

Safeners help crop plants to tolerate herbicides

# Soft on the crop, hard on the weed

"The active substance is the key to the activity of a crop protection product" – at least that's the received wisdom. But in fact, this is only half the story. A product does what it should only because the active substance has been combined with special co-formulants. Here, we take a look at safeners, substances that underlie the selectivity of certain crop protection agents.

A glance at the label instructions immediately shows that crop protection products comprise more than just the active substance. Depending on the product, the formulation is made up of a mixture of stickers, wetting agents, thinners and solvents along with emulsifiers, anti-foaming agents, colourants, odourants and tasting agents. But there is another important group of co-formulants missing from this list: "Safeners have become particularly valuable

tools. They ensure that many active substances can be tolerated by crop plants – and that they only damage the target weeds", says Dr. Chris Rosinger, Head of Bayer CropScience's Safener Technology Research Group. He explains the principle as follows: "Safeners stimulate the production of metabolizing enzymes in the crop plants we want to protect, so that the active substance is rapidly degraded into inactive substances." This sounds simple – but in practice, it's extremely complex. Many of the mechanisms are not yet fully understood. But this doesn't mean that safener research is like looking for a needle in a haystack. Rosinger and his team work

in a very targeted way: in fact, this is why their research has been so successful. The individual steps that have to be taken in order to achieve official registration of a safener are comparable to those necessary for the development of an active substance. Promising substances undergo extensive screening. They first leave the laboratory for the glasshouse, and only later do they reach the field. Screening leads to the

*Modern techniques allow hundreds of thousands of test substances a year to be tested for their safening potential for various herbicides on the most important crops.*





*Field trials:  
Dr. Chris Rosinger,  
who works for Bayer  
CropScience at  
Frankfurt-am-Main,  
tests new safeners  
in cereal stands.*

exclusion of unsuitable substances, for example those that fail to protect the crop plant sufficiently, or those that also promote herbicide metabolism in the target weeds. “We can be working with a large group of substances over a period of years, and with a bit of luck, a suitable safener will be left at the end”, comments Rosinger.

The researchers can be proud of their track-record: mefenpyr-diethyl ensures crop compatibility in Atlantis®, Husar® and Hoestar® Super, whereas isoxadifen-ethyl does the same for Laudis® and Maister®. Another iron in the fire is cyprosulfamide, which is already present in the maize herbicide Adengo®. Bayer CropScience is thus benefiting from its long experience in developing safeners, and continues to consolidate its leading position in this area. But Chris Rosinger wouldn't be a card-carrying researcher if he were not permanently on the lookout for further innovations. In order to increase the pay-back on their research, he and his team of botanists, biochemists and chemists are looking for a true

all-rounder: a safener capable of protecting various crop plant species, and if possible, suited to use in combination with a wide range of active substances. “At the moment, we are testing new groups of substances that we expect to deliver innovative products in the medium term.” If the new safeners could be used not only through application to the soil or to the canopy, but also in seed-treatments, then their usefulness would increase even further.

Because safeners render active substances compatible to the crop, they allow farmers some promising options. Active substances that would otherwise be too aggressive to the crop can now be “tamed” and used as crop protection agents. The result is an increase in the number of highly-active substances that are available. “This is extremely important, particularly if you consider resistance management”, stresses Rosinger. Here, Atlantis is the perfect example. As there are currently no new active substances for controlling weed grasses in the pipeline, the combination of

mesosulfuron as active substance and mefenpyr-diethyl as safener is an especially valuable one. Jürgen Beutel, Customer Advisor for Bayer CropScience in Germany, sees a further plus of safeners: “They extend the range of conditions an active substance can be used in.” For example, the maize herbicide Laudis provides high plant compatibility, even during periods of plant stress. Isoxadifen-ethyl also improves compatibility, even on marginal land, where the crop plants tend to suffer through stresses caused, for example, by lack of water or nutrients. Herbicides are rated according to their efficacy. “In the end, what's important to the farmer is whether or not our products achieve the desired effect”, says Jürgen Beutel. “They're not interested in whether it's safeners, the active substance or other co-formulants that play a role here.” Nevertheless, with its safener technology, Bayer CropScience is taking an innovative approach to making effective active substances available for crop protection. ◀

## *Atlantis – selectivity thanks to safener technology*

*Bayer CropScience's Atlantis® OD is a selective post-emergence cereal herbicide that impresses through its effective and reliable activity against a broad spectrum of weed grasses. The product contains the two complementary active substances mesosulfuron and iodosulfuron, along with the safener mefenpyr-diethyl. It controls important weed grasses such as Alopecurus myosuroides, Apera spica-venti, Avena fatua and Bromus diandrus, as well as various broad-leaved weeds. Atlantis is available in liquid form – as an oil dispersion – and is thus easy to dose. The special ODesi®-formulation technology brings an improvement in the spray deposition, distribution and penetration, together leading to highly-reliable efficacy, even under unfavourable weather conditions.*