PHOSPHINE RESISTANCE TESTING

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PHOSPHINE RESISTANCE BACKGROUND

Phosphine is a widely used fumigant used to protect stored commodities from insect damage. After 60 years of use and misuse, evidence of insect resistance to phosphine is showing up in many parts of the world. It is believed that ineffective fumigations from low gas concentrations are the driving force that selects for phosphine resistance. Recent studies have shown that phosphine resistance has increased in both frequency and strength of resistance. Now the use of phosphine fumigants are threatened by the development of insect resistance.

Current research is working to identify and understand the extent of phosphine resistance. Knowing the species of insect and its level of resistance can give a better understanding of the extent of insect infestation and allow managers and fumigators to make more effective and efficient fumigation decisions. Outlined are three methods to test for phosphine resistance in insects. Each method requires a different number of sample insects, exposure periods and phosphine concentration.

SCREENING OF PHOSPHINE RESISTANCE

The resistance kit by Detia Degesch can be used out in the field by managers or fumigators to test different insect species for the presence or absence of phosphine resistance. Testing for the frequency of resistance identifies the presence or absence of phosphine resistance. Testing for the frequency of resistance is determined by the number of insects who survive a period of phosphine exposure. Insect populations that have ≥80% survival are considered to have high frequencies of phosphine resistance and should be tested in a level of phosphine resistance study.

FREQUENCY OF PHOSPHINE RESISTANCE

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LEVEL OF PHOSPHINE RESISTANCE (DOSE RESPONSE)

Testing for the level of resistance identifies the concentration of phosphine gas required to kill resistant insects. This gives managers and fumigators the information needed to determine if a higher concentration of phosphine gas is needed or if an alternative fumigant should be used to eradicate insects.

CONCLUSIONS

Phosphine fumigants are threatened by the development of insect resistance. Phosphine can continue to be an effective fumigant if phosphine resistant insects are managed properly. It is necessary to test insects for phosphine resistance and eradicate resistant populations to ensure the sustainability and future use of phosphine fumigants. Insect samples can be sent to Fumigation Service and Supply for testing for phosphine resistance. A detailed report will be provided on whether insects are resistant to phosphine and recommendations will be provided on what you can do to eradicate this genetic resistance.