Department of Primary Industries and Regional Development
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Protect Grow Innovate

PestFacts WA

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Increase in diamondback moth numbers

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Image 1: Diamondback moth larvae captured by sweep netting canola. Photo courtesy of: Amber Balfour-Cunningham (DPIRD).

Diamondback moth (DBM) caterpillar numbers have increased in some canola crops in the northern agricultural region recently. Growers and agronomists are encouraged to inspect canola crops with an insect sweep net and be prepared to act if numbers have reached thresholds to prevent economic damage. DBM thresholds for control at late flowering (no moisture stress) are 100 or more per 10 sweeps, and 150 to 200 caterpillars per 10 sweeps at pod maturation.

Research Scientist Christiaan Valentine (DPIRD) has found a range of 105 to 450 DBM caterpillars per 10 sweeps (average 272 per 10 sweeps) in late flowering/podding canola at Carnamah. This is up from 14 to 24 DBM caterpillars in 10 sweeps (average of 19 per 10 sweeps) recorded 12 days earlier, indicating a recent rapid increase in DBM numbers, likely due to the warm weather.

Further north, Christiaan found 99 to 132 DBM caterpillars per 10 sweeps (average 121.8 per 10 sweeps) in late flowering/podding canola at Tenindewa. This is up from 34 to 43 per 10 sweeps (average of 38 per 10 sweeps) recorded 13 days earlier. Christiaan noted that while DBM numbers were approaching the threshold, not much damage was visible on the plants. At Moonyoonooka, Christiaan found 2 to 25 DBM caterpillars per 10 sweeps (average 12 per 10 sweeps) in late flowering/podding canola.

David Cameron (Farmanco) has reported a notable increase in DBM larvae at Moora and surrounding areas in the northern agricultural region. He commented that threshold levels have been found recently in more advanced crops. A grower at Bindi Bindi has found 57 DBM caterpillars per 10 sweeps in a late flowering crop this week, which was a significant increase from 2 caterpillars per 10 sweeps found a week earlier.

In the central agricultural region, Research Scientist Amber Balfour-Cunningham (UWA/DPIRD) found an average of 22 caterpillars per 10 sweeps in later flowering canola at Quelagetting, North Cunderdin. Amber noticed some damage to flower petals and saw DBM caterpillars chewing leaves in the upper canopy. In the previous fortnight there was less than 1 DBM per 10 sweeps on average.

Technical Officer Danae Warden (DPIRD) has been finding below threshold numbers in late flowering/podding canola at Northam (average of 15 caterpillars per 10 sweeps), York (average of 22 per 10 sweeps), Wongan Hills (average of 37 per 10 sweeps) and Bolgart (average of 24 per 10 sweeps).

Technical Officer Joel Kidd (DPIRD) has found either no DBM or very low numbers of DBM caterpillars in flowering canola crops in the Esperance region, including Howick, Dalyup, Neridup, Gibson, Cascade and Munglinup.

Insect fungal disease found on diamondback moths

- Cadoux

Image 2: Diamondback moth caterpillar infected with entomopathogenic fungus. Photo courtesy of: David Stead (Anasazi Agronomy).

Image 3: Diamondback moth larva and pupa infected with entomopathogenic fungus. Photo courtesy of: David Stead (Anasazi Agronomy).

David Stead (Anasazi Agronomy) reports finding DBM larvae and pupae heavily infected with entomopathogenic fungus (insect fungal disease) in canola near Cadoux. The fungal infection is having a detrimental effect on the DBM population and has greatly reduced the caterpillar numbers in the crop. This fungus is specific to DBM and does not infect plants. Like other fungal spores, it is always present in the environment and only establishes when conditions are suitable, such as a moist canopy from recent morning dews and moderate to warm daytime temperatures.

Monitoring and managing diamondback moths

Spring is when most DBM damage typically occurs in canola crops. For information on this year’s spring temperature and rainfall outlook, refer to DPIRD's latest Seasonal Climate Outlook.

For information on DBM monitoring and management refer to the 2024 PestFacts WA Issue 14 article Diamondback moth activity is increasing in some crops.

If numbers warrant spraying then growers and consultants can refer to DPIRD's 2024 winter spring insecticide guide.

DPIRD research trials have shown that late season application of insecticide (especially multiple sprays) against DBM is less likely to result in a profitable outcome than early and mid-season pest control. This is mainly because DBM have less impact on yield once crops stop flowering. Visual surface grazing and scarring of pod walls and stems will occur from DBM caterpillars feeding in the late season. This may result in a minor reduction of grain filling capacity depending on the number of caterpillars, soil moisture levels and length of time to harvest. For this reason, the threshold of DBM numbers required to justify spraying will increase over time.

When checking crops with a sweep net be mindful that small native budworm caterpillars can easily be confused with DBM caterpillars in canola crops. DBM caterpillars are usually pale yellowish green and tapered at each end of their body, which grows to about 10 mm long. They often wriggle rapidly when disturbed and will hang on a silken thread. Native budworm caterpillars are far more damaging as they grow to larger sizes (up to 40 mm long) and will chew into the pods.

Growers considering late applications of insecticides need to be mindful to adhere to label withholding periods prior to swathing/harvest.

Further information

To read about earlier DBM activity this season, refer to the 2024 PestFacts WA articles in:

- Issue 14 Diamondback moth activity is increasing in some crops
- Issue 9 Diamondback moth caterpillars are being found early
- Issue 4 article Diamondback moths in moisture stressed crops.

For more DBM information refer to:

- DPIRD's Diagnosing Diamondback moth page
- Grains Research and Development (GRDC) Diamondback moth is a sporadic but serious canola challenge factsheet
- GRDC's Managing diamondback moth video
- DPIRD's Protecting WA Crops newsletter March 2024 article Lessons learned from 5 years of monitoring diamondback moths and larvae across the five port zones of WA.

If you are sweep netting canola crops for DBM caterpillars, please use the PestFacts WA Reporter app to report and share your findings.

For more information contact Research Scientist Dustin Severtson in Northam on +61 (0)8 9690 2160, Technical Officer Alan Lord in South Perth on +61 (0)8 9368 3758 or Research Scientist Svetlana Micic in Albany on +61 (0)8 9892 8591.

Article author: Bec Severtson (DPIRD Northam).

Beneficial insects are active in canola crops

- Eradu South
- North Cunderdin
- Northam
- Esperance
- Mount Barker

Image 4: Diadegma wasp and diamondback moth caterpillar. Photo courtesy of: Amber Balfour-Cunningham (UWA/DPIRD).

Peter Norris (Agronomy for Profit) recently reported seeing large numbers of small beneficial insects, likely to be Diadegma wasps, active in a late flowering canola crop at Eradu South. Diadegma wasps are a natural enemy of diamondback moth (DBM), and high rates of parasitism have been observed in crops that have not had broad-spectrum insecticides applied. Peter commented that he had never seen so much parasitoid wasp activity in a canola crop before and pointed out that this paddock had received limited prophylactic insecticide sprays.

Lacewing adults and hoverfly larvae, known to be generalist insect predators, and aphid parasitoid wasps were also found in sweeps of the same crop by DPIRD Research Scientist Christiaan Valentine and Technical Officer Surya Dhakal. The crop is now at the late flowering/podding stage, and 99 to 132 DBM caterpillars per 10 sweeps (average 121.8 caterpillars per 10 sweeps) were found this week. This is an increase from 34 to 43 caterpillars per 10 sweeps (average of 38 per 10 sweeps) found 2 weeks earlier. Christiaan noted that while DBM numbers were approaching the threshold this week, not much damage was visible on the plants. Green peach aphid were present on the leaves but were not in concerning numbers, and no noticeable damage was found.

DPIRD Research Scientist and UWA PhD candidate Amber Balfour-Cunningham has found lacewing and hoverfly adults, which have predatory larvae, after sweeping a canola crop at Watercarrin, North Cunderdin. Amber also observed high numbers of aphid “mummies” at a canola crop in Northam. These are aphids that contain an aphid parasitoid wasp larva or egg and will be killed by the wasp. Aphid parasitoid wasp “mummies” look like swollen and hardened bronze-coloured aphids.

Image 5: Cabbage aphid mummies on canola. Photo courtesy of: Amber Balfour-Cunningham (UWA/DPIRD).

Brent Pritchard (Farmanco) has found small colonies of aphids on canola racemes, many of which were infected by entomopathogenic fungus (insect fungal disease), in a canola crop at Mount Barker. Pale or orange aphids indicate that fungal disease infection has occurred. Infected cabbage aphids often turn dark in colour and then form a dark grey ‘ooze’ of dead bodies, which later dries into a light to dark grey crust at the raceme terminals. This fungus is specific to aphids and can cause colonies to collapse. Like other fungal spores, it is always present in the environment and only establishes when conditions are suitable, such as a moist canopy from recent morning dews and moderate to warm daytime temperatures.

Diadegma wasp biology

Diadegma are black and light brown wasps, approximately 5 to 7 mm long, with prominent antennae and banded legs.

Image 6: Diadegma wasp side view. Photo courtesy of: Amber Balfour-Cunningham (UWA/DPIRD).

The adult wasps seek out small DBM caterpillars and then parasitise them. They do this by laying a single egg directly into the caterpillar which then develops into a wasp larva within

the caterpillar's body. When the parasitised caterpillar pupates, the developing wasp spins its silken cocoon inside the cocoon of the DBM. An adult wasp then emerges instead of a DBM moth. One female diadegma wasp can parasitise (kill) up to 300 DBM in her lifetime.

Diadegma may be confused with other species of wasps, including common hoverfly parasitoid wasps (*Diplazon* spp.), winged ants, native flies, and aphid parasitoid wasps.

Look for small black wasps flying in the crop, often hovering near leaves damaged by DBM larvae. Diadegma are attracted to chemicals emitted by canola leaves during caterpillar feeding damage.

Other signs of DBM parasitism that may be seen in the field includes parasitised DBM pupae (cocoons) on plants that are rounded on each end or "gherkin shaped", in comparison to DBM pupae that are pointed on one end or "torpedo shaped".

Image 7: Diadegma sp. parasitoid pupa on underside of a canola leaf from DPIRD and UWA's pest & beneficial insect surveillance canola crop in Northam. Photo courtesy of: Amber Balfour-Cunningham (UWA/DPIRD).

Research on diamondback moth parasitoids

Amber Balfour-Cunningham (UWA/DPIRD) has previously found *Diadegma* spp. in sweeps of paddocks that have high parasitism of DBM (>50%), with a ratio of 1 diadegma wasp to 3 DBM larvae in each lot of 10 sweeps. DBM parasitoid wasps can be difficult to see in crops and sweeps due to their small size and strong flying ability.

DBM larvae can be dissected or "squished" in the field to look for parasitoid wasp larvae inside the DBM, however the DBM larvae may be parasitised and contain a wasp egg (0.05 mm) or young transparent parasitoid wasp larva (0.12 mm) that are difficult to see by eye or with a hand lens.

Improved monitoring and prediction methods for DBM parasitoid wasps and other winged natural enemies in canola is the focus of Amber's PhD research project. Amber's research is supported by UWA, the Grains Research Development Corporation (GRDC) and DPIRD with support from CSIRO.

Assessing beneficial insects in your crops

Some beneficial insects may be found while sweeping the crop, including parasitoid wasps, lacewings, hoverfly larvae, ladybird beetles, predatory bugs and predatory flies. Descriptions of many of the beneficial species present in broad-acre cropping can be found in DPIRD's Know what beneficials look like in your crop page.

Some beneficial insect species can be challenging to identify in the field, such as parasitoid fly species.

Beneficial insect activity is likely to be highly variable throughout the day and is also highly variable in different parts of the crop.

Managing beneficial insects for pest suppression

Avoiding calendar applications of insecticide sprays will assist the activity of existing natural enemies or beneficial insects to provide pest suppression.

Growers should consider insecticide options that are soft on beneficial insects if spraying for pests. Pyrethroids, organophosphates and other broad-spectrum insecticides will kill parasitoid wasps and other beneficial insects, which can suppress pests that were not controlled by a single spray application.

Pests such as DBM are also resistant to many broad-spectrum insecticides. If DBM numbers warrant spraying then growers and consultants can refer to DPIRD's 2024 winter spring insecticide guide.

For a list of insecticides with their toxicity to beneficial insects, refer to Cesar Australia's Beneficials Chemical Toxicity Table.

Research on beneficial insect activity

DPIRD is co-investing in a 5-year national GRDC project led by CSIRO. This project is researching the use of predatory insects that target canola pests, to manage canola pests. The project is a collaboration with the South Australian Research and Development Institute (SARDI), New South Wales Department of Primary Industries (NSW DPI) and Murdoch University,

Lady beetles, carabid beetles, hoverflies and parasitic wasps are examples of beneficial insects that consume canola pests.

In the first year of this project, DPIRD will determine whether early season pesticide applications impact the arrival time of beneficial insects that help control late season pests, and whether the early arrival of late season beneficials can help reduce late season pest populations.

Monitoring is an important tool for growers to determine threshold levels of insect pests. This project aims to encourage growers and consultants to also monitor for beneficial insects. Doing so could lead growers to delay spraying, track insect pest population changes across the season, or invest in more selective pesticides that protect beneficial insects.

Further Information

For more information on beneficial insects refer to DPIRD's Know what beneficials look like in your crop page.

You can also download or order a hardcopy of GRDC's Beneficial insects – the back pocket guide.

For more information contact Research Scientist Svetlana Micic in Albany on +61 (0)8 9892 8591.

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Basal sclerotinia stem rot in lupins and vetch

- Chapman Valley
- Northampton
- Bolgart

Image 8: Lupin plants with basal sclerotinia stem rot infection appear pale and wilted. Photo courtesy of: Ciara Beard (DPIRD).

Ongoing wet conditions and dense crop canopies have been favouring sclerotinia canopy infection in canola and lupin crops. Ground level (basal infection) is now being reported in lupin crops at Chapman Valley, Northampton, and Bolgart. Robert Campbell (Nutrien) has also found sclerotinia in a vetch crop neighbouring the lupin crop at Northampton and even in capeweed at the same site.

Image 9: Basal sclerotinia stem infection displayed as fluffy white fungal growth at the base of the lupin stem and sometimes black sclerotia are visible. Photo courtesy of: Ciara Beard (DPIRD).

Image 10:Sclerotinia infection on lupin flower stems and pods. Photo courtesy of: Robert Campbell (Nutrien).

Sclerotinia on lupins and other pulses is predominantly caused by *Sclerotinia sclerotiorum*, the same pathogen that causes sclerotinia stem rot in canola.

Growers in areas with a history of sclerotinia are reminded to monitor their pulse and canola crops for sclerotinia stem rot infection and consider sclerotinia management when their crops are close to or at flowering.

Symptoms

Sclerotinia canopy infection is the most common infection pathway with aerial ascospores produced by apothecia infecting petals during crop flowering. This is known as carpogenic germination of sclerotia. Lesions occur in the upper half of the lupin's main stem or branches and on pods. Basal sclerotinia is a different infection pathway where sclerotia

germinate myceliogenically and directly infect the stem at ground level in very wet conditions and seasons. The fungus moves through the soil and produces a white cottony-looking growth that girdles the stem, causing the plant parts above the lesion to wilt and die. Hard black sclerotia, 2 to 8 mm in diameter, are produced in the fungal growth or in the cavities of infected stems or pods. Sclerotia can survive in soil for several years and are the source of new sclerotinia infections for all broadleaf crops and pastures. *Sclerotinia minor* is another pathogen that can cause ground level collar rot in lupins, though it is considered to be much less common in WA. Sclerotia of *S. minor* are much smaller in diameter (0.5 to 2 mm) and look like poppy seeds.

Management

Research to date has shown that basal sclerotinia is very difficult to manage because the fungal infection is occurring at or below ground level. The lupin sclerotinia project is investigating some potential strategies but currently no foliar fungicides are registered or recommended for reducing basal sclerotinia infection in lupin. Foliar fungicide application, targeted at canopy infection in lupin, generally does not provide any reduction in incidence of basal sclerotinia infection or yield losses associated with it.

Sclerotinia is best managed before disease symptoms are seen. Foliar fungicides are registered for sclerotinia in chickpea, field pea, lentil and lupin but not other pulses. For further information refer to DPIRD's page Registered foliar fungicides for lupin and other pulse crops in WA .

Further information

Further information on sclerotinia canopy symptoms, fungicide management of canopy sclerotinia and identification of canola bloom stages was covered in the previous 2024 PestFacts WA articles:

- Issue 13 Sclerotinia and blackleg infections in canola and lupin canopies
- Issue 11 Sclerotinia stem rot update
- Issue 9 Sclerotinia disease in progress in WA.

Further information can be found at;

- DPIRD's Managing sclerotinia stem rot in canola page
- DPIRD's Managing sclerotinia in lupins page
- GRDC's Sclerotinia stem rot in canola factsheet.
- GRDC's Lupin sclerotinia disease risk assessment guide factsheet
- DPIRD's Registered foliar fungicides for canola in WA page
- DPIRD's Registered foliar fungicides for lupin and other pulse crops in WA page.

For more information on sclerotinia in lupins contact plant pathologists Ciara Beard in Geraldton on +61 (0)8 9956 8504 or Geoff Thomas in South Perth on +61 (0)8 9368 3262.

For more information on sclerotinia in canola contact plant pathologists Andrea Hills in Esperance on +61 (0)8 9083 1144 in Ciara Beard Geraldton on +61 (0)8 9956

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PestFacts WA webinar recording can now be viewed online

On Monday 26 August 2024 DPIRD Research Scientists Ian Foster, Ciara Beard, Geoff Thomas and Kithsiri Jayasena delivered a webinar on the topics:

- WA's latest climate outlook
- Foliar diseases that have been occurring across the WA grainbelt
- Managing disease risk.

The webinar recording is now available for viewing on the DPIRD YouTube channel and the presentation PowerPoint slides can be downloaded on the DPIRD About PestFacts WA webpage.

For more information on the webinar topics presented, contact Research Scientists Ian Foster in Perth on +61 (0)8 9368 3954, Ciara Beard in Geraldton on +61 (0)8 9956 8504, Geoff Thomas in Perth on +61 (0)428 947 287 or Kithsiri Jayasena in Albany on +61 (0)8 9892 8477.

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