

Heat Treatment Workshop

Heat, Profume, phosphine, and other insect-killing methods discussed at KSU

With a complete ban of methyl bromide scheduled to take place in about a year, the milling industry is exploring every avenue to find an affordable replacement for the popular fumigant.

The Fourth Heat Treatment Workshop, held Aug. 5-7, 2003 at Kansas State University (KSU), attracted insect control experts from around the world as well as people from the milling industry wanting to learn more about potential methyl bromide alternatives.

Nearly 80 people attended the workshop, organized by KSU Professor Dr. Bhadriraju Subramanyam (Subi) and sponsored by the American Feed Industry Association (AFIA), including representatives from eight foreign countries.

While most of the discussion centered on heat treatments, the pros and cons of other insect-killing products and processes were also debated.

Here's a look at some of the alternatives that were discussed during the three-day workshop at Shellenberger Hall on the KSU campus.

Heat Treatment

Description: Gas, electric, or steam heaters are used to raise temperatures inside the milling facility to between 120 and 140 degrees, which is the lethal target zone for insects. The heated air is moved by fans to various parts of the facility.

Pros:

- Is not toxic like chemical fumigants.
- Sections of a facility can continue to operate while a treatment is occurring.
- Heat treatments reduce total shut-down time to less than 36 hours.
- Leaves no harmful residue.
- Doesn't corrode machinery.
- Doesn't require air-tight sealing like chemical fumigants.

Cons:

- Sustained high temperatures can damage the structure of older milling facilities.
- Energy costs can be quite high, depending on the heat treatment method used and size of the area that is treated.

Notes: The consensus seems to be that heat treatments are a tool in the integrated pest management (IPM) tool box that complements other IPM tactics such as fumigation. Although researchers have



Heat treatments like the TEMP-AIR® Thermal Remediation process, pictured above, that was used to kill insects in the Kansas State University pilot feed mill in August during the heat treatment workshop, are popular alternatives to methyl bromide fumigation.

made tremendous strides in the study of heat treatments, Dr. Subi reminded the workshop participants that "heat treatment is still an art. We are striving to understand and develop this technology into a science."

Phosphine

Description: Is comprised of aluminum and magnesium phosphide. Available in tablets, pellets, or gas form. Gas is released when aluminum or magnesium phosphide pellets react with moisture in the air.

Pros:

- Has proven to be an effective fumigant, particularly when the air temperature is between 70 and 90 degrees F.
- Diffuses more evenly over a structure than methyl bromide.
- Can be combined with recycled carbon dioxide and heat to lower the amount

needed and increase effectiveness.

- Can penetrate the grain kernel or grain mass.

Cons:

- Is toxic.
- Can be corrosive.
- Is flammable if mishandled.

Notes: EPA recently approved new label language for the re-registration of phosphine. Manufacturer's expect to begin issuing new labels some time in 2004.

ProFume®

Description: ProFume is a trade name for sulfuryl fluoride, an inorganic gas fumigant that has for many years been used in structures, vehicles, and wood products for control of termites, beetles, and other insects and rodents.

Pros:

- Is non-flammable and odorless.

- Is non-corrosive in vapor phase.
- Safe for use on sensitive electronic equipment and mechanical systems.
- Fumiguide and other tools are available for precision fumigation.
- Does not deplete atmospheric ozone.

Cons:

- Is highly toxic.
- Only certified applicators can purchase and use the product.

Notes: ProFume is expected to receive Environmental Protection Agency approval by the end of the year (see related story, page 59). Among the alternatives, ProFume is considered to be the most similar to methyl bromide.

Dryacide®

Description: An odorless powder composed mainly of diatomaceous earth (DE). When exposed to Dryacide, the waxy skin that protects insects from drying out is absorbed into the powder, causing the insects to dehydrate and die. Can be used in powder form or as a water-based slurry.

Pros:

- Is not toxic.
- Because it is a stable, inert mineral dust, it does not degrade like chemicals (can last up to 12 months).
- No applicator or special storage provisions necessary.
- No waiting period after applying it.
- Is a relatively inexpensive alternative.

Cons:

- Overuse can alter the flow and movement of grain.
- Effectiveness on grain and surfaces is adversely affected when humidity reaches about 60%.

Notes: Is most effective when used in concert with heat treatments. Can be used quite effectively in hard-to-reach areas of the mill.

ECO₂FUME™

Description: A mixture of 98% carbon dioxide and 2% phosphine. Ready-to-use, high-pressure steel cylinders dispense the mixture into structures from the outside.

Pros:

- Does not deplete the ozone layer.
- Is non-flammable.
- Easy to achieve and control application levels.
- Possible to achieve required concentration levels within minutes rather than hours or days.
- Less expensive than methyl bromide.

Cons:

- Can be corrosive.
- Requires a lot of planning and

monitoring.

Notes: This product, as well as VAPORPH₃OS®, is dispensed into structures from the outside, preventing any worker contact with the gas.

VAPORPH₃OS

Description: A 99% phosphine and 1% carbon dioxide mixture that is blended on-site and dispensed in high-pressure steel cylinders.

Pros:

- Does not harm the ozone layer.
- Contains no waste byproducts.

• Easy to achieve and control application levels.

• Is less expensive than methyl bromide.

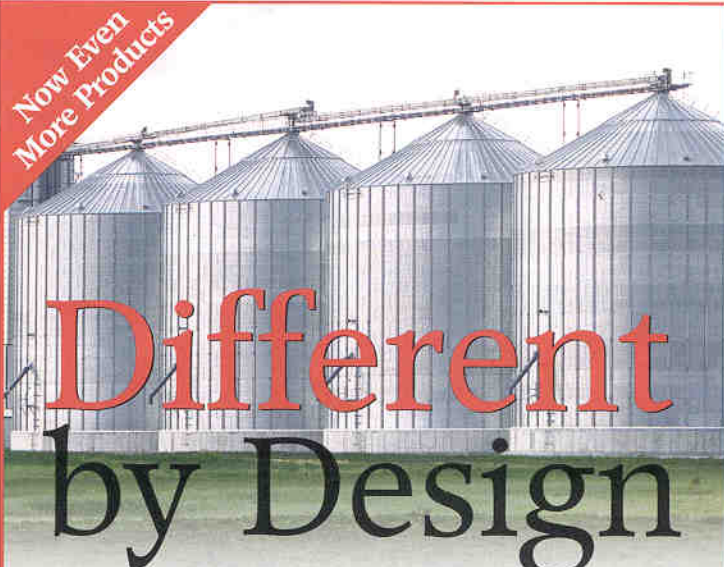
Cons:

- Requires blending before dispensing.
- Requires a lot of planning and monitoring.
- Can be corrosive.

Notes: EPA approved VAPORPH₃OS for carbon dioxide blending and forced-air blending on May 12.

Arvin Donley, editor


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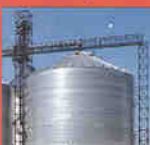
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