easily administered product, which is widely accepted by overseas markets, is considered the greatest grain-hygiene threat faced by the industry. Consequently much of the CRCNPB's investment is focused on methods to maximise the life of this product and to develop new technologies to control pests in the supply chain, helping to ensure the continued supply of quality, clean grain to the market.

These grains projects are undertaken through the five science and technology programs of the CRCNPB, including the Post-Harvest Grain Integrity Research Program, and are reported in this *Ground Cover* supplement.

The CRCNPB has seven programs. The first five focus on innovative science research activities, while the sixth develops education and training programs in plant biosecurity. The seventh program facilitates the delivery and adoption of the CRCNPB's science and technology outputs. □

GRDC Research Code NPB00004
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## PLANNING FOR THE WORST

**BY SHARYN TAYLOR**

Australia's geographic isolation has, in the past, provided a degree of protection from exotic pest threats, and the grains industry is free from many pests that affect agriculture in other countries. However, rapid growth in trade and movement of people is increasing the risk of new pests becoming established in our crops.

One of the key tools an industry has in preparing for an incursion of exotic pests is the development of contingency plans specific to each pest. These plans provide detailed information on life cycles, potential distribution, survival strategies and methods for surveillance and sampling. Contingency plans form the basis of the development of response plans in the event of the detection of an exotic pest, assisting with the rapid response, eradication, containment or management.

Contingency plans are being developed through the Cooperative Research Centre for National Plant Biosecurity with funding from the GRDC. These plans will target key pest threats based on the overall risk rating identified in the National Biosecurity Plan for the grains industry and also on the value of crop production. This will ensure that all high-risk pests of major grain crops will be covered by a contingency plan, enhancing preparedness of the grains industry for potential biosecurity threats.

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# Unwelcome to Australia

**A single incursion of khapra beetle highlights the range of contingencies and responses required for containment and eradication** By Rob Emery

HAVING A HOUSE shrink-wrapped to aid fumigation was just part of the response that was required for an incursion of khapra beetle, found in April 2007 in a suburban home and personal effects of a family that had migrated to Perth, Western Australia, two weeks before the discovery.

The khapra beetle (*Trogoderma granarium*) is one of the most serious pests of stored grain and is a regulated quarantine pest in most countries. It is nominated as one of the 100 worst invasive species worldwide, and infests grain and cereal products, particularly wheat, barley, oats, rye, maize, rice, flour, malt and noodles, although it will feed on almost any dried plant or animal matter.

Khapra beetle's importance lies not only in its capacity to cause serious damage to stored commodities, but also the impact it has on trade for countries that have established infestations. The Australian Bureau of Agricultural and Resource Economics (ABARE) estimates that the potential economic impact of khapra beetle in WA alone would range between $46 million and $117 million a year due to lost market access.

While Australian Quarantine and Inspection Service (AQIS) port inspectors regularly intercept khapra beetle in vessel holds, the Perth incursion was the first on the mainland. This made the discovery of greater concern and the need for total eradication essential.

The khapra beetle incursion was initially reported because the family was disturbed by the presence of beetles, larvae and cast skins throughout their belongings, which had taken six weeks to arrive by container ship. They sought help from a commercial pest controller who recognised the suspicious beetles from various literature and reported it to the Department of Agriculture and Food, Western Australia (DAFWA), who sent an inspector to collect specimens.

Adult and immature specimens from a breeding population were identified by the DAFWA taxonomist and these were later confirmed by CSIRO Entomology in Canberra.

Immediate and uncompromising action was taken through industry and government collaboration to quarantine the home, with the family being moved to a hotel with only the clothes they were wearing. The fumigation was managed by the Co-operative Bulk Handling Group using methyl bromide at the internationally agreed khapra beetle rate of 80 grams per cubic metre. To achieve this type of fumigation in a two-storey suburban home provided some interesting challenges.

The two-storey home was shrink-wrapped to ensure a high standard of sealing so that gas concentrations were maintained and monitored for 48 hours. Two days later holes were cut in the shrink wrap and the aeration process commenced. Within 12 hours methyl bromide concentrations had fallen to below the threshold limit, but pockets of higher concentrations remained. A further six days of aeration were required, so security guards were employed to protect the open house.

Professional cleaners were engaged as soon as the house was habitable. Unfortunately the house still had a malodour and the 'decaying body smell' attracted many blowflies and flesh flies to the house, adding to the residents' displeasure.

After extensive gas testing throughout the house the malodour was found to be dimethyl disulphide, most likely to have formed from a reaction between the fumigant and sulphur in the poorly refined carpet underlay.

The carpets were removed, and industrial fans and an ozone generator were used to try to remove the smell. Eventually a forensic cleaning company was employed to clean the whole house and contents, while the family dealt with washing and dry cleaning all clothing, sometimes multiple times to totally remove the odour.

Six weeks after the detection of khapra beetle the family were able to return to their home.

The container in which the family's possessions had arrived was traced by AQIS and inspected on arrival in Norway by AQIS officials, but no khapra beetle infestation or food residues could be found. Trace-back work has so far not indicated where the infestation took place.

Although the incursion was successfully controlled and no khapra beetles have been recorded in the first 12 months of a two-year trapping program, much was learnt about the logistics, costs and unforseen chemical reactions associated with achieving this outcome for a single incursion. The identification of this incursion by a commercial pest controller reinforced the importance of communication to all potentially involved parties within and external to the grains industry. □

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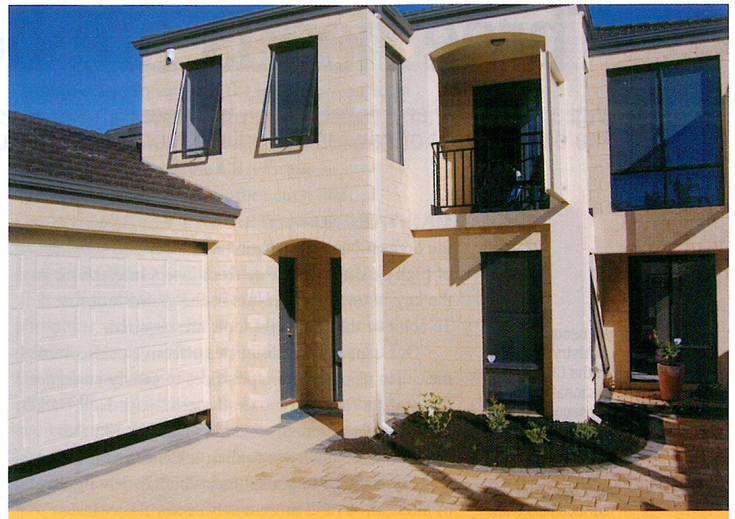
## KHAPRA BEETLE: A SERIOUS PEST OF ALL STORED GRAIN

The khapra beetle is classified as a high-risk exotic pest by the National Grains Industry On-Farm Biosecurity Program, impacting on market access and production costs.

Main issues with khapra beetles:

- adults have wings but do not fly;
- insects are spread in infected grain;
- insects are only 2 to 3mm long;
- it can damage up to 30 per cent of grain before it is noticed;
- phosphine fumigation is not very effective;
- larvae can survive more than a year without food; and
- its existence reduces the number of overseas markets.



A COMMERCIAL PEST CONTROLLER RECOGNISED THE SUSPICIOUS BEETLES


Fumigating the two-storey Perth residence: before (above) and after shrink-wrapping for the control of an incursion of the exotic stored-grain pest khapra beetle.

PHOTOS: ENTOMOLOGY BRANCH, DAFWA