



Reduce Ambrosia contamination to zero with customised grain cleaning solutions

by Dr Heike Knörzer, Head of Petkus Academy / D-99848 Wutha-Farnroda

Ambrosia free, is not only a quality label for bird food. It is an insurance policy against a weed that is in most countries an alien invasive species threatening both health and crop production. When experts talk about an integrated systems approach to limit and prevent the spread of *Ambrosia artemisiifolia*, also known as common ragweed, they tend to disregard a major pillar.

Apart from quarantine arrangements, plant protection measures and crop cultivation practices, proper - and sometimes sophisticated - seed and grain cleaning processes are also immensely important.

In most cases indeed, the species was accidentally introduced into other countries with contaminated seed. Every single Ambrosia seed can produce a plant that produces 3,000-to-32,000 seeds in return. The achenes are globose to pyriform with a length of two-to-three millimetres and can survive in a dormant state for 40 years.

It demonstrates the importance of post-harvest seed and

grain hygienisation measures such as mechanical and optical cleaning.

“Yes, the aim is to reduce the Ambrosia contamination to zero, which is possible with aggressive and rigorous machine adjustment. But you have to keep the balance for the processor as well. Therefore, the grain loss or the good seed recovery as economical aspect has also to be taken into account”, says Jan R Hartmann, Petkus Head of Sales.

Excellence in grain cleaning is characterised by a grain cleaning line that consists of different technologies where each individual machine is precise and highly efficient in its sorting task, allows for high throughput and minimises good grain loss. Machines that can operate from Far East Russia to South Ural to Egypt and South Africa as well as in Europe, Asia and Australia, where Ambrosia is already present.

Technological solutions instead of lining up machines

A major aspect in sorting Ambrosia is using an air screen cleaner in combination with a gravity table and an optical sorter. All processing machines must have excellent sorting efficiencies and seed recovery solutions.

Thus, the experts from Petkus Technologie GmbH tend

Ambrosia threat on human health and crop production

Ambrosia is susceptible to frost and prefers warm temperatures. With a growth cycle of 115-to-183 days, the species fails to produce mature seeds under cooler conditions. Risk assessments predict an increase of its distribution under climate change conditions. In addition, a study of Wayne et al. (2002) assume a stimulated Ambrosia pollen production by 61 percent under a scenario of a doubling of the atmospheric CO₂ concentrations.

The weed is associated with significant yield loss particularly in sunflower, maize, soybean and cereals. Studies from the USA report about yield decrease in maize of about 74 percent. Hungary reported of a maize yield decrease of 69 – 73 percent at a weed density of 26 plants per m².

Yield reductions were also studied in beans, peas, cotton and sugar beet. It also inhibits germination and growth of tomato by more than 50 percent and reduces lettuce and peanut growth. Reinhardt et al. (2003) estimated the costs related to invasion of the weed in 2003 for Germany to be about EUR €32 million.

The CABI Invasive Species Compendium lists Ambrosia also as host plant for crop diseases such as *Plasmopara halstedii*, *Puccinia xanthi*, Cucumber mosaic Virus, *Septoria sp.*, *Phoma sp.* and *Sclerotium* of sunflower. Due to its phenolic compounds and terpenes, extracts from Ambrosia leaves can show a negative effect on the germination of several crops.

The tiny pollen grains are about 20 µm in diameter and can travel long distances of more than 600 km. The atmospheric Ambrosia pollen load is a severe source of seasonal aeroallergens. In the USA and Canada, it is the second most important cause of seasonal allergies.

A study by Cakmak et al. (2002) found that an increase of 72 ragweedplants-grains-per-m³ was associated with an increase of about 10 percent in patient visits to a children's hospital in eastern Ontario for conjunctivitis and rhinitis.

In Europe, the clinical relevance is increasing (CABI Invasive Species Compendium) with allergic rhinitis, fever or dermatitis. Cattles digesting Ambrosia can suffer from nausea.

to speak from technological solutions instead of just lining up machines. Practical examples from inter alia maize and soybean lots analysed by the Petkus seed laboratory demonstrated that 100 percent of Ambrosia can be eliminated with a seed recovery rate between 83 and 96 percent, depending on cleaning stage.

“With an optimised process evaluation we could show in addition that good seed loss could be below one percent”, says Michaela Gessler, Laboratory Technician at ROEBER Institut GmbH. With Petkus solutions, an “Ambrosia free” quality label can be achieved.

For both crops, three processing steps were conducted to separate Aambrosia, which were mechanical cleaning by the Petkus V Cleaner followed by the Petkus G Gravity Table and finally optical sorting by the Petkus/ROEBER OS 901.

The Petkus V Cleaner series is usually dedicated to high capacity pre-cleaning. But furthermore, “our V Cleaner



series is known as a pre-cleaner that shows a precise cleaning accuracy above the average due to its outstanding screen efficiency” says Hartmann.

The reject fraction from mechanical cleaning was processed with a gravity table. The heavy fraction from the gravity table was sorted with an optical sorter. This solution resulted in a minimum seed loss with high recovery rates.

“This solution only works if your pre-cleaner can do an excellent job”, says Hartmann.

Cleaned to zero Ambrosia

For mechanical cleaning or pre-cleaning, two different machine set-ups were tested for their efficiency to eliminate Ambrosia: high capacity pre-cleaning at industrial rates with 120 t/h and a more restrictive,

commodity cleaning process with 60 – 65 t/h.

For maize, 81 percent of Ambrosia could be removed at high capacity ranges with a negligible seed loss rate. With reduced throughput rates, 100 percent of Ambrosia could be removed. Subsequent cleaning procedures aimed at recovering good seed and to minimise good seed loss to below one percent.

“For such tasks, your gravity table must be tough and efficient”, says Hartmann, “as we evaluated a material concentration of 88 Ambrosia grains/kg in the reject fraction of the screen cleaner.”

For soybean, 21 percent of Ambrosia could be removed at high capacity ranges with negligible seed loss rate as well. With reduced throughput rates, 100 percent of Ambrosia could be removed.

www.petkus.com