

Insects: friend and foe

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WITH ABOUT one million described species, insects are the most diverse group of organisms living on our planet: they make up more than half of all species known today. As pollinators, insects play an essential role in plant reproduction and dispersal. In return, plants are an important source of food for insects. They are on the menu for about half of the one million insect species described. Remarkably, only about five thousand of these, i.e. half a percent of all insect species, are regarded as serious pests for humans. Yet despite the intensive use of pesticides, insect pests are responsible for destroying almost one fifth of the world's crop production. In nature, on the other hand, pests are the exception. How is that possible?

The Colorado potato beetle *Leptinotarsa decemlineata* is particularly fond of the leaves and flowers of plants in the nightshade family, such as potato and tomato.



SOS signal

In nature, plants are very good at defending themselves against insects that prey on them. The first line of defence for plants is a *direct* one. This is the do-it-yourself method of physical defence with thorns, hairs or thick, leathery leaves which insects find difficult to penetrate with their mouthparts, or chemical defence, for example with toxic repellents. These include the bitter taste of Brussels sprouts and mustard: what you are tasting are the defence substances – glucosinolates – that plants in the cabbage family such as Brussels sprouts, cauliflower, kale and mustard plants produce to defend themselves against insects.

Plants also defend themselves *indirectly* by attracting the natural enemies of herbivorous insects. After all, your enemy's enemy is your friend! When plants are bitten into, they produce aromatic compounds which parasitic wasps, predatory mites and other natural predators use to locate their prey. These volatile substances form a kind of SOS signal which the plant emits to summon natural reinforcements.

Plants can't move away to escape hungry herbivores, but they have many ingenious defence tactics. Even within one plant species, some varieties are more proficient at deploying these defence options than others. If we bear this in mind, we can select varieties with good defence strategies for food production and thereby reduce the use of pesticides.