IMPROVING PHOSPHINE PENETRATION INTO DEEP GRAIN BIN BY AID OF CARBON DIOXIDE.

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A field trial was carried out to examine the effect of carbon dioxide (CO_2) on the distribution of phosphine in a deep grain bin.The trial was conducted in a 37 m deep steel bin containing wheat heavily infested with stored product insects.

The bin was fumigated with magnesium phosphide at a dosage of 2 g/m^3. Carbon dioxide (200 g/m^3) in the form of dry ice was added to the bin immediately after the phosphine application. Both gases were applied to the top of the bin.

The exposure period was 10 days. Very good distribution of phosphine and carbon dioxide was achieved throughout the bin during the fumigation period. The highest concentrations of both PH_3 and CO_2 were recorded at the bottom of the bin already after 24 hours, while the lowest concentrations were recorded at the top of the bin. This picture remained unchanged during the whole fumigation period.

Grain samples taken from the base and top of the bin at the completion of the fumigation period showed total insect mortality. The high levels of both phosphine and CO_2 achieved in this trial are more than required to attain total insect kill, so in future tests lower dosages of the two gases should be considered.
Application of the gas mixture is very simple and the whole procedure takes about 15 minutes for a large bin.

Conclusions:

The method described here offers the following advantages:

1. Effective strategy for fumigation of grain in deep bins.

2. Requires only a single, short application.

3. Inexpensive and does not require sophisticated equipment.

4. Suitable for a wide range of storage structures with a fair level of gas tightness.