INSECT CONTROL USING VACUUM OR CO_2 IN TRANSPORTABLE FLEXIBLE LINERS

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Although there is a large number of suggested potential alternatives to MB for disinfestation of durable commodities, development of most of these alternatives is likely to be costly. The combined factors of MB phase-out, the gradual development of insect resistance to fumigants and the undesirable effects of fumigant residues in food, have led to the idea of using controlled atmospheres. The objective of this investigation was to develop an alternative control treatment based on vacuum or a combination of heat and CO_2.

Response of insects to low pressures is temperature and moisture dependent. It was demonstrated that at 25ºC and 65% relative humidity complete mortality of adults of most common storage insect pests was obtained within 7 h when exposed to 20 mm Hg. Use of vacuum in rigid structures requires robust and expensive treatment chambers that limit its application. It has been economically justified only for special treatments, such as in the case of fumigation under vacuum for quarantine treatments. The use of increased CO_2 concentrations has also been identified as effective in the control of storage insects using the flexible liners. However, its application depends on the availability of CO_2 particularly in production areas. Our experience demonstrates that accessibility to power needed to operate a vacuum pump poses an advantage over the use of CO_2.

These encouraging reports led to the idea of developing a transportable system to render the technology a practical tool for the control of insect pests. Experiments were carried out using a 15 m^3 capacity plastic container termed the Volcani Cube. This container is made of a flexible liner and characterized by its transportability. An oil-lubricated vacuum pump (3 hp) to reduce the pressure to 25-mm Hg within 25 min was used. The purpose of the tests was to study the technology that would contribute to improved performance. The possibility of maintaining low pressures within 22 and 75 mm Hg in the Volcani Cube over extended periods of several months was successfully tested.