

## AT A GLANCE

- // Seed treatment is crucial for agriculture.
- // Unwanted dust can accompany treated seeds.
- // Bayer researchers are working on ways to prevent this dust.
- // Less dust means less potential risk for pollinators.



Field operation of Bayer SweepAir technology – one new way to make seed treatment even safer for pollinating insects.

# THE DUST TRAP

*Seed treatment products protect crops like rapeseed or corn from fungal diseases and insect pests. However, if particles of the protective layer which contain an insecticidal active substance are rubbed off the seed, they have the potential to harm honey bees, wild bees and other beneficials. Bayer researchers are working on making the entire seed treatment process even safer for beneficial insects and the environment.*

A thin, protective, multi-layer covering surrounds the seeds: Rapeseed, corn kernels, cereals, soybeans, and other crops are often coated with seed treatment products for crop protection. As the seeds germinate and grow, the active ingredient of systemic substances is later translocated in the roots or young plant shoots, protecting them from fungi and voracious insects. For many crops, seed treatment is essential – because if vulnerable seedlings are attacked by pests, the crops' growth and subsequent yield could be seriously reduced. By protecting plants early in this way, less crop protection products will need to be sprayed later, reducing the potential risk for beneficial pollinating insects. However, this is only true if the protective treatment stays where it is intended to exert its effect – on the seeds in the field.

To achieve this, seed treatment products need to be correctly applied to the seed by qualified professionals in the first place and carefully handled, stored and used by the farmer, as directed. Otherwise, they can be rubbed off the treated seed when being sown, making it difficult to totally avoid that the resultant dust may be emitted to the environment. This happened, for example, when corn was planted in certain regions of Slovenia and Germany in 2008.

Such accidents, though very infrequent, have strengthened objections to the use of neonicotinoid seed treatment products, which have fallen out of favor with the EU public in recent years. As a result, the European Commission restricted the use of such products. However, neonicotinoids are essential to farmers because they protect for instance rapeseed from the flea beetle, which is particularly causing damage to the young plants. These substances also kill wireworms, which feast on corn roots. Unfortunately, the reasons for negative incidents involving pollinators have often been simple: "Usually, the products were simply not used correctly or were of poorer quality," explains Dr Reinhard Frießleben, Head of Application Technology,

Bayer CropScience. "Significantly less dust is generated with higher-quality seed treatment products." Nevertheless, Bayer wants to make seed treatment products even safer to protect beneficial insects and their environment. Experts from Bayer CropScience and Bayer Technology Services are creating solutions together in the 'Zero' Dust project in order to further reduce the generation and emission of abraded dust during sowing of treated seed. 'Zero' in this context does not denote a "scientific 0.000..." for dust. It refers to all measures, which can help to reduce dust emergence and emission. Targets for mitigation levels depend on various factors such as crops, markets, treatment and sowing machinery types. The experts are taking a close look at the entire process, from the composition of the active substances and additives in the treatment coating to the planting of seeds in the field.

**For many crops, seed treatment is essential – because if vulnerable seedlings are attacked by pests, the crops' growth and subsequent yield could be seriously reduced.**

One sub-project is the development of SweepAir, a kind of vacuum cleaner for the seed sowing machine. Dr Lubos Urbka from Bayer CropScience who co-developed the technology explains its principle: "The abraded seed treatment dust, generated when sowing treated seed, is removed from the air, transported to the ground and buried just as the seed is." The core of this technology is a so-called cyclone separator used for cleaning the exhaust air generated by the sowing equipment's vacuum fan. The mixture of air and any rubbed-off seed treatment particles spins around in the

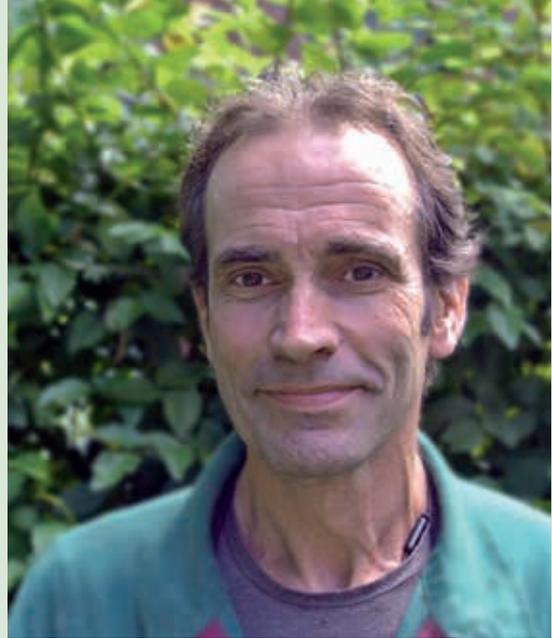
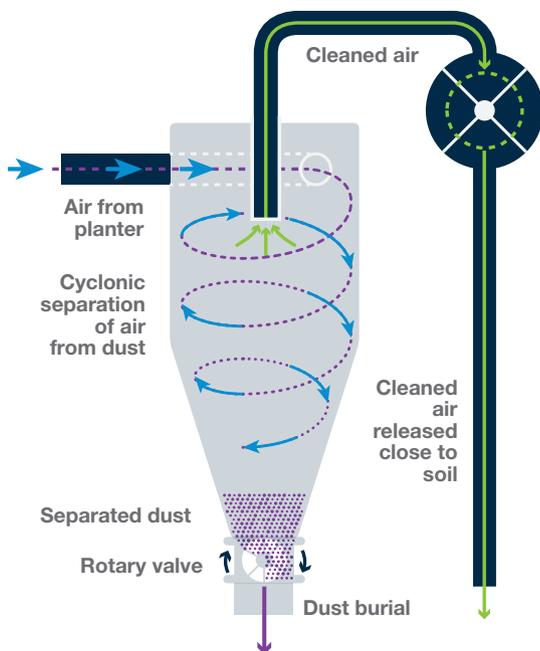
cyclone. The centrifugal force flings the dust particles onto the container's interior wall. From there, they trickle into a collecting tank and are then buried in the ground. The cleaned air is vented outside and let out close to the ground surface.

The renowned Julius Kühn-Institut in Germany has already tested the SweepAir system. In a standardized test, the experts assess the dust emission from sowing equipment systems in comparison to a reference machine that releases air and dust upward. Using the same test with the SweepAir cyclone system, 99 percent less dust was emitted into the air. "That is an enormous improvement," says Dr Björn Schwenninger, 'Zero' Dust project leader at Bayer CropScience, "even compared with the modified machines currently available, which release the air near to the ground. The so-called deflectors achieve dust reduction of approximately 90 percent in the standardized test. With SweepAir, the difference seen is an order of magnitude in dust reduction."

The new technology has proved convincing under controlled conditions. And the prototype that was developed has also been carefully tested in the field. "We can improve some aspects of the machine before the technology, hopefully, is taken up by an equipment manufacturer," says Dr Schwenninger. Farmers and mechanical engineers have already shown an interest – in part, for the sake of bees and their fellow pollinators.

## This is how SweepAir works

The planter exhaust air that may contain abraded seed treatment dust is guided into the cyclone. There the air spins around, flinging the dust particles onto the interior wall. They trickle down in a collecting tank from where they are buried into the ground.



## INTERVIEW

### The right approach

**Karl-Hans Wellen is a sub-contractor providing agricultural services. He tested the SweepAir prototype on his clients' fields.**

#### How did SweepAir perform in practice?

*"Sowing conditions were very dusty and dry here in 2014 – really hard on the equipment. It should be clear that we were testing a prototype. It still has a few glitches; for example, the equipment occasionally clogged. However, these things will be taken care of as the equipment is improved."*

#### How did your customers respond to the prototype?

*"Farmers are very environmentally conscious, and the SweepAir technology is a good approach to making agriculture more ecologically sound. Our customers with whom we tested the system were, therefore, very interested."*

## From the lab to the field

In the 'Zero' Dust project, experts from Bayer CropScience and Bayer Technology Services are working to further reduce the generation and emission of seed treatment dust and, thereby, make sowing treated seed even safer for pollinators and the environment. For example, they are investigating how to formulate seed treatments and film coatings so they stick better – by means of stabilizing additives or by varying particle size. They also want to improve the seed treatment application process itself. And since a little bit of dust always rubs off, they are also working on solutions to reduce the spread of dust in the field, for example with SweepAir.

## CONCLUSION

The dust reducing Bayer technology SweepAir has proved convincing under controlled conditions and in a first practice test. We aim at collaborating with machinery manufacturers to make it available and at gaining acceptance by regulatory authorities.