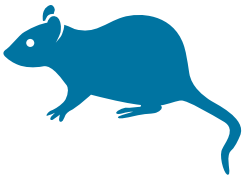

NSWROD SOP2 Baiting of rodents with zinc phosphide in crops

Background

Zinc phosphide is the most commonly used rodenticide after anticoagulants. It is an acute poison, killing after a single dose and is used when a rapid reduction in the rodent population is required. For mice it can be deployed for broadacre, in-crop protection as well as in commercial and industrial premises. Pre-prepared bait, either in grain or pellet form, is available for mouse control, which can be applied using ground or aerial techniques (as specified on the label and APVMA permit). Baits for Australian native climbing rats and Australian native ground rats are supplied in cellulose-based sachets which are distributed throughout sugar-cane crops by hand from vehicles or tractors while other operations are being conducted in the crop (e.g., weed spraying).

Zinc phosphide is an extremely toxic compound. Rodents, like most vertebrates, are highly susceptible to the effects of zinc phosphide, which is a non-specific pesticide. Native animals and birds, and domestic pets and livestock are also vulnerable to this type of poisoning. Good baiting technique helps to minimise the risk to non-target species and maximise the effect on targeted rodent populations.

This standard operating procedure (SOP) is a guide only; it does not replace or override the relevant NSW or federal legislation. The SOP should only be used subject to the applicable legal requirements (including WHS) operating in the relevant jurisdiction.

Individual SOPs should be read in conjunction with the overarching Code of Practice for that species to help ensure that the most appropriate control techniques are selected and that they are deployed in a strategic way, usually in combination with other control techniques, to achieve rapid and sustained reduction of pest animal populations and impacts.

Application

- Baiting with zinc phosphide should only be used in a strategic manner as part of a co-ordinated program designed to achieve sustained effective control, and is commonly used for plague control (once-off crises).
- Crops can only be baited after they have been assessed as at a reasonably high risk from rodent damage, the potential for crop damage will be of economic significance and there are no native mouse species present (Users should check the specific requirements in NSW, see EPA for more information).
- For in-crop mouse protection baits must not be placed within the outer 50 m of crop or within 50 m of native vegetation. It can be deployed for broadacre, in-crop protection,

using aerial application or accurately calibrated ground application equipment delivering 2-3 grains/m^2.

- For commercial and industrial premises, individual site risk assessments must be completed before any baiting to ensure there is a suitable buffer between area to be baited and stored grain to avoid inadvertent contamination of stored grain stocks.
- In facilities where food production occurs, the use of baits should be integrated with current rodent control policies and practices to prevent any contamination of food production areas.
- Because of the high risk of poisoning non-target animals, particularly birds, baits should be placed in areas of sufficient vegetation cover or in active burrows (see relevant APVMA permit for specific details).
- Sachets for rat control can be applied at 100 sachets per hectare or the equivalent of 1kg of bait material per hectare.
- Sachets should not be visible from the surface, and if they cannot be concealed, then bait stations must be used. If possible, baits should be applied in the late afternoon. Baits should not be placed in locations accessible to livestock and domestic animals. Baits should not be placed where they can contaminate streams, rivers or waterways.
- Containers which have held bait material should not be used for any other purpose. Disposal of used containers involves crushing and burying below one metre in a disposal pit specifically marked and set up for this purpose, clear of waterways, vegetation and roots. Excess or unused baits must also be buried below one metre. Used containers and baits must never be burnt.
- Zinc phosphide is listed as a Schedule 7 - Poison under the Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP). This compound has a high potential for causing harm at low exposure and requires special precautions during manufacture, handling, storage and use. Zinc phosphide is only available to licensed or authorised users who have the skills to handle it safely. Special regulations are in place restricting the availability, possession, storage or use of this poison. In NSW, contact Local Land Services (LLS) for information on where to purchase zinc phosphide rodenticide products.
- Persons using this product may be required to hold a fumigators license in NSW (*NSW Pesticides Regulation 2017*). It is the responsibility of permit users to ensure they are compliant with NSW requirements.

Animal welfare implications

Target animals

- Zinc phosphide is an extremely toxic compound. When it comes into contact with moisture under acidic conditions (e.g., in a stomach), it reduces to phosphine gas which upon absorption causes chemical corrosion and congestion to the liver and other organs, damage to the liver and respiratory distress, depression of the central nervous system and diarrhoea.
- Clinical signs of poisoning generally appear rapidly, with animals showing reduced activity within one hour. Poisoned animals may kick at their abdomens with their hind

feet and show postural changes indicative of severe abdominal pain. The symptomatic period can last for several hours, with final symptoms including convulsions and paralysis. Time to death can be either rapid (8–24 hrs) or prolonged (24–72 hrs), with death usually occurring as a result of cardiac and respiratory failure or pulmonary oedema.

Non-target animals

- Zinc phosphide is toxic to a wide range of vertebrate species and there is no antidote for zinc phosphide poisoning. Non-target animals can be at risk during a baiting campaign.
- Poisoning of non-target species can occur either directly by eating baits intended for rodents (primary poisoning) or through scavenging carcasses from poisoned animals (secondary poisoning).
- There is some potential for secondary poisoning as the compound persists in the poisoned rodents' stomach for several days, however it does not accumulate in the muscle or other tissue, nor within the predators themselves. So as long as the single dose eaten is not too great, predators will experience no ill long-term effects. Many scavengers can detect phosphine odour in carcasses and discard the gut contents of poisoned mice.
- The susceptibility of non-target species to primary poisoning is determined by many factors, including sensitivity to the poison, body weight, concentration of zinc phosphide in the bait, bait placement, bait type and palatability, timing of baiting and level of exposure to poison baits. Additional factors affecting secondary poisoning include number of dead rodents available for scavenging, the time period over which carcasses are available and the concentration of poison in the carcasses.
- To minimise the risks to non-target animals, the following monitoring and baiting strategies are recommended to either reduce the amount of toxic bait dispensed or minimise the broad distribution of baits in areas where rodent populations are:
    - Monitoring – can be used to estimate the rodent population and its distribution, and can provide a guide for the amount of bait required and effective bait placement. Monitoring can involve damage assessments, trapping or the use of bait cards which are squares of grid paper soaked in linseed or canola oil.
    - Pre-feeding with non-poisoned bait – allows an assessment of what animals are eating the bait and the quantities of poisoned bait needed for the control program.
    - Placement of baits – place bait in areas with sufficient vegetation cover to hide from birds. Do not apply to bare ground (including fallow where there is no vegetative cover). In the case of mouse baits, apply bait as evenly as possible across the crop, and do not apply in a trail. Sachets for rat control must be placed in bait stations, and can be covered with leaf trash or placed under the crop canopy. Particular care should be taken when baits are applied near native vegetation using aircraft as high bait concentrations may occur on the ground beneath aircraft that need to climb steeply. Adhere to all stipulated directions and distance restrictions in the relevant permit and label.
    - Timing of baiting – rodents mostly feed at night; therefore, bait laid in the late afternoon will be mostly consumed overnight before diurnal non-target species such as birds will have access.

- Check bait stations regularly – bait stations used for rat control should be checked at no less than 72-hour intervals.
- Withholding period – livestock should not be allowed to graze baited areas for 14 days after application, or after all bait sachets have been recovered or have completely degraded.

Workplace health and safety considerations

- Operators using zinc phosphide must strictly follow the directions on the approved label when using, storing or disposing of this rodenticide.
- Zinc phosphide is toxic to humans and should be handled with care. Exposure can occur from ingestion, skin contact or inhalation of vapours. This poison must be kept away from acids, water and liquids, as dangerous phosphine gas is released slowly in moist air and immediately if wet. It must be kept away from naked flames, or any sources of heat or ignition.
- Adequate ventilation must be maintained during use.
- Appropriate personal protective equipment including overalls, impervious footwear, full-face respirator with combined dust and gas cartridge or supplied air respirator and elbow-length PVC gloves must be worn when opening the container and handling poisoned baits. Gloves and respirator should be washed after each day's use.
- If the poisoned bait gets on the skin, immediately wash area with soap and water.
- After use and before eating, drinking or smoking, wash hands, arms and face with soap and water.
- After use, wash contaminated clothing, footwear and gloves.
- If poisoning occurs, go straight to a hospital or doctor or contact the Poison's Information Centre (Ph 13 11 26). Remove from contaminated area. Apply artificial respiration if not breathing.
- For further information refer to the Material Safety Data Sheet (MSDS) available from the supplier.

Equipment required

Poison baits

- Zinc phosphide baits are available from rural suppliers and are strictly controlled by the requirements of the AVPMA for Schedule 7 poisons.
- Zinc phosphide used for mouse control is available in pre-prepared bait, either in grain or pellet form.
- Zinc phosphide used for rat control is available in pre-prepared grain bait, distributed in 10g individual sachets. These sachets should not be opened.

Other equipment

- Equipment for ground or aerial baiting.
- Personal protective equipment.
- First Aid kit.

Procedures

Always read relevant permit for conditions and directions for use.

Assessment of site and estimation of rodent numbers

- Apart from seeing rodents, some form of monitoring is required to identify the species present, gauge the population, the possible level of damage and the potential impact on non-target species. This monitoring is a legal requirement for using zinc phosphide bait.
- Monitoring of mice can be carried out using active hole counts, bait cards (which are squares of gridded paper soaked in linseed or canola oil and placed at suitable intervals), baits stations or traps. Methods for monitoring of rats include assessment of fresh chewing damage and rat movement tracks, use of break-back traps or active burrow counts.
- Visual monitoring for any effects on non-target species must be undertaken and recorded in the days immediately following baiting.

Laying of ground bait for mouse control

- The even placement of bait is critical to achieve maximum effectiveness and minimise risks to non-target species.
- Ground application of zinc phosphide must be done using accurately calibrated ground application equipment to apply the bait at a rate of 1 kg/ha to achieve an even coverage of 2-3 grains (pellets)/m^2.
- Zinc phosphide can only be used for in-crop protection. This poison must not be used around commercial, agricultural, industrial and domestic premises, or within towns or residential areas. Baits must not be placed within native vegetation or within 50m of crop boundaries.
- Baits should be placed in areas with sufficient vegetation cover. Baits should not be placed in locations accessible to livestock and domestic animals. Baits should not be placed where they can contaminate streams, rivers or waterways.
- Rodents mostly feed at night; therefore bait should be laid in the late afternoon to reduce access to diurnal non-target species such as birds.
- Baits should not be applied if heavy rain is imminent. Zinc phosphide baits will tolerate some light rain and dew and remain active for several days; however, it is recommended that at least two nights are free from rain after baits are applied to ensure maximum performance.
- A withholding period of 14 days applies within which crops may not be harvested, or livestock allowed to graze in baited areas.

- Retreatment may be required in line with manufacturer recommendations and relevant permit in areas of extremely high mouse densities.

Aerial baiting for mouse control

- Baits can only be applied from an aircraft if the pilot holds a NSW EPA Aerial Applicator Pilot Licence, has an agricultural rating and the aircraft has an air operator's certificate endorsed for pesticide application and is employed or is the holder of an EPA Aerial Applicator Business licence.
- Pilots must be given a property map showing the paddocks to be baited and a signed indemnity form from the landholder before commencing baiting application.
- A pesticide application record applicable to the bait line must be completed by the aerial contractor and supplied to the landholder.
- The even placement of bait is critical to achieve maximum effectiveness and minimise risks to non-target species. Bait should be applied at a rate of 1 kg/ha to achieve an even coverage of 2-3 grains (or pellets)/m^2.
- Baits should be placed in areas with sufficient vegetation cover. Baits should not be placed in locations accessible to livestock and domestic animals. Baits should not be placed where they can contaminate streams, rivers or waterways.
- Rodents mostly feed at night; therefore, it is preferable for bait to be laid in the late afternoon to reduce access to diurnal non-target species such as birds. However, this may reduce available aerial operator time and may not be practical in high-demand situations.
- Baits should not be applied if heavy rain is imminent. Zinc phosphide baits will tolerate some light rain or dew and remain active for several days; however, it is recommended that at least two nights are free from rain after baits are applied to ensure maximum performance.
- A withholding period of 14 days applies within which crops may not be harvested, or livestock allowed to graze in baited areas.
- Retreatment may be required in line with manufacturer recommendations in areas of extreme high mouse densities or areas with significant alternative feed.

Laying of ground baits for rat control

- The placement of bait is critical to achieve maximum effectiveness and minimise risks to non-target species.
- Zinc phosphide used for rat control is available in pre-prepared grain bait, distributed in 10g individual sachets. These sachets should not be opened, but placed at bait stations spaced no less than 10m apart within the crop to achieve a rate of 100 sachets (1kg) per hectare. These baits cannot be applied by aerial application methods.
- Zinc phosphide can only be used for in-crop protection. This poison must not be used around commercial, agricultural, industrial and domestic premises, or within towns or residential areas. Sachets must not be placed within native vegetation or within 5m of crop boundaries.

- Bait stations should be in areas where rats are active and there is potential for damage to the crop. There should be sufficient vegetation cover, such as under crop canopy to prevent access by birds and keep bait dry during rain. Sachets can be covered with leaf trash. Baits should not be placed in locations accessible to livestock and domestic animals.
- Bait stations should be designed to prevent the bait from spilling out onto the ground. Sachets must not be attached or wired to trees. Bait must not be placed in direct contact with the ground. Baits should not be placed where they can contaminate streams, rivers or waterways.
- Bait stations should be checked at no less than 72-hour intervals.
- Rodents mostly feed at night; therefore, bait should be laid in the late afternoon to reduce access to diurnal non-target species such as birds.
- Bait may retain activity for several weeks or months if sachets are unopened by rats, even in wet conditions. The cellulose-based sachets and enclosed bait are designed to eventually degrade due to the effects of soil moisture and sunlight.
- A withholding period of 14 days applies within which crops may not be harvested, vegetative matter cut for stock feed, or livestock allowed to graze in baited areas. Livestock or domestic pets should not be allowed access to the baited area unless all bait sachets have been recovered or completely degraded.
- Re-baiting of crops may be required in areas of extreme high rat densities or areas with significant alternative feed. The minimum retreatment interval is 14 days, although one month is recommended in some circumstances.

Collection of uneaten baits and rodent carcasses

- Where possible, any uneaten bait at the end of a program should be collected and buried to depth of one metre.
- Where possible, rodent carcasses should be located and collected daily, and buried.

Procedural notes

Users of zinc phosphide must always refer to the relevant Commonwealth and State legislation and current APVMA permit for more detailed and up-to-date information on conditions of use including distance restrictions and bait distribution, storage, transportation and disposal.

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