PestFax

Apr 2017

Green bridge increases risk of early onset of fungal and virus leaf diseases and soil-borne pests and diseases

Growers and consultants are urged to identify what fungal, virus or soil-borne pests and pathogens are lurking in their green bridge and manage their cropping programs accordingly. If you are unsure of what you are finding use the PestFax Reporter app to send a report to the PestFax team requesting identification.

While there are plenty of reports of volunteer regrowth throughout the wheatbelt, the PestFax team had not received any green bridge disease reports when this issue went to print.

Significant rainfall experienced by growers in February and March across the Western Australian wheatbelt has resulted in weeds and crop volunteers germinating in paddocks and along roadsides. This vegetation can serve as a 'green bridge' for diseases which need a living plant to survive, such as rusts and viruses.

These weed and crop volunteers can also act as a between-season host for root diseases and aphids.

If weeds and/or volunteers are present at the start of the new cropping season, particularly in or adjacent to cropping paddocks, there is a greater risk of spread of pests and diseases to newly emerging crops.

Autumn regrowth/green bridge risks:

- Cereal volunteers significantly increase the chances of outbreaks of foliar diseases such as rust and powdery mildew during the cropping season. Leaf rust in barley was widespread in 2016, occurring further into central and northern regions than historically usual. In the Great Southern last year, leaf rust pressure was high and infection was found at early growth stages in varieties that possess adult plant resistance genes.
- Viruses. Wheat sown back into paddocks full of cereal volunteers are at greatest risk of wheat streak mosaic virus (WSMV) infection. Ensuring an adequate fallow period for complete death of volunteer plants before sowing will reduce risk for this disease. The green bridge can give aphids a chance to build-up which can increase the risk of early incursion of barley yellow dwarf virus (BYDV) (hosted by cereals) and beet western yellows virus (BWYV) (hosted by volunteer canola and cruciferous weeds). If you have symptomatic looking plants you are concerned about, they can be tested for the presence of virus through DDLS - pathology services. Appropriate use of insecticide seed dressing or foliar insecticides to address early season aphid infestations may be useful in high risk environments.
- Soil-borne pests and diseases. Major soil borne pathogens and nematode pests that impact our broadacre cropping areas (plant parasitic nematodes, crown rot, rhizoctonia and take-all) are all favoured by the moist soil conditions that occur after summer/early autumn rainfall events. They can readily multiply on roots of cereal volunteers, then transfer directly to emerging crop seedlings if there is no 'fallow' period between death of sprayed autumn volunteers and sowing of this year's crop.

Disease management strategies

Growers need to kill weeds and crop volunteers, including those along fencelines, prior to the start of the cropping program to reduce potential pest and disease outbreaks. Ideally there needs to be a break (a fallow period) of at least two weeks free of vegetation capable of hosting disease or pests prior to sowing. To achieve this, the weeds and volunteers should be sprayed with a herbicide at least four to six weeks before sowing, to ensure weeds are completely dead at planting.

Alternatives to herbicides are to heavily graze or cultivate weeds and crop volunteers which will reduce their potential as a 'green bridge' or host of diseases and pests.

In addition to managing the green bridge growers can;

- Sow clean seed.
- Know the latest disease ratings of your varieties and plan accordingly. Crop variety guides are available for all grains on the DAFWA website, which document the disease susceptibility for each variety.
- Consider applying in-furrow or seed dressing fungicides to reduce your risk of early infection of rusts and powdery mildew in susceptible varieties and rhizoctonia, crown rot and take-all. For more information see DAFWA's Seed dressing and in-furrow fungicides for cereals in Western Australia.
- In case of early disease outbreak, budget for early foliar fungicide sprays where upfront fungicides are not used. For more information visit DAFWA's Registered foliar fungicides for cereals in Western Australia.
- Maintain crop health. Healthy crops are better able to withstand disease attack so plan to apply adequate nutrition, particularly potassium. Be careful to avoid excessive nitrogen though as this can cause dense canopies that favour powdery mildew build up and increases the risk of crown rot white head expression if the season ends with a dry finish.
- Reduce exposure to stubble through rotation and careful paddock planning (to avoid sowing on or adjacent to infected stubble) or stubble management (such as grazing, windrowing, baling, incorporating or burning).
- Earlier sown crops may be more at risk of some foliar diseases such as powdery mildew so consider later sowing of susceptible varieties and at risk paddocks or at least plan to monitor earliest sown paddocks closely for disease.

For more information see DAFWA's Control of green bridge for pest and disease management and the Grains Research and Development Corporation's (GRDC) Green Bridge fact sheet.

For further disease forecasts and information on managing specific diseases see DAFWA's Crop diseases: forecasts and management.

For more information contact South Perth Research Officers; Brenda Coutts (virus diseases) on +61 (0)8 9368 3266, Geoff Thomas (foliar diseases) on +61(0)8 9368 3262, Sarah Collins (nematodes) on +61 (0)8 9368 3612 or Daniel Huberli (root diseases) on +61 (0)8 9368 3836, or Svetlana Micic (insects), Research Officer, Albany +61 (0)8 9892 8591.

2017 canola blackleg sporacle forecasts are now available and some canola varieties have reduced blackleg resistance ratings

DAFWA's first blackleg spore showers forecast for the season is now available online.

Blackleg epidemics are primarily initiated by airborne ascospores originated from matured pseudothecia (fruiting bodies) of the fungus on previous years' infected residues.

The DAFWA blackleg sporacle model predicts the onset of blackleg ascospore release from canola stubble for 25 canola growing districts of Western Australia.

The model is currently predicting that major spore releases are likely to coincide with the seedling establishment for the towns of Esperance Downs, Scaddan, Salmon Gums, Munglinup, Jerramungup, Mount Barker, Katanning and Darkan.

Early release of infective spores from old crop stubbles is anticipated to occur where there has been significant pre-seasonal rainfall coupled with cooler temperatures. Ravjit Khangura (DAFWA canola pathologist) encourages farmers in these areas to sow resistant varieties and plant canola at least 500m away from last year's canola residues. Use of in-furrow and seed dressing fungicides are likely to be cost-effective in high disease pressure situations.

The model also shows that depending upon the rainfall events in the coming two weeks the fungal fruiting bodies may mature earlier in Narrogin, Williams, York and Northam. Therefore, the blackleg risk is considered above average in these areas and where possible farmers are encouraged to use resistant varieties and other blackleg management options.

In some Central and Eastern districts (Moora, Tammin and Merredin), the spore maturity is at a very early stage, therefore, the risk of infection on canola seedlings is low for the earlier sown crops.

In some of the central (Wongan Hills, Badgingarra) and northern areas (Northampton, Eradu, Mingenew and Mullewa), spore maturation process has not yet commenced, consequently, the risk of spores falling at the susceptible seedling stage is currently very low.

Refer to the Canola blackleg spore maturity forecast for Western Australia page to check the blackleg sporacle model forecast for other districts. The blackleg spore shower risk will change each week as the season progresses depending upon the weather conditions in the coming weeks, therefore, growers are urged to check the weekly updates.

The overall risk of blackleg infection on a property will be determined by factors such as choice of resistant variety, paddock rotation, fungicide usage, distance from previous year's canola residues and stubble reduction.

Reduced resistance in canola varieties

The resistance ratings of some canola varieties have been downgraded due to their poor performance against blackleg in the majority of blackleg nurseries across Australia last year.

The triazine tolerant (TT) varieties ATR-Bonito, ATR-Wahoo and Pioneer 45T01TT are now rated moderately susceptible (MS) to blackleg in the latest GRDC Blackleg Management Guide. The Clearfield system varieties Pioneer 45Y88, Carbine and Archer are also now rated as MS to blackleg.

Growers who are planning to sow these varieties are urged to take extra care while implementing their blackleg management program.

Growers should consider;

- Sowing into paddocks that are out of canola rotation for more than three years.
- Avoiding sowing within 500m of last year's canola residues.
- Applying seed dressing and fertilizer applied fungicide.
- Budgeting for foliar application in case it is required.

For further details on blackleg management and current blackleg ratings refer to GRDC's Blackleg Management Guide (2017 Autumn variety ratings).

For more information contact Ravjit Khangura, Research Officer, South Perth on +61 (0)8 9368 3374.

Use the PestFax Reporter app to report and identify pests and diseases this season

The newly released PestFax Reporter app was a big hit in 2016 with more than 270 reports and many fantastic photos being submitted via this app. The PestFax team encourages the WA agricultural industry to exceed this number of reports this season!

We are also keen to receive more fabulous photos of insects, diseases and other crop and pasture disorders.

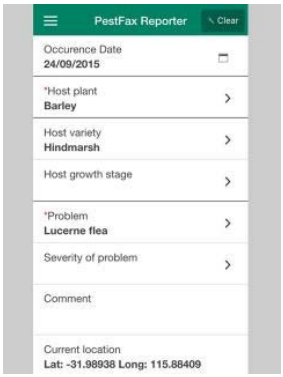
The PestFax Reporter app has been designed so users can quickly and easily report or identify any pests, diseases, weeds and other damage, such as frost directly from the paddock. The more reports that are received the more forewarned growers and consultants are of emerging pest issues in their areas. Reporting both the presence and absence of common disease or pests multiple times is encouraged so that a more detailed picture of the distribution and severity of a problem can be built up.

Where do I find the app?

It is a free app that is available for download from iTunes or Google Play.

How do I make a report?

Easy drop down selection lists help you to enter your information. You only need to enter the crop type and the problem and send the report. Any extra information about the situation that you can add, such as variety, growth stage of the crop and severity of the problem, will be appreciated



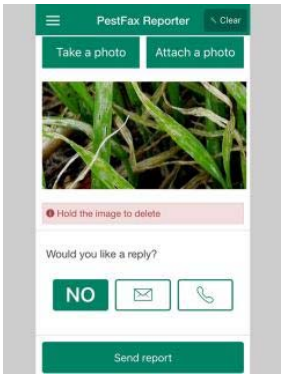
The PestFax Reporter app's selection screen.

What if I do not know what the insect or disease is?

Fill out as many drop down fields as you can and in the Comments section say that you require identification or add any extra information.

Users can upload a maximum of three photos. This is an easy process where you can take a photo during the report or attach a photo taken earlier. If you are not happy with the photo, press on the image to delete it and take it again. It is helpful if users can fill out any other information about the paddock scenario to assist DAFWA experts.

In the “Would you like a reply?” section select the email icon or phone icon to request an email or telephone reply/diagnosis from a DAFWA expert.



The PestFax Reporter app's photo upload screen.

How long does it take to fill out a report?

When used to the app reports can take as little as 20 seconds. If reporting the same insect or disease multiple times past reports can be updated with new information and submitted, saving even more time.

Do I need mobile coverage to submit reports?

No, users do not need mobile coverage. Fill out your report, click “Send” and your phone will send it automatically when you return to an area with coverage.

Why should I bother reporting common insects and diseases?

Every report received is displayed on the PestFax map and helps build a comprehensive picture of cropping issues during the season. This helps growers, industry and the department to react quickly and with appropriate information to manage crop constraints.

For instructions on using the app and more information visit the department’s PestFax reporter page.

For more information contact Art Diggle, Senior Research Officer, South Perth on +61 (0)8 9368 3563.

Identify what insects you are finding in the green bridge to prevent them damaging your emerging crop

The green bridge of weeds and volunteer crops that have germinated after heavy rains in February and March is expected to act as a between season host for many different insects and result in population build-ups. It provides a reservoir for aphids, caterpillars, beetles, weevils, wheat curl mites and viruses. If the green bridge and insects are not effectively controlled insect pests may be able to transfer onto freshly sown crops as they emerge and result in feeding or virus damage

While inspecting a paddock near Toodyay recently, DAFWA entomologist Dusty Severtson found both green looper caterpillars and turnip aphids on volunteer canola plants at the crop edge. Dusty noted that he has seen green peach aphids this early in the pre-season period, but this is very early to be seeing turnip aphids.

Growers and consultants are urged to check weeds and crop volunteers, identify what insects are present and assess their population levels, as different management techniques are recommended for different insects. For example, vegetable weevils can often build up in patches of capeweed and, because they require high rates of insecticide, are often overlooked until seedling crop damage is evident.

In particular growers need to be on the lookout for;

Aphids

Russian wheat aphids inside a curled leaf. Photo courtesy of: Frank Peairs (Colorado State University Bugwood).

It is important to identify what aphids are present and manage accordingly as sometimes aphids are found on plants that are not their preferred host, for example green peach aphids have been found on cereals.

Western Australian grain growers are also urged to check cereal volunteers and grassy weeds for the presence or absence of the exotic Russian wheat aphid (*Diuraphis noxia*) and damage symptoms following the detection of this aphid in South Australia, Victoria and New South Wales in 2016, and later in Tasmania. For information on diagnosing, reporting and managing the Russian wheat aphid click here.

For more information on identifying aphids refer to DAFWA's Diagnosing cereal aphids and Diagnosing canola aphids pages.

Caterpillars

Pasture webworm are brown caterpillars with black heads, which hide in web-lined tunnels during day

Webworm, cutworm, pasture day moth, brown pasture looper are some of the caterpillars that may also be hiding in the green bridge. Webworm caterpillars are commonly found damaging seedling cereal crops where they were allowed to build up on grassy weeds prior to sowing.

Slugs and snails

Black-keeled slugs. Photo courtesy of: Svetlana Micic (DAFWA).

Examine paddocks at night for slug and snail activity. Before seeding is a good time to put out slug traps, for example hessian bags or carpet squares, not only on the heavy country but also on the lighter soil types especially in long term no till paddocks. If one or more slugs are found under the hessian sacks they can damage emerging canola crops leading to re-seeding becoming necessary.

For more management information refer to DAFWA's Snail and slug control and Identification and control of pest slugs and snails for broadacre crops in Western Australia pages.

Mites and lucerne flea

Adult up to 2 millimetres long, uniformly red brown body with stout hairs covering the body.

Balaustium mites and bryobia (clover) mites do not have a cold temperature requirement so can be present all year round.

In contrast, redlegged earth mites and blue oat mites only hatch from over-summering eggs in the soil once there has been sufficient moisture and seven days of temperatures below 20°C. Lucerne fleas hatch in autumn after soaking autumn rains.

So it is important to know when these pests have or have not hatched yet relative to pre and post sowing insecticide applications.

Diamondback moths

Diamondback moth

The native diamondback moth (DBM) caterpillar is a serious pest of brassicas that is difficult to control. They are a problem when abundant early rains and mild winters allow them to multiply on volunteer canola plants and radish and mild autumn and winter conditions prompt DBM to move onto germinating canola crops and damage canola seedlings.

Free insect identification available

As part of a GRDC-funded project, the department offers free insect identification services. For more information on these refer to the Get your insects identified for free with DAFWA article in PestFax Issue 1 2017.

The PestFax team is eagerly waiting for any green bridge insect photos or reports to come in via the PestFax map and PestFax Reporter app.

For more information contact Svetlana Micic, Research Officer, Albany on +61 (0)8 9892 8591 or Dustin Severtson, Development Officer, South Perth on +61 (0)8 9368 3249 or 0427 196 656.

Get your insects identified for free with DAFWA

If you discover unfamiliar insects in your paddocks this season have them correctly identified by using one of the many free insect identification services provided by DAFWA.

Identifying and reporting the location of various insect pests to the department's PestFax map is important so that other growers and consultants can be aware of insect occurrences.

Growers and consultants can also download the department's PestFax Reporter app from iTunes or Google Play. Users can quickly enter a report, upload a maximum of 3 photos and request an email or telephone reply / diagnosis from a DAFWA expert. More information can be found at the department's PestFax Reporter app page.

Unfamiliar insects can also be identified for free by department entomologists Svetlana Micic and Dusty Severtson. This free pest identification service is funded by the GRDC's National Pest Information Service project.

Mail live specimens to:

- Department of Agriculture and Food Western Australia, 444 Albany Highway, Albany WA 6330, attention to Svetlana Micic.
- Department of Agriculture and Food Western Australia, 3 Baron-Hay Court, South Perth WA 6151, attention to Dusty Severtson.

Email good quality close up photos of the pest to department entomologists Svetlana Micic and Dusty Severtson.

For instructions on how to take photos and mail insect samples refer to the department's How to take a pest sample and send it in for identification YouTube video.

You can also find instructions at the department's Sending specimens for identification page.

Other free department insect identification tools and services that can be used to identify unfamiliar insects are;

- The MyPestGuide suite is composed of the apps; MyPestGuide-Reporter, MyPestGuide – Crops, MyPestGuide-Disease and MyPestGuide-Grapes. These apps allow users to report and identify pests such as insects, weeds, diseases and animals to DAFWA. Experts will identify your pest, reply back to your device and map it online.
- Pest and Disease Information Service (PaDIS). The Pest and Disease Information Service (PaDIS) provides advisory and identification services on animal and plant pests, weeds and diseases that impact Western Australia's agriculture and food industries. Phone 1800 084 881.
- MyCrop. MyCrop is a collection of interactive tools that bring crop diagnostics to the paddock. Growers select crop symptoms to identify the potential pest.

For more information contact Dusty Severtson, Development Officer, South Perth on +61 (0)8 9368 3249.

Manage stubble now to minimise frost risk later

Frost caused significant damage to crops in many parts of the WA Wheatbelt last season, highlighting the importance of having a comprehensive frost management strategy as part of annual farm

planning in frost prone areas. It should include pre-season, in-season and post frost event management tactics.

Research conducted through the GRDC National Frost Initiative (NFI) has found that pre-season stubble management influences both frost severity and duration.

Frost stubble research findings

Rebecca Smith, a Living Farm Research agronomist, has conducted 18 stubble management trials as part of the NFI between 2014 and 2016.

The key research findings were;

- Reducing stubble load reduced the severity and duration of frost events and resulted in less frost damage and better yields under frost. No differences were observed between stubble height, orientation or composition. Data to date suggest it's mainly a load issue.
- In frost prone parts of the landscape growers can minimise frost risk by reducing stubble loads back to grain yield potential, prior to seeding. This can be achieved by various approaches including cutting low, windrow burning/chaff carting, stubble mulching, raking and burning, strategic blanket burning and summer grazing
- Without frost, once off stubble reductions did not reduce yield and may give a slight improvement in yield due to reduced disease and less nitrogen tie up, depending on site, season and variety choice.
- With multiple severe frost events, stubble reduction did not increase yield

Please refer to Rebecca's 2017 GRDC Research Updates presentation and paper for more detailed information.

Is stubble removal cost effective?

The research sites that did experience moderate frost damage, stubble management practices reduced severity, duration and damage. An example of this was shown in York 2015 and 2016 where there was between $60-$200/ha increase in gross margin by reducing stubble to below 2t/ha.

The sites where frost damage was too severe, there was no negative impact of stubble removal on gross margin.

Where sites experienced no frost damage, there was an economic cost of removing stubble, mainly associated with nitrogen lost. This cost is higher with higher stubble loads.

So what's considered too much stubble and how do I calculate it?

In terms of minimising frost risk, a good rule of thumb is that stubble loads should match grain yield. For example, in a low production environment, 2t/ha grain yield potential = 4t/ha stubble and the stubble load needs to be halved at seeding, back to 2t/ha to minimise frost risk. In a medium production environment with 3t/ha grain potential = 6t/ha stubble, which needs to be reduced to 3t/ha to minimise risk. This calculation assumes a harvest index of 0.5. See Figures 1 to 3 to get a visual of stubble loads.

Take home message

Frost is difficult to manage and with seasons like 2016 it is hard to survive unscathed. Due to seasonal and spatial variability in frost, like all management practices, the ability of stubble management to manage frost risk is site, season and often landscape specific. Stubble management will only form one part of your frost management strategy so it's important to consider pre-season, in-season and post frost event management tactics to customise your management plan. For more information on the other tactics please refer to GRDC's Managing frost risk Tips and Tactics fact sheet.

Acknowledgments

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Further information

More information about frost management can be found in the GRDC's Managing frost risk Tips and Tactics fact sheet and the GRDC 2017 Research Updates Stubble management recommendations and limitations for frost prone landscapes presentation and paper by Rebecca Smith (Living Farm).

For more information contact Dr Ben Biddulph, Research Officer (project manager), DAFWA, South Perth on +61 (0)428 920 654 or Rebecca Smith, CROPS Group Coordinator, Living Farm, York, +61 (0)409 684 818.

All Page Links

[1] https://www.agric.wa.gov.au/sites/gateway/files/Volunteer%20ceraeals%20forming%20a%20green%20bridge.jpg
[2] https://www.agric.wa.gov.au/diseases/pestfax-reporter
[3] https://www.agric.wa.gov.au/mycrop/diagnosing-wheat-streak-mosaic-virus
[4] https://www.agric.wa.gov.au/barley/managing-barley-yellow-dwarf-virus-and-cereal-yellow-dwarf-virus-cereals
[5] https://www.agric.wa.gov.au/mycrop/diagnosing-beet-western-yellow-virus-canola
[6] https://www.agric.wa.gov.au/bacteria/ddls-plant-pathology-services
[7] https://www.agric.wa.gov.au/nematodes/nematodes
[8] https://www.agric.wa.gov.au/mycrop/diagnosing-crown-rot-cereals
[9] https://www.agric.wa.gov.au/mycrop/diagnosing-rhizoctonia-root-rot-cereals
[10] https://www.agric.wa.gov.au/mycrop/diagnosing-take-all-cereals
[11] https://www.agric.wa.gov.au/barley/seed-dressing-and-furrow-fungicides-cereals-western-australia
[12] https://www.agric.wa.gov.au/barley/registered-foliar-fungicides-cereals-western-australia
[13] https://www.agric.wa.gov.au/grains/control-green-bridge-pest-and-disease-management?page=0%2C0#smartpaging_toc_p0_s0_h2
[14] http://www.grdc.com.au/Resources/Factsheets/2010/01/Green-Bridge-Factsheet
[15] https://www.agric.wa.gov.au/barley/crop-diseases-forecasts-and-management
[16] mailto:brenda.coutts@agric.wa.gov.au
[17] mailto:geoff.j.thomas@agric.wa.gov.au
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[21] https://www.agric.wa.gov.au/canola/canola-blackleg-spore-maturity-forecast-western-australia
[22] https://www.agric.wa.gov.au/sites/gateway/files/Blackleg%20lesions%20canola%20RKhangura%20DAFWA.jpg
[23] https://grdc.com.au/Resources/Factsheets/2017/03/Blackleg-Management-Guide-2017
[24] mailto:ravjit.khangura@agric.wa.gov.au
[25] https://itunes.apple.com/au/app/pestfax/id998246180
[26] https://play.google.com/store/apps/details?id=au.gov.wa.agric.pestfax&utm_source=global_co&utm_medium=prtnr&utm_content=Mar2515&utm_campaign=PartBadge&pcampaignid=MKT-Other-global-all-co-prtnr-py-PartBadge-Mar2515-1
[27] https://www.agric.wa.gov.au/sites/gateway/files/PF-Reporter-screenshot-sele.jpg
[28] https://www.agric.wa.gov.au/sites/gateway/files/PF-Reporter-screenshot-phot.jpg
[29] mailto:art.diggle@agric.wa.gov.au
[30] https://www.agric.wa.gov.au/sites/gateway/files/Turnip%20aphids%20canola%20volunteers%20March17.jpg
[31] https://www.agric.wa.gov.au/sites/gateway/files/Green%20loopers%20canola%20volunteers%20DSevertson%20March17.jpg
[32] https://www.agric.wa.gov.au/sites/gateway/files/Russian%20wheat%20aphid%20pest%20of%20small%20grains%20inside%20curled%20leaf%20taken%20by%20Frank%20Peairs%20Colorado%20State%20University%20Bugwood.org_.jpg
[33] https://www.agric.wa.gov.au/barley/biosecurity-alert-russian-wheat-aphid
[34] https://www.agric.wa.gov.au/mycrop/diagnosing-cereal-aphids
[35] https://www.agric.wa.gov.au/mycrop/diagnosing-canola-aphids
[36] https://www.agric.wa.gov.au/sites/gateway/files/Pasture%20webworm.jpg
[37] https://www.agric.wa.gov.au/mycrop/diagnosing-webworm
[38] https://www.agric.wa.gov.au/mycrop/diagnosing-cutworm-cereals
[39] https://www.agric.wa.gov.au/mycrop/diagnosing-pasture-day-moth-damage
[40] https://www.agric.wa.gov.au/mycrop/diagnosing-brown-pasture-looper
[41] https://www.agric.wa.gov.au/sites/gateway/files/Black%20keeled%20slug%203_1.JPG
[42] https://www.agric.wa.gov.au/pest-animals/snail-and-slug-control
[43] https://www.agric.wa.gov.au/grains/identification-and-control-pest-slugs-and-snails-broadacre-crops-western-australia
[44] https://www.agric.wa.gov.au/sites/gateway/files/Photo%204%20Balaustium%20mite_1.jpg
[45] https://www.agric.wa.gov.au/mycrop/diagnosing-balaustium-mite
[46] https://www.agric.wa.gov.au/mycrop/diagnosing-bryobia-mite
[47] https://www.agric.wa.gov.au/mycrop/diagnosing-redlegged-earth-mite
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[49] https://www.agric.wa.gov.au/mycrop/diagnosing-lucerne-flea
[50] https://www.agric.wa.gov.au/sites/gateway/files/X11_0061%20Diamondback%20moth.jpg
[51] https://www.agric.wa.gov.au/mycrop/diagnosing-diamondback-moth
[52] https://www.agric.wa.gov.au/newsletters/pestfax/pestfax-issue-1-april-2017?page=0%2C4#smartpaging_toc_p4_s0_h2
[53] https://www.agric.wa.gov.au/diseases/pestfax-map?link=ri3i
[54] mailto:dustin.severtson@agric.wa.gov.au
[55] https://www.agric.wa.gov.au/sites/gateway/files/Turnip%20aphid%20wild%20radish%20JGalloway%20July16%20cropped.jpg
[56] https://www.youtube.com/watch?v=I5JL0qoPSAE
[57] https://www.agric.wa.gov.au/livestock-biosecurity/sending-specimens-identification
[58] https://www.agric.wa.gov.au/biosecurity/mypestguide-suite
[59] https://www.agric.wa.gov.au/biosecurity/pest-and-disease-information-service-padis
[60] https://www.agric.wa.gov.au/mycrop
[61] http://www.giwa.org.au/_literature_226139/Smith_Rebecca_S1_Stubble_management_recommendations

[62] http://www.giwa.org.au/_literature_225512/S1_Rebecca_Smith_2017
[63] https://www.agric.wa.gov.au/sites/gateway/files/1t%20per%20ha%20stubble%20portrait.jpg
[64] https://www.agric.wa.gov.au/sites/gateway/files/2%20t%20per%20hectare%20stubble%20frost%20portrait.jpg
[65] https://www.agric.wa.gov.au/sites/gateway/files/4%20t%20per%20ha%20stubble%20frost%20portrait.jpg
[66] https://grdc.com.au/Resources/Factsheets/2016/02/Managing-frost-risk-Northern-Southern-and-Western-Regions
[67] http://www.giwa.org.au/announcements/2017-grdc-grains-research-updates
[68] http://www.giwa.org.au/2017researchupdates
[69] mailto:ben.biddulph@agric.wa.gov.au
[70] mailto:rebeccas@livingfarm.com.au

Important disclaimer