

FINAL REPORT

US00055

Formative study of human exposure to zinc phosphide during the on-farm preparation of mouse baits (Phase 1)

PROJECT DETAILS

PROJECT CODE: US00055

PROJECT TITLE: FORMATIVE STUDY OF HUMAN EXPOSURE TO ZINC PHOSPHIDE DURING THE ON-FARM PREPARATION OF MOUSE BAITS (PHASE 1)

START DATE: 01.12.2011

END DATE: 31.05.2012

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Summary

Mice can have a significant impact on cropping systems and outputs. Access to mouse baits in a timely and cost-effective manner is an important tool in managing these impacts. Currently, mouse baits can be produced commercially or under an Emergency Permit approved by the Australian Pesticides and Veterinary Medicines Authority (APVMA). However, throughout the recent plague conditions, demand for mouse bait products has significantly outstripped supply, impacting negatively on outputs.

This project sought to investigate the human health risks associated with the potential on-farm batching of mouse baits using zinc phosphide[#] (Zn_3P_2 , abbreviated as ZnP). These include risks from inhalation of phosphide dusts and exposure to phosphine[#] gas. The results will potentially support use of zinc phosphide mouse bait production by growers in an on-farm context and future regional batching stations operating under Emergency Permits.

Data exist on the human health impacts for production of commercially manufactured baits, however there is little to no empirical data on the use of ZnP in the preparation of mouse baits and its impacts on human health in an on-farm situation. A requirement of the APVMA prior to approval of a product use for on-farm manufacturing of baits is a stringent assessment that includes measurement of potential human health exposure risks.

[#] Refer to 'Report Disclaimer'

Quantitative measures of potential risk will be determined in this formative first phase. Outputs of this work will be submitted to the APVMA for review and will be placed in the public domain.

Based on these data, a second phase may be conducted to verify the human safety of on-farm batching systems for mouse baits using ZnP.

It is envisaged that subject to successful completion and verification of the system(s) used that a designated protocol enabling growers to batch baits on-farm under APVMA Emergency Permit criteria may be developed.

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Conclusions

The study data provide a sound basis on which to further progress to a more complete examination of the process of mouse bait batching on-farm. Future exposure studies building on this phase will be needed to meet the health and safety specifications defined in the Agricultural Manual of Requirements and Guidelines (MORAG). This will involve a broader assessment than has been undertaken in this formative phase and should be designed around the Organisation for Economic Cooperation and Development (OECD) guidelines.

Recommendations

A Phase 2 program should be conducted to meet the requirements for an Occupational Health and Safety (OHS) Package as specified by the APVMA.

Outcomes

This preliminary phase was not envisaged to provide any direct economic benefits at this time. However, these data will provide the evidence base from which a potential health and safety protocol for on-farm batching can be determined. This will likely have significant economic benefits for growers in the event of a mouse plague situation.

Achievements/Benefits

This study has provided detailed preliminary data on human exposure to zinc phosphide[#] in the on-farm preparation of mouse bait. Though formative in nature, the study illustrates that it is safe to proceed to a more substantive investigation of the potential human exposure risks and the controls required for on-farm mouse bait batching using the active ingredient zinc phosphide.

The lack of a specific exposure standard for ZnP in relation to the risks posed by inhalation of ZnP dusts is a limitation. However, the airborne concentration of any substance that is hazardous to health must be kept as low as reasonably practicable to minimise the risk to health, irrespective of whether an exposure standard exists. Given the potential for hydrolysis under moist or acidic conditions within the body and subsequent release of phosphine[#], an appropriate standard needs to be developed. Furthermore, due recognition must be given to the absolute priority to ensure that both hygiene procedures (e.g. washing of face and hands) plus the use of suitable personal protective equipment (PPE) and subsequent care in their removal are adhered to.

The findings from this study indicate that the risks from dermal deposition of ZnP dust are low. This is in keeping with other existing literature in the area.

Measured phosphine concentrations were generally within the exposure standards. From the limited data available, it appears that decanting of the mixed bait into the pre-used drums of mouse bait provided the highest readings. Further, it is contended that this may be the result of remnant phosphine (from ZnP bait) still contained in the drums. This exposure may be reduced through earlier removal of lids, allowing flushing of the drums with air in an open area. Despite the relatively low average personal phosphine readings recorded, it is imperative that suitable PPE be used and work practices followed to minimise exposure risks as variable conditions may be encountered.

Exposure to phosphine during clean down operations was also recorded at relatively low levels using a direct reading meter. However, this also requires further detailed assessment to determine risks and a safety protocol.

Other research

A second phase is planned building on these data.

Intellectual property summary

No information will be released in the public domain until a review and approval of the report by the APVMA.