

Biological control of weeds via their own aromas

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Plant experts in the Netherlands can still become enthusiastic about a special variety of broomrape. Farmers in southern countries, however, are less impressed because broomrape and its 'sister' striga are considered a harmful weed in these regions. Research in the Laboratory of Plant Physiology of Wageningen University shows how useful insects that can control this weed may lend a helping hand in the future, namely

via the plant's own aromatic substances. "You can also use a mixture of aromatic substances to distinguish various varieties of parasitic plants," says Harro Bouwmeester, professor in plant physiology.

Several varieties of broomrape and striga are [parasitic plants](#), requiring the root system of other plants to survive. As broomrape reaches its northern distribution limit in the Netherlands it is less common and causes fewer problems for farmers. In Southern Europe, the Middle East and Africa, however, the opposite is the case. There the parasitic plants can become a very harmful weed in crops such as tomatoes, sunflowers, maize and sorghum.

Complex aroma

In Israel tomato farmers are combating the broomrape with herbicides, for instance, but the plants themselves may offer a biological alternative. Each variety of broomrape emits a complex of over 100 types of volatile aromatic substances. Some of these aromatic signals are picked up by insects that are harmful to the plant as they lay their eggs in the ovaries, after which the larvae eat the young seeds. "If we can identify those specific aromatic substances, we would be able to lure the insects to the plants with extra aromas and deploy them as a potential biological control method," Harro Bouwmeester explains.

Taxonomy

While searching for useable aromatic substances, Peter Tóth, post doc in Bouwmeester's group, discovered another practical application of the aromatic substances from broomrape: they can help identify one variety from another. In taxonomy (the science involving the description and classification of plants) there is still uncertainty about the description and classification of the various broomrape varieties: which genus do

they belong to? By looking at the composition of the aromatic mix, Tóth and his colleagues were able to classify a number of these 'disputed varieties' in the proper taxonomic genus. Their findings were described in the magazine *Frontiers in Plant Science* this month.

Parasite or not?

"In addition, we found a difference between the aromas of parasitic and non-parasitic broomrape varieties," Bouwmeester continues. "This may teach us something about how these varieties evolved into weeds. Some varieties that have yet to become harmful have an aromatic composition resembling that of the harmful varieties. We believe this means that these [varieties](#), too, will eventually become weeds."

Sustainable development

In time Bouwmeester hopes that the research into the aromatic substances of broomrape will lead to biological control of the weed. "For farmers in Southern Europe it could mean an alternative to the herbicides they use now. For farmers in Africa, who often cannot afford herbicides at all, this could be a sustainable alternative to labour-intensive weed control. They now try to remove the weeds by hand, with large parts of the harvests being lost as a result."

Provided by Wageningen University

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