Ozone can combat pests in stored grain

Insect pests in dried grain, maize and rice can be combated with ozone. The method has several environmental and health-related advantages over traditional insecticides.

The harvest may well be finished, but the yield is far from secured. The grain is often stored for many months, during which time armies of hungry insects can cause great damage to the stocks.

However, by using ozone, farmers can effectively overcome the little beasts, according to a new study, recently published in the journal Pest Management Science.

“Our results mean that we might be able to use ozone as a replacement for the traditional insecticides or fumigation agents in use today,” says Lise Stengård Hansen, a lecturer at the Department of Agroecology at Aarhus University, who is one of the researchers behind the project.

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According to Hansen, ozone has many environmental and health-related benefits.

Ozone is an unstable gas which rapidly decays into oxygen and becomes harmless. By itself, it is a very hazardous gas, but the use of ozone doesn’t seem to have any bad effects on neither the grain nor the environment, plus it leaves no residue in the grain afterwards.

"But one must of course ensure that ozone is only used in suitable conditions, for instance in gas-tight silos or grain stores under sealed tarpaulins, so that people don’t come into contact with the gas before it has decayed,” explains the researcher.

Another advantage with ozone is that it can be produced in situ by means of an electric high-voltage process and a special machine.

“That way you avoid having to transport toxic pesticides or fumigation agents to the cereal stocks like they do today.”

**Studied eleven species of insects**

The researchers exposed eleven different species of insects, which are known to cause damage in stored grain and other dry plant products, to ozone in the laboratory.

They tested how effective ozone is for fighting the various species in various doses, at different developmental stages and under different temperature conditions.

This enabled them to find the right combination of dose and treatment time to affect both the free-living insects and their concealed eggs and larvae.

“There is a great difference in how much ozone is required to combat the various stages and species of insects.”

The adults are usually more sensitive to ozone and die after a treatment with 25 ppm (parts per million) with a five-day exposure time, which is relatively little. But to fight the stages that live inside the kernels, a relatively high dose of 135 ppm for eight days is required, she explains.

**Approval process up next**

There is, however, some way to go before ozone could potentially replace insecticides.

“First, the method needs to be fully developed technically, after which it will go through a series of approval processes with the various authorities around the world. Then the process will need to be marketed. So it will probably be a while before the use of ozone becomes a reality,” she concludes.

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Researchers from Aarhus University are the first to have studied how effective ozone is against insects in grain in all their various stages of development. The results show that ozone has certain environmental and health-related benefits over traditional insecticides because ozone decomposes and vanishes. (Photo: Colourbox) [10]

When grain is in storage, insects can do great damage. In some developing countries, up to 100 percent of the crop will be lost due to insect attacks. (Photo: Colourbox) [11]
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Searching for a better corn Vikings grew barley in Greenland Barley gene could help feed the world Lise Stengård Hansen's profile Lethal doses of ozone for control of all stages of internal and external feeders in stored products, DOI: 10.1002/ps.3304

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