



Phosphine Resistant Grain Insects

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Storage and delivery of high-quality grains in the United States is closely linked to effective phosphine fumigation. Effective application of phosphine to stored grain should kill essentially all insects and other pests so that serious damage is avoided and a quality product can be delivered. The US grain industry is now facing a growing pest management problem in that many grain insects are resistant to phosphine.

Insecticide resistance is the ability of an insect to survive a normally toxic dose of an insecticide. This survival is genetically based and inherited by future generations of that pest population. Genes for resistance come from random mutations in the insect's genome. For phosphine resistance, fumigation of a bin with a mix of susceptible and

resistant insects will kill the susceptible (those lacking the resistance gene), but then "select" for those insects carrying the gene. Resistant insects will multiply and proliferate into the future, and be more and more difficult to control.

Phosphine resistance was discovered over 50 years ago in just a few countries, but is now common world-wide. Our research at KSU, along with work by other USDA and university entomologists, has found that all of the most common species of grain pests have resistant populations, and that these can be found in every grain storage region of North America. We know that some fumigation failures are in facilities with nearly all insects having phosphine resistance. (See photos of resistance testing research below and on page 2).

What can we do about the phosphine resistance problem? First is to determine if phosphine-resistant insects are in your grain. Suspicions may arise when a poor kill is observed soon after fumigation. If resistant insects are suspected, then the fumigator can consider using high concentration phosphine in well-sealed storages for a long hold time. If a serious resistance problem is suspected, perhaps with repeated control failures, then the "textbook" recommendation is to stop using phosphine and totally switch to a new chemical. Different insecticides have different modes of toxic action. Switching to a totally different insecticide can help control those phosphine resistant insects. Research is underway at KSU and

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Roger Sanborn
CSE President and CEO

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- Roger Sanborn



Pictured left: KSU is developing a "knock down test" for phosphine resistance.

Test insects are held in a tube with a very high phosphine concentration and the time is recorded when insects are knocked down.

Susceptible insects will be knocked down in minutes, while resistant insects can take hours.

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elsewhere for methods to manage phosphine resistance, and conserve the effective use of phosphine for years to come.



Pictured above: Red flour beetles in a knock down test at 3000 ppm phosphine. The beetle on the right has been knocked down with no movement and the beetle on the left remains up and walking.

For questions about phosphine resistance or grain fumigation please contact Tom Phillips at twp1@ksu.edu.



Central States at GEAPS: Booth 511 is one of hundreds of exhibitors on display

Central States Enterprises participated in its 14th Grain Elevator and Processing Society (GEAPS) convention from February 21-24. CSE has been an exhibitor at GEAPS for the past 11 years.

The 2015 EXCHANGE convention in St. Louis boasted 3,215 attendees with over 350 exhibitors – including CSE’s 20-year celebration booth for business as Central States Fumigation Services founded in 1995.

President and CEO Roger Sanborn, Vice President Thadd Bigler,

Gulf South Regional Manager Chris Mack, Human Resources and Safety Director Ward Stockamp,

and Sales Representative Don Webb were all in attendance for the event. “[GEAPS] is getting bigger every year,

and I have been attending for the past 10 years,” said Webb. “We’ve always made it an experience for our customers at Central States Enterprises, and it’s great to see them espe-

cially if we can only see them face to face once or twice a year.” Webb also said that network-



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