A COMPARATIVE STUDY OF PHOSPHINE RESISTANCE LEVELS IN STORED.GRAIN BEETLES COLLECTED FROM SEALED AND UNSEALED FARM STORAGES IN WESTERN AUSTRALIA

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ABSTRACT

Western Australia has established a reputation as an exporter of residue-free grain despite having conditions that are more suitable to the development of grain-insect pests than many :other countries. This has been brought about by the extensive use of sealed storage and phosphine (PH_3) fumigation both in the central handling system and on-farm.

The Western Australian grain industry has been concerned for some time that PH_3 resistance could result in control failures due to the inefficient use of PH_3 in unsealed and poorly maintained sealed storage units. To monitor this threat a survey was conducted in 1991 to study the frequency of PH_3 resistance in the rust-red flour beetle, *Tribolium castaneum*; the rice weevil, *Sitophilus oryzae*; the granary weevil, *S. granarius*; the lesser grain borer, *Rhyzopertha dominica*; and the sawtoothed grain beetle, *Oryzaephilus surinamensis*. This study, which used a discriminating dose test, concluded that there was no significant difference between sealed and unsealed storage units with respect to the frequency of resistant populations.

There is, however, a need to determine whether sealed or unsealed storage units give rise to either significantly different *levels* of PH_3 resistance or to a different frequency of resistant individuals within a population. This paper reports on a frequency distribution analysis of data collated from an earlier PH_3 resistance survey and on progress toward the establishment of resistance levels of grain-insect strains collected during the same survey.

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