

# Integrated Pest Management exploration

## Design and Technologies (food and fibre production)

### Content description: South Australian Scope and Sequence

#### YEAR 9

#### Analyse and make judgements on the ethical and sustainable production of food and fibre enterprises s

- examine, prioritise, and discuss solutions for the challenges facing agriculture in Australia such as: climate variability, pests, diseases, and weeds
- analyse food and fibre systems from different perspectives, for example, biosecurity

## TASK DESCRIPTION

Students will investigate South Australian Riverland business *Biological Services* and learn how their “products” are used in integrated pest management systems.

They will respond to a series of questions, using a format of their choice.

Teacher may guide students to complete some or all questions.

## RESOURCES:

### Biological Services website

Biological control agents and beneficial insects -  
Biological Services, Australia

<https://biologicalservices.com.au>

### Biological Services Key Pests and Biocontrol Solutions flyer

## SKILLS CHECKLIST

- using technical language
- clear and concise expression
- identifying key words in a question to construct responses
- locating and interpreting information on a website
- applying concepts in new contexts



# Integrated Pest Management exploration

*Biological Services* is a South Australian business producing beneficial insects for farmers to use to control pest species as part of integrated pest management programs.

Explore the **Biological Services** website:

Biological control agents and beneficial insects -  
Biological Services, Australia  
<https://biologicalservices.com.au>

1. Explain these terms:
  - a. insectary
  - b. integrated pest management (IPM)
  - c. biological control agents
  - d. pesticide resistance
2. List three pest species that affect tomatoes.
3. List three crops that are affected by silverleaf whitefly.
4. Compare how predatory bugs like *Orius* and parasitic wasps like *Encarsia* control pests.
5. Explain why Biological Services have to breed pest species like thrips and mites.
6. Select one beneficial species that *Biological Services* produce and describe how they are distributed for use on farms.
7. IPM uses biological control in combination with three other strategies: cultural control, varietal selection and chemical control. Select one of these and compare and contrast it to biological control.
8. Explain how biological control agents benefit humans and the environment.
9. *Biological Services* sell pheromone traps and yellow sticky traps as “IPM tools”. Predict how they can help farmers to manage insect pests.
10. Evaluate why green peach aphid is “a much feared insect”.
11. Analyse how biological control helps to reduce the risk of pesticide resistance.
12. Reflect on the reasons why some producers use two or three different biological control species at the same time.
13. If you could interview the manager of *Biological Services*, formulate three open ended questions (ie questions that do not require Yes/No answers) you would ask them about the business of breeding beneficial insects or IPM.
14. Imagine you have just started a new job with *Biological Services* where you have been given the task of finding and commercialising a biological control agent for an agricultural pest insect that currently does not have a biological control option. Which one would you target and why?



**Key Pests**

**Biocontrol Solutions**

**DIAMONDBACK MOTH**



**DIADEGMA**

**MOTHS (HELIOTHIS)**



**TRICHOGRAMMA**

**TWO SPOTTED MITE**



**PERSIMILIS**



**CALIFORNICUS**



**OCCIDENTALIS**

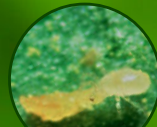
**WHITEFLY**



**ENCARSIA**



**ERETMOCERUS**



**MONTDORENSIS**



**NESIDIOCORIS**



**LAILAE**

**FUNGUS GNAT**



**HYOASPIS 'M'**



**DALOTIA**



**HYOASPIS 'A'**

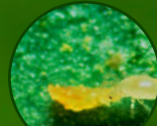
**THRIPS**



**CUCUMERIS**



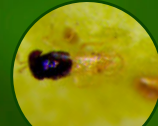
**ORIUS**



**MONTDORENSIS**



**LAILAE**



**THRIPBIUS**

**RED SCALE**



**APHYTIS**



**LINDORUS**

**APHIDS**



**APHIDIUS 'C'**



**APHIDIUS 'E'**



**APHELINUS**



**D.RAPAE**



**HIPPODAMIA**



**GREEN LACEWINGS**

**BRYOBIA, BROAD, RUST & BLISTER MITES**



**BRYOBIA  
RUST**

**BROAD  
BLISTER**



**DOREENAE**



**CALIFORNICUS**

## Biocontrol Solutions Index

- **Aphelinus abdominalis** - can attack over 200 aphid species but prefers larger species such as Foxglove Aphid (*Aulacorthum solani*) and Potato Aphid (*Macrosiphum euphorbiae*). It has a long lifespan, able to withstand high temperatures, and kills many hosts by direct feeding. Use in conjunction with *Aphidius*.
- **Aphid Parasite Mixture** - a mix of the 4 parasites is supplied where several aphid species may be present, or if aphid species is not confirmed.
- **Aphidius colemani** - will parasitise many of the smaller aphid species including the major pests of greenhouses Green Peach Aphid (*Myzus persicae*) and Cotton/Melon Aphid (*Aphis gossypii*).
- **Aphidius ervi** - attacks a range of larger aphid species including (*A.solani*), (*M.euphorbiae*) and *Acrythosiphum* species.
- **Aphytis melinus** - main parasite of Red Scale for Citrus crops in mediterranean climates.
- **Californicus** - tolerates hot/dry conditions. Feeds on a range of mite species including Broad Mite, Cyclamen Mite and Two Spotted Mite. Will persist in the crop in the absence of Two Spotted Mite by feeding on other mite species, pollen, and small insects. More tolerant of pesticide residues. Use where conditions do not favour *Persimilis* e.g. too hot/dry, boundaries, hotspots, tree crops. Is available in sachets.
- **Cucumeris** - preys on eggs and first instar Thrips on foliage and in flowers, main Western Flower Thrips predator for Strawberries. Establishes quickly on pollen-producing crops. Aids in control of Broad Mite. Effective on Onion Thrips for Onion storage. Is available in sachets.
- **Diaeretiella rapae** – able to parasitise the major aphids of Brassica crops – Green Peach Aphid (*M.persicae*), Cabbage Aphid (*Brevicoryne brassicae*) and Turnip Aphid (*Lipaphis pseudobrassicae*).
- **Dalotia** - soil dwelling beetle feeds on a wide range of small insects, mites, and fly eggs. Can tolerate wet conditions and aids in control of Shoreflies and Thrips. Use in conjunction with *Hypoaspis* 'M'.
- **Diadegma** - parasite of Diamondback or Cabbage Moth larvae. Regular inoculation of Brassica crops reduces the need for chemical controls.
- **Doreenae** – inhabits outdoor perennial crops such as Grapevines, Almonds, Pome and Stonefruits. Feeds on a wide range of pest mites including Rust, Blister, Broad and Bryobia Mites. Is available in sachets.
- **Encarsia** - used worldwide for Greenhouse Whitefly on vegetables and ornamentals. Works best in temperatures above 20°C.
- **Eretmocerus** - *E.hayati* for Silverleaf Whitefly. *E.warrae* for Greenhouse Whitefly. Both species can withstand high temperatures and kill many hosts by direct feeding. Use in conjunction with *Encarsia*.
- **Green Lacewings** (*Mallada signatus*) – predators of aphids and other soft bodied pests such as mealybugs/scales, moth eggs and small caterpillars.
- **Hippodamia** - generalist ladybird predator. Most commonly associated with aphids, but also known to feed on whitefly nymphs, moth eggs, psyllid nymphs, and some mite/Thrips pests when preferred prey is unavailable.
- **Hypoaspis 'A'** - soil dwelling predator with an appetite for Thrips pupae in the soil. Also controls Bulb Mite in Lillium/Bulb crops, and Chicken Mite (*Dermanyssus* sp).
- **Hypoaspis 'M'** - soil dwelling predatory mite preys on larvae of Fungus Gnats and other small organisms in the top of the root zone. Also controls Snake Mite in reptile enclosures.
- **Lailae** - feeds on eggs, crawlers and young nymphs of both Silverleaf and Greenhouse Whiteflies. Attacks Thrips by preying on first and second instar Thrips. Well suited to Greenhouse crops and outdoors where humidity present.
- **Lindorus** - feeds on a range of armoured scales such as Red Scale, Oleander Scale, Purple Scale, as well as some soft scales and mealybugs. Mostly used in nurseries, interior landscapes and greenhouses.
- **Montdorensis** – mostly used in greenhouse crops for Greenhouse and Silverleaf Whiteflies. Also a major predator of Thrips. Is available in sachets.
- **Nesidiocoris** - voracious general predator particularly of whiteflies, moth eggs and small grubs. It will also attack Thrips, Mites and Aphids. It is mostly used in Tomato and Eggplant crops.
- **Occidentalis** - Spider Mite predator, tolerant of very hot/dry conditions. Resistant to organophosphate and carbamate insecticides. Mostly used in tree crops such as Pome fruit.
- **Orius** - predatory bug that can feed on all active stages of Thrips especially in flowers. Used mostly in Capsicum, Chilli, Strawberry and flower crops where a pollen source is available.
- **Persimilis** - voracious Two Spotted Mite predator. Thrives in warm, humid conditions. Is the main control agent for Spider Mite in Greenhouse crops, Strawberries and Raspberries.
- **Thripobius** - tiny wasp specific to Greenhouse Thrips (*Heliothrips haemorrhoidalis*).
- **Trichogramma** – moth egg parasites used to aid in control of *Heliothis* and many other caterpillar species.