

FUMIGATION IN THE FUTURE: **ALTERNATIVE METHYLBROMIDE?**

Post harvest insect pests threaten stored and transported grain and produce, wood structures and installations in the food and feed industry. They give rise to quality deterioration, health and safety risks, organoleptic change and general damage to goods. It is estimated that post harvest losses due to insects amount to dozens of billions dollars per year.

Fumigation is a common method to control and eradicate insects pests and makes use of a gaseous compound that diffuses homogeneously throughout the treated object and penetrates well in stored goods. Upon contact with the fumigant, all stages of the lifecycle of insects – egg, larvae, pupae and imago – are eradicated through intoxication.

Worldwide, only a limited number of molecules are available for fumigation: mainly phosphine, methylbromide and sulfurylfluoride.

The regulations related to fumigation are mainly dependent on the type of application. A fumigant applied must be registered or authorized in the respective country for the relevant application: treatment of stored grains, wood boring insects, fumigation of mills and structures, termite treatment, etc. Regulations vary between regions and countries and are sometimes determined by international agreements such as the Montreal Protocol. The requirements related to international trade of wood packaging materials are laid down in the ISPM15.

Shipped agro commodities can be treated in accordance with the guidance of the International Maritime Organization (IMO) or GAFTA protocol. In order to secure safety, multimodal transport of goods must be in accordance with IMDG code.

A fumigant gas that today is commonly used in stored commodities – and virtually the only fumigant available for

this type of application - is phosphine. It is generated in situ by introducing (metalphosphide) tablets or pellets in the cargo. Upon reaction with ambient moisture, phosphine gas will be gradually released and diffuse through the cargo up to a depth of approximately 8 m, depending on the conditions. To improve and speed up diffusion, forced recirculation can be used.

Benefits of recirculation include a more homogeneous gas concentration throughout the cargo, a shortened fumigation period and accelerated ventilation at arrival, thus avoiding a delay of discharge.

Although widely applied, phosphine has nevertheless some important concerns on effectiveness and potential. If good fumigation practices are not maintained, tolerant insects will be the eminent result. Recent observations have revealed that tolerance is rapidly increasing, therefore possibly compromising the future use of phosphine.

Since 1985, the convention of Vienna and The Montreal Protocol ordered research and measures to reduce substances that are detrimental to the ozone layer. Methylbromide (used for fumigation of mills, silos, buildings and in many regions for the fumigation of commodities) was identified as an ozone depleting molecule. Since then its use was gradually restricted and today it is not authorized anymore in many regions.

With the adoption of the Montreal Protocol, the search for alternatives began. Sulfurylfluoride, that had been successfully used for termite control in wood, was re-evaluated as an alternative for post harvest insects. Today it is registered in various countries for fumigation of mills, warehouses and storage structures. In addition, it was registered in some countries for treatment of nuts, dried fruits and cocoa. In Australia a registration for fumigation of grains was obtained to help prevent resistance issues with other fumigants and insecticides.



Today, fumigation is the single method to provide accurate control of post harvest loss. Only when the highest execution criteria are respected, current methods will remain available as an effective and accurate tool. The registration of new molecules and applications remains challenging and narrowly focussed.

SGS will take care of your application with attention to a correct planning, diligent application and thorough safety measures.