USE OF MIXTURE OF GASEOUS PHOSPHINE AND CARBON DIOXIDE FOR FUMIGATION OF GRAIN IN DEEP SILO BINS.

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Fumigant mixtures containing carbon dioxide (CO_2) have been proved to be effective in treating grain in deep silo bins. They offer a simple and an effective solution for fumigation of silos that are not equipped with installation for closed circulation. Good penetration to depths up to 40 m have been achieved with these mixtures. An added benefit is the synergistic effect of CO_2 that can enhance the toxicity of the fumigants (4).

The first mixture was developed in Israel using methyl bromide + CO_2 (1), and then followed by development of mixtures of phosphine (PH_3) + CO_2 (2,3).
The traditional use involves separate applications of the fumigants with dry ice as a source for CO_2.

Recently, a new formulation of gaseous PH_3 + CO_2 in cylinders was developed by BOC Gases Australia. This formulation is preferred for the following reasons: It enables a simultaneous application of the two gases and thus simplifies the procedure. The immediate release of the gas shortens the exposure period of the fumigation by achieving the required concentration in less time. It can also allow a reduced dose of PH_3.

In a field study, the efficiency of a gaseous PH_3 + CO_2 mixture was examined.
The content of one cylinder of Phosfume® (31 Kg), was applied to the top of a 26 m tall wheat bin, making a calculated dose of 0.55 g/m^3.
After 18 h from application, a concentration of 180 ppm PH_3 (0.25 g/m^3) was achieved at the bottom of the bin and 220 ppm PH_3 (0.3 g/m^3) at the top. Phosphine concentrations were determined by the Bedfont phosphine monitor model 415. The main conclusion drawn from this study clearly indicates that the formulation can

penetrate easily and rapidly into grain bulks stored in deep bins and achieve PH_3 concentrations that are entomologically effective.

This pioneering study shows the potential of a new $PH_3 + CO_2$ formulation as a simple and an effective tool for the treatment of grain in deep silo bins, thus providing an alternative to methyl bromide.

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