

Grain & Seed News

A Newsletter for the Grain & Seed Industry • Number 14

Fumigating Grain Bins with Phosphine (Part 1)



By Pete Mueller
Illinois Regional Manager

Most of us have heard the name Phostoxin™ fumigant, and some of us have had the opportunity to use it or a similar product over the years.

But what is it? Phostoxin is one of many brand names for a family of fumigants called phosphine and comes in a pellet form. A fumigant is a pesticide that reaches the target pest as a gas. When Phostoxin is exposed to atmospheric moisture/humidity it will change from solid aluminum phosphide to produce a gas called hydrogen phosphide or **phosphine**. This solid or tablet will leave behind an inert grayish dust.

At the proper temperature + time + concentration phosphine will kill all stages of target pests. Phosphine has been approved for stored grain in the United States since 1958. It is an old product but is still commonly used to protect grain and grain-based products across the United States and in over 120 countries.

Fumigants like ethylene oxide, carbon tetrachloride, ethylene dichloride, chloropicrin, and now methyl bromide have been removed from the market for various reasons: difficulty of application, safety (bystander, applicator, or product safety), or environmental impact. They are now gone and no longer registered for grain fumigations. Phosphine is still standing, a time tested method for fumigating grain storage facilities.

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Non-confined space fumigations need to be sealed from the outside. This includes the roof vents and the eaves. Boom-lifts are often used to reach these heights safely.



Careful sealing utilizing harnesses and ropes allows for an effective fumigation.

Mission Statement

In all, our aim is to offer quality service, provide the absolute best products available worldwide, to be a respected world-class organization, and maintain profitability with innovation, alternatives, and education.

Supporting the Grain, Seed, Milling, and Popcorn Associations



Fumigating Grain Bins with Phosphine: *continued*

For years the perception of a phosphine fumigation has taken on a 'Magic Bean' approach. This means minimal sealing, randomly throwing the pellets in the bin, and few to no gas readings taken. This poor fumigation technique offered only a minimal mortality. Immature insect stages would often emerge as adults in a few days or weeks and the fumigation was blamed as a failure.

The Art and Science of Grain Fumigations

"The Art and Science of a Fumigation" requires proper sealing of a grain bin, calculating the correct dosage, assuring that the gas reaches

the target pest in the bin, letting it sit under gas for the proper duration, and monitoring for efficacy and bystander safety. It is important to note that all of the aforementioned can be found in the label.

"It is not the formulation or the chemical that has changed, but a lackadaisical approach where fumigations fail, people are exposed, and resistant populations of pests increase."

Grain Bin Sealing. Sealing a grain bin correctly for a phosphine fumigation is hot, dusty, risky, dirty, and sometimes unhealthy. When sealing steel bolted bins, the top of the grain mass needs to be totally covered with

polyethylene sheeting so as to contain the gas concentration. In order to get a good seal over the grain surface, the poly sheeting must be tucked between the grain and the sidewall. If multiple poly sheeting is needed because of the size of the bin or the presence of temperature cables, they must be seamed together in a way to make a gas-tight seal.

Aeration fans are the grain bins natural form of aeration. They are critical to the success of your fumigation. If the fans are not sealed properly the fumigant gas will escape through the infested sub-floor and insects often survive.

Calculating the Correct Dosage. Pesticide labels are important to read and understand. Under the section Dosage Range you will find a chart. The goal of the fumigator is to maintain 200 parts per million after 96 hours when the grain temperature is above 65° F. The label recommends 450 – 900 pellets/thousand bushels for grain bins. The exact amount to be used will depend on the following:

Time + Temperature + Concentration = Dead Insects

Part 2 of this article will appear in the next issue of Grain & Seed News.

New Grain Protectant From Fumigation Service & Supply 1-800-992-1991



- Labeled for stored Barley, Corn, Oats, Popcorn, Rice, Rye, Sorghum, and Wheat
- Controls Insects on Stored Grains and Seeds
- Long-Lasting Residual
- Caution Statement; Not a Restricted-Use Insecticide
- Comes in 1- and 2-gallon Containers
- Can be mixed with Diacon™
- Good for Empty Bin and Perimeter Treatment
- Cost: 2.0 – 2.5 cents to 4.0 – 4.5 cents per Bushel for Combination of Centynal plus Diacon

Fumigating Seed Warehouses

Rodents and insects can cause damage to seed and seed bags while in storage. Untold amounts of money are spent by the seed industry on establishing a reputation for their brand. The appearance of defects in their product can tarnish their brand and nullify the labor of many. The goal is to provide a quality product with a consistently perfect appearance.

Fumigation is performed on seed warehouses, storage bins, and grading towers. Fumigation can be for preventative reasons and sometimes it is because the rodent or pest insect population has reached an economic threshold. In the past, seed

warehouses were fumigated with phosphine fumigants. Brand names like Phostoxin™ or EcoFume™ were commonly used. Phosphine is a very good penetrating gas that kills insects in 2-3 days while the rodents commonly die in 1-2 days.

The problem with phosphine is that it can be corrosive to precious metals like computers, fork trucks, shrink wrapping machines, and other copper products. This is especially true in refrigerated warehouses where copper pipes are plentiful and often exposed. The phosphine corrosion made a poor appearance that could cause failure

after multiple treatments if not managed.

Since 2007, ProFume™ fumigant has replaced phosphine for most seed warehouse fumigations and other structural fumigations like flour mills and food processing facilities. ProFume is colorless and odorless and comes in a steel cylinder.

One advantage of ProFume is that it is also a good penetrating gas; it will reach the center seed pallets of shrink-wrapped seed bags in 6-10 hours. It has not shown any genetic resistance to insects or rodents like phosphine is starting to develop. Another advantage to ProFume is that it is quicker than phosphine. It takes 24-36 hours to fumigate a trailer, warehouse, grading tower, or other sealable structure.

The disadvantage of ProFume is that it is more expensive and it needs more specialized equipment and training than phosphine. The other disadvantage is that the sulfuryl fluoride ProFume, fumigant is a



By David Mueller, BCE President

‘sticky’ gas. When it gets into seed bags and a ProBox™ it is often slower to escape than phosphine. This is an important safety concern. Warehouses need to aerate for 24-48 hours before reentry. Special aeration equipment and detection equipment are needed to perform these fumigations safely.

Safety is increasingly important in any contracted work on the property of a seed or grain company. Accidents can be prevented with proper training, equipment, supervision, and documentation. Today’s fumigator needs to understand your safety policies and provide the proper training, equipment, supervision, and documentation to ensure accident-free jobs.



Clearing a seed warehouse that has been fumigated with ProFume (sulfuryl fluoride) takes skill and patience.

FSS specializes in safe and effective fumigation. We have fumigated thousands of seed warehouses and grain bins during the past three decades. We currently have an experience MOD insurance rating of 0.89. FSS has an in-house safety coordinator that oversees our fumigations, training, and documentation. We have a technical director that can answer your questions. If we can help answer your questions and help reduce your customer complaints, contact us at 1.317.896.9300 or www.fumigationzone.com.

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