

INFLUENCE OF GRAIN TEMPERATURE ON EFFICACY OF FUMIGATION IN LEAKY BINS

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Hard wheat at 20°, 25°, and 30°C was fumigated with an aluminium phosphide formulation in small cylindrical grain bins of corrugated metal. The bins were provided with sufficient open area to approximate leakage rates commonly encountered in farm and commercial-scale bins of this type, and fumigant concentration profiles were determined over a 10-day period. Leakage and fumigant sorption rates at each temperature were determined by comparing the fumigant profiles with those obtained in a sealed barrel fumigated at the same temperatures with and without the same grain.

Grain temperature affects the length of time that stored-grain insects remain in fumigant-resistant stages. Therefore, the effects of temperature on concentration profiles was compared with the effect on insect development. The 25° and 30°C grain temperature conditions appeared to provide the greatest likelihood of a complete kill, since concentrations lethal to early egg stages of *Rhyzopertha dominica* (Fab.) were observed within three days, and lethal concentrations` remained after half the egg development time. However, variation in fumigant concentrations was greater at 30°C, indicating a greater likelihood of insect survival in underdosed parts of the grain mass. The 20°C condition would excessively prolong the time spent in fumigant-resistant stages, reducing the likelihood of a complete kill.