods to manage pest species. This is the principle of biological control.

Virtually every insect has at least one other insect that feeds upon it. In nature, this predation or sometimes parasitism is a primary regulating method. It is important to manage the agricultural environment to make it as favorable for predators and parasites as possible while still maximizing crop production. We can sometimes do this by habitat preservation (for predators and parasites), the introduction of predators and parasites, the judicious use of selected insecticides, and so on. This is not always easy and it does require a more thorough knowledge of the system but it can have very positive outcomes.

There are several categories of insects that are beneficial as to their feeding on pest insects. These include primarily predators and parasites/parasitoids. Predators are usually larger than their host, feed on many hosts during their lives and kill the host. Some predators are generalists in that they feed on just about anything that they can subdue while others are relatively specific on the type of prey that they attack. As adults and immatures, ladybird beetles feed on a variety of small, soft-bodied insects such as aphids and scales. Usually the larger the predator, the larger the host it can attack. Predatory stink bugs, big-eyed bugs, and damsel bugs will feed on just about anything that they can subdue. This would include the smaller pests but also Colorado potato beetle larvae. Spiders are very generalist predators. All of these insects, and others, can have a positive effect on limiting pest insect populations and we should try to preserve and encourage them.

A second group of beneficial insects are parasites or more specifically called parasitoids. A parasitoid is an insect that usually lays an egg or several eggs into a host, the egg hatches and the parasitoid immature devours the host, eventually killing it. Parasitoids include many small wasps and some flies that lay their eggs onto or into caterpillars. Parasitoids are often very host specific and a certain species of parasitoid wasp will attack only one species of host or a very limited number of related hosts. This can be very beneficial when one is dealing with one or two primary pests.

An IPM program can be very complicated or relatively simple depending on the commodity and the pest species complex. A good program can help one save money and provide a more environmentally friendly management scheme. Today, this latter attribute can be very important.

If you are looking for help, there are a number of resources. Many individuals working in private industry and for governmental agencies including the USDA and WSU can provide information and help. My training is in taxonomy and insect biology and I can provide identifications and information as well as help analyze specific situations. Remember, even small changes can have significant benefits.