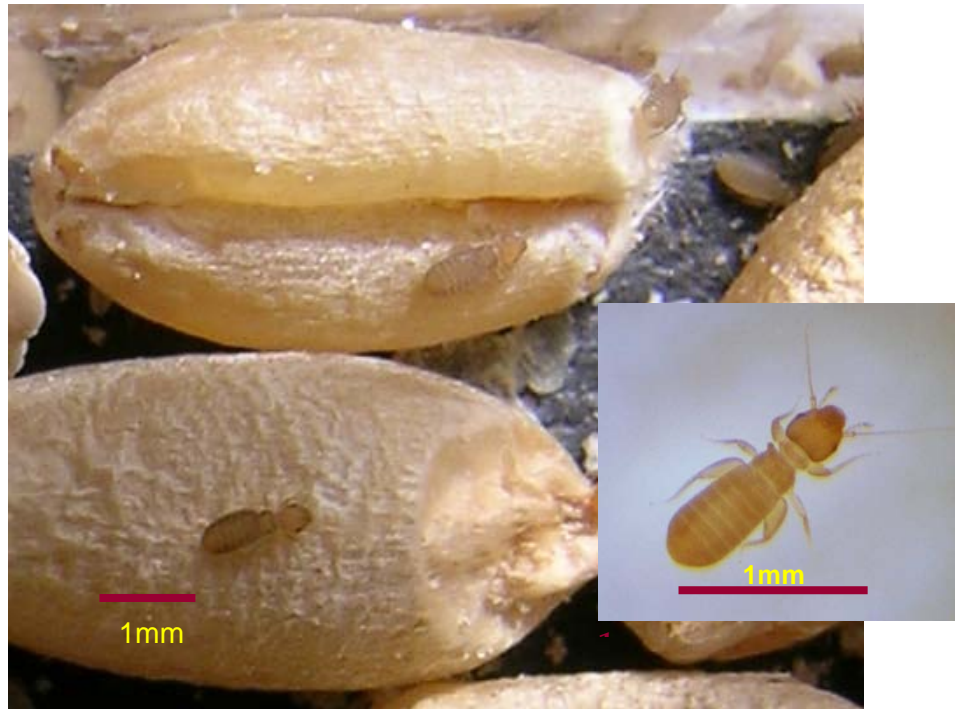


DPI&F note

Grain storage – psocid pests (or booklice)

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Psocids on wheat grains

Introduction

In the past 10 years, psocids have emerged as important pests in grain storages in Australia. Psocids (pronounced 'so kids', also called booklice) are tiny termite-like insects. These are common grain pests, but are not seen usually because they are the size of specks of dust. When present in large numbers they appear as a moving carpet of dust on the grain, silos and sheds. Psocids infest a range of commodities including wheat, barley, sorghum, maize, rice beans pulses, oilseeds and cassava.

The most cosmopolitan species of psocid in Australia is *Liposcelis bostrychophila*. *L. entomophila* occurs mostly in warmer summer rainfall zones of Queensland and northern NSW. *L. decolor* occurs mostly in winter rainfall zones of WA, SA and southern NSW. One or more of these species have been detected in almost all grain handling facilities in Australia. Central storage and export terminals are worst affected with regular population outbreaks, control failures and reinfestations.

Biology

Psocids thrive under warm, moist conditions. Under favourable conditions of 30°C and 70% relative humidity, psocids will multiply by 25 times in a month. Under these conditions the life cycle of psocids takes 21 days.

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Because of their rapid growth in warm, moist conditions, they usually reach peak numbers during late summer. They are more common in the higher humidity of coastal regions than in drier inland areas. Infestations of psocids are generally more conspicuous in commodities with high moisture content and contaminated with mould.

Damage

Psocids are secondary feeders, i.e., they excavate the soft endosperm of damaged or cracked grain. They feed preferentially on the germ, eating out the germ by first gaining access via damaged seed coat caused by harvesting, handling and other “primary” stored grain insect pests. Their feeding causes damage only when numbers are high. Huge infestations can spread to storage structures, machinery and walkways, sometimes in the form of a moving carpet of brown “dust”. They can cause discomfort to workers handling infested grain. The presence of “zones” of heavy psocid populations in grain storages can cause build-up of grain temperature and high humidity. This can result in spoilage of grain.

Many markets will not accept produce infested with psocids. This reason is sufficient to justify control measures.

Control

The three main psocid species differ markedly in their susceptibility to particular insecticide treatments. However almost all infestations are comprised of at least two species. Therefore, treating an infestation with a single chemical insecticide where more than one species are present may result in incomplete control and subsequent reinfestation by the tolerant species. Reliance on chemical control alone will often not work!

If serious infestations of psocids persist, it may help to have the psocid populations closely **examined by specialist** who should be able to identify the **particular species present**. Send insect specimens to: Food Protection Team, DPI&F Entomology, 80 Meiers Road, Indooroopilly, Qld., 4368. Note: Please be sure to attach full details of origin of the specimens, your full contact details, details of previous treatments applied. It is always risky to use a chemical to control a mixed infestation, specifically where the tolerant species *L. entomophila* is present. However, when an infestation is exclusive to one species of psocid, the suggested grain protectant insecticides are:

Protectant Insecticide	Species controlled		
	<i>L. bostrychophila</i>	<i>L. entomophila</i>	<i>L. decolor</i>
Organophosphates (OP's): eg, Fenitrothion (eg, Fenitrothion 1000®), Pyrimiphos-methyl (eg, Actellic®), Chlorpyrifos-methyl (eg, Reldan®)	Yes	No	Yes
Deltamethrin (eg, Deltashield®)	no – all species		
Deltamethrin + piperonyl butoxide (eg, K-Obiol Combi®)	no – all species		
Carbaryl	no – all species		
Methoprene (eg, Diacon®, DiaconS®)	no – all species		
Chlorpyrifos-methyl <u>plus</u> spinosad* eg, Reldan® + Conserve®* (applied to grain)	yes – all species		
Combination OP + carbaryl , eg, fenitrothion <u>or</u> pyrimiphos-methyl <u>or</u> chlorpyrifos-methyl, <u>plus</u> carbaryl (applied to structures)	yes – up to 10 months protection on steel surfaces– all species		
Azamethiphos, eg, Alfacron® (applied to structures – <u>not</u> on surfaces which come into contact with grain)	yes – 5g/litre water on steel and 10 g/litre on concrete		
Dichlorvos, (eg DDVP®, Divap®)	effectiveness uncertain – all species		
Diatomaceous earths / inert dusts (eg, Dryercide®, Absorba-cide®)	not effective at high relative humidity (>60% r.h., 13% grain moisture) – all species		

Source: Manoj Nayak and Pat Collins, QDPI&F, 2005. * Spinosad expected to be available on Australian market, 2007.

Recommendations for managing psocids

Strict hygiene practices in and around grain or produce storage and handling areas are essential for control.

- Remove and destroy unwanted, infested produce by burning or burying.
- If infested produce is to be kept, fumigate as described below.
- Clean up and destroy grain dust and grain residues at least weekly.
- Clean grain storages and handling equipment before handling new uninfested produce.
- Spray the walls and floors of warehouses and sheds with azamethiphos (Alfacron®), 5g/litre water for steel storages, 10g/litre water for concrete storages (applied at 20 litres/ square metre surface), but **do not spray surfaces that come into contact with the grain or produce.**

Because of their need for warm, moist conditions, psocid numbers can be kept low by:

- reducing temperature below 20°C, for example by aeration, or
- reducing moisture below 60% relative humidity or 13% moisture for cereal grains, for example by drying.

Fumigation with phosphine will kill psocids **only if it is done in a sealed, gas-tight storage.** Dosages lower than recommended on the label often allow psocid eggs to delay their development, during the fumigation.

Reinfestation due to subsequent hatchings can then occur after the fumigation period is over. Apply 1.5 tablets per cubic metre and leave the enclosure sealed for 7 days if temperature of the produce is above 25°C, or for 10 days at lower temperatures. Air the treated produce before it is handled.

Further information

For more information on:

- fumigation – see DPI&F Note ‘Grain Storage - Insect control in stored grain’ (**CHECK LINKAGE ADDRESS**)
- aeration – see DPI&F Note ‘Grain Storage – aeration for cooling and drying’, at www.dpi.qld.gov.au/fieldcrops/3947.html (**CHECK LINKAGE ADDRESS**); GRDC Publications: ‘Aeration – how aeration works’, and ‘Aeration – what’s possible?’, both available at GRDC website, www.grdc.com.au/growers/as
- insect identification – see “Grain Storage-Identification of Insect Pests” (**CHECK LINKAGE ADDRESS**)
- Or, phone one of the National Grain Storage Extension Team.

Qld	Peter Hughes or Ken Bullen	07 4688 1200
Qld	Philip Burrill	07 4660 3620
Vic.	Peter Botta	03 5761 1647
SA	Peter Fulwood	08 8568 6422
WA	Chris Newman	08 9366 2309
NSW	John Cameron	02 9482 4930