CROP PESTS AND PARASITES MANAGEMENT

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Introduction

In agriculture, the presence, even a sustained one, of beneficial organisms is not always sufficient to properly neutralize pests. Not to mention parasites, which are mostly fungi that make plants sick. Against them, beneficial organisms can do nothing. At least not directly, though it's true they sometimes act indirectly. An example: animals that consume rotten fruit fallen on the ground or remaining on the tree help reduce the stock of fungal spores causing, for instance, scab or moniliosis. They thus reduce the risk of these diseases appearing the following spring.

Therefore, intervention is necessary to find the most effective and least damaging means to complement field protection.

Chemical treatments should be avoided, and other avenues, which fortunately exist, should be explored. However, they require motivation, careful observation, rigor, and a minimum of knowledge!

An Increasing Sensitivity of Crops

Since the mid-20th century, crop protection interventions have multiplied considerably. This inflation is due to the emergence of new treatment techniques but also, to a large extent, to an increase in the impact of damaging agents.

Several causes combine their effects to explain the phenomenon:

- Crops have expanded onto lands and into climatic zones not always well-suited to them. For example, wheat cultivation has extended to cold and humid soils that favor diseases like foot rot;
- Varietal selection has favored plants' ability to utilize high mineral nitrogen fertilizers and thus yield, at the expense of resistance;
- Monoculture, or at least excessive simplification of crop rotations,

favors parasitism and the proliferation of pest insects;

- The direct or indirect destruction of beneficial organisms and their shelters (deforestation, pollution, etc.) leads to the same result;
- The same goes for often excessive, unbalanced, too-soluble fertilizers (i.e., in forms absorbed too quickly by plants);
- Meanwhile, international trade amplifies the dissemination of pathogenic fungi, pest insects, viruses, etc.

The Potential Role of "Useful" Pests and Parasites

The viewpoint that crop pests and parasites have a positive impact by eliminating weakened and thus unproductive plants is sometimes put forward. It somewhat echoes the idea of natural selection that allows for the maximum flourishing of life.

It is not without foundation.
However, if we use the analogy of grafting, we must admit that agriculture is not a completely natural activity, even when it strives to be.

In nature, the productivity criterion is usually a strength against parasites and pests.

In agriculture, this criterion sometimes becomes a weakness if it is achieved too artificially, among other things through selection heavily oriented towards quantity.

Furthermore, crops are usually less well adapted to the environment than the spontaneous vegetation they replace.

Adopt Good Cultural Practices

Crop allocation, crop rotation, plant associations, soil tillage, fertilization, preservation of the natural environment, choosing crops suited to the environment, and the necessity of using good quality seeds and seedlings constitute good cultural practices. Through these, the cultivated plant is placed in the best conditions to resist parasites and pests.

Take Specific Precautions

Simple operations contribute to protecting crops, particularly against parasites:

- "Gentle" drainage eliminates excess water that favors pathogenic fungi;
- Dead leaves accumulating under fruit trees in winter sometimes harbor parasites such as scab. Collecting them, when possible, to compost or even burn them in the most severe situations, reduces the risk of future infestation;
- Collecting and destroying damaged fruit is also a wise precaution. Whether fallen on the ground or remaining attached and dried on the trees, they indeed constitute sources of future infestation by parasitic fungi.
- Removing diseased parts or entire heavily affected individuals limits the risk of contamination between individuals, for example, in the case of tree cankers;
- Subsurface or drip irrigation avoids contact of infected water with the vegetative organs of plants;
- Generally, overly dense sowing and planting favor diseases like mildew due to lack of aeration and light. The effect is often the same when they are too early, whether in autumn (due to excessive vegetation before the bad season) or in late winter (due to a too-slow start caused by cold);
- A judicious application of lime amendment sometimes reduces a cabbage disease called clubroot;

Insects and Other Small Collaborators of the Farmer

The best way to facilitate the work of beneficial organisms is to provide them with a suitable living environment and let them work in peace.

The army of beneficial organisms includes mammals, birds, amphibians, snakes... It also includes insects, spiders, and some other small animals. These "collaborators" are small in size but great in effectiveness.

Insects

Insects constitute an immense class grouping a prodigious number of species.

Some are adversaries of the farmer. They attack cultivated plants and the resulting harvests, in the fields or in storage places.

But others are valuable allies. The most well-known are **ladybugs** which destroy aphids.

The elegant **lacewings**, whose larvae eat a large quantity of aphids, sometimes overwinter in buildings, for example under the woodwork of rarely opened windows.

Gall midge larvae also consume aphids.

Various species of **parasitic wasps** behave in a surprising way. Thanks to a kind of long pointed tube called an ovipositor, they lay their eggs in the bodies of certain aphids and caterpillars. The larva develops inside the host's body, which, obviously, dies. The rapid succession of generations makes these wasps particularly effective. They overwinter as larvae within their hosts.

In orchards, these overwintering forms on branches tend to be killed by possible winter treatments, which are therefore better avoided from this perspective.

Hoverflies, represented by several species, are a kind of wasp with silent, fast, and precise flight. They lay their eggs within aphid colonies, and their larvae devour them. Apiaceae plants (carrots, parsley, fennel, etc.) are said to favor their presence.

Certain species of **bugs** living on trees feed on caterpillars, aphids, and various insects. Others consume harmful mites.

Ichneumon wasps resemble large mosquitoes and parasitize many caterpillars. *Aparteles glomeratus* parasitizes in particular the caterpillars of the cabbage white butterfly, a very common and well-known pest of cabbage crops. Tachinid flies also destroy many caterpillars.

The **praying mantis**, for its part, is a first-rate carnivore that destroys many insects troublesome for agriculture. **Dragonflies** are very effective, as is the glowworm.

Various species of wood ants consume all sorts of pest insects.

Spiders

Various species of spiders destroy many insects that they trap in their webs. They are very useful.

Mites and Microorganisms

Several species of predatory mites consume harmful mites. Let's not forget microorganisms that attack pests. Thus, certain tiny fungi parasitize and annihilate aphids when conditions are favorable for them.

Bacteria and **viruses** exert the same effect on certain caterpillars, etc.

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