

METHYL BROMIDE ALTERNATIVES TO CONTROL STORED PRODUCT INSECTS DEPOLANMIŞ ÜRÜN ZARARLILARININ KONTROLÜNDE METİL BROMİD ALTERNATİFLERİ

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Abstract: The adverse effects of fumigant residues in food and the environment have led regulatory agencies to take actions by imposing strict limitations on pesticide registration. Methyl bromide (MB) is a versatile fumigant with a quick killing effect on insects, but - because of its contribution to stratospheric ozone depletion - has been phased out in developed countries since 2005, and in developing countries phase out will take place by 2015. Although there are exemptions for quarantine and pre-shipment purposes for MB, as well as the possibility to apply for exemptions for critical uses, where no existing alternative exists, the onus is on the applicant to demonstrate that every effort is being made to research alternative treatments.

In contrast, phosphine remains popular, even though insects have developed resistance to it. These restrictions on the use of fumigants have posed new global challenges to the food industry, and have resulted in efforts to register new fumigants, and in the development of new technologies as alternative control methods .

Among the newly considered fumigants are sulfuryl fluoride, carbonyl sulphide, propylene oxide, methyl iodide, ozone, ethyl formate, and hydrogen cyanide. Sulfuryl fluoride has emerged as a promising candidate fumigant for disinfecting stored food commodities. Other registered fumigants suffer from the limitation that they may be useful for application in a specific situation only. The potential use of volatiles of botanical origin shows promise but requires registration procedure before they can be employed in practice

The most common non-chemical alternative in the cereal storage is the use of aeration systems during the winter and refrigerated aeration in the summertime with the objective to achieve temperatures of less than 18°C to reduce insect activity.

There is renewed interest in using heat to control stored product insects in flour mills, empty silos, and food processing facilities using target temperatures ranging from 54°C to 60°C. For thermal disinfection of wood pallets, 56°C for 30 minutes is required. Thermal disinfection of dates is successfully implemented as an alternative to MB in Israel. All Israeli dates packing houses have adopted the method.

Among the new gaseous application technologies that have successfully replaced fumigants are the manipulation of modified atmospheres (MAs). Recent developments include the use of high pressure carbon dioxide or low-pressures for specific applications. Biogenerated MAs termed also hermetic storage is based on the principle of generation of an oxygen-depleted, carbon dioxide-enriched interstitial atmosphere caused by the respiration of the living organisms in the ecological system of a sealed storage. Plastic structures suitable for long-term storage systems, as well as intermediate storage of grain in bags or in bulk have been developed and applied. These niche applications of MAs that have resulted in very promising application treatments with market acceptability, serve as models for global challenges for new application methods.

Key words: Storage insect control, methyl bromide alternatives, fumigants, sulfuryl fluoride, botanicals, grain aeration, cooling, thermal disinfection, modified atmospheres, biogenerated atmospheres, hermetic storage.