

Biosecurity Manual for Sugarcane Producers

A guide to farm biosecurity measures to reduce the risks of weeds, pests and diseases impacting production

Version 1.0 January 2017





Plant Health Australia (PHA) is the national coordinator of the government-industry partnership for plant biosecurity in Australia. As a not-for-profit company, PHA services the needs of Members and independently advocates on behalf of the national plant biosecurity system.

PHA's efforts help minimise plant pest impacts, enhance Australia's plant health status, assist trade, safeguard the livelihood of producers, support the sustainability and profitability of plant industries and the communities that rely upon them, and preserve environmental health and amenity.

planthealthaustralia.com.au



CANEGROWERS is the peak body for Australian sugarcane growers. CANEGROWERS Australia represents around 80% of Australia's sugarcane growers. CANEGROWERS is a highly successful lobby, representation and services group, with 19 offices across Queensland and New South Wales. CANEGROWERS represents the Australian sugarcane industry as a member of PHA.

canegrowers.com.au



Sugar Research Australia (SRA) invests in and manages a portfolio of research, development and extension projects that drive productivity, profitability and sustainability for the Australian sugarcane industry. SRA is an industry-owned company, funded by a government matched statutory levy paid by growers and milling businesses.

sugarresearch.com.au



The Australian Sugar Milling Council is the peak body for sugar millers, and seeks to foster relationships with Governments and advocate on behalf of the sugar industry.

asmc.com.au

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Phone: 02 6215 7700
Fax: 02 6260 4321
E-mail: biosecurity@phau.com.au
Website: planthealthaustralia.com.au

An electronic copy of this manual is available from the website listed above and also from the Farm Biosecurity website farmbiosecurity.com.au

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Introduction

This manual is designed for use by farmers and their staff, contractors, millers, researchers and consultants working in the sugarcane industry. It shows simple procedures that you can use to minimise the risk of introducing and spreading weeds, pests and diseases onto properties.



You have an important role to play in protecting your farm, your region and the sugarcane industry from biosecurity threats. Under new legislation in Queensland and NSW everyone has a responsibility for the biosecurity risks under their control and this manual will help you meet these obligations.



Implementing the measures recommended in this manual in day-to-day operations will improve your farm's biosecurity.

It makes good business sense to avoid new pests and weeds as these can cause crop losses and management can be costly.

Every farm is different, so the general principles described here will need to be tailored to your needs.

The practices you choose will vary from site-to-site, depending on factors such as the size and location of your property, the facilities available, and the risks that need to be addressed.

While Australia has world-class border biosecurity, there is always the chance that new pests will make it into the country. Farm biosecurity measures are your best protection.

On page 28 there is a Biosecurity Checklist that will help you to assess the strengths and weaknesses of your current arrangements.

Your obligation

Times have changed. Everyone now has responsibility for reducing the risks posed by pests, diseases and weeds.

New legislation in Queensland and NSW sets out in law that biosecurity is everyone's responsibility.

Everyone has a role to play in safeguarding Australia from endemic and exotic pests. The obligations are described on page 6.

The threats

There are many exotic pests of sugarcane that Australia doesn't want in production areas. These are described at the back of this manual, along with information on established pests and weeds of biosecurity significance.

For each pest, examples are provided of the biosecurity measures that need to be used to prevent the entry and spread of pests and diseases onto properties.

Becoming familiar with these pest threats will make it more likely that you will notice them if they are present on your farm.



Copies of this manual are available from SRA or CANEGROWERS. An electronic copy is available on the Plant Health Australia website planthealthaustralia.com.au and the Farm Biosecurity website farmbiosecurity.com.au.

Biosecurity overview

By implementing the recommended measures in day-to-day operations, you will improve your farm's biosecurity and that of your region, minimising crop losses and additional costs.

What is biosecurity?

Biosecurity is the management of risks to the economy, the environment and the community, from new pests entering, establishing and spreading in your area.

Biosecurity is a shared responsibility and a national priority. Biosecurity involves government actions at the border, pre-border work in other countries, regional and interstate restrictions, emergency responses for new pests as well as measures on-farm. See diagram below

Pests and diseases do not respect farm boundaries or state borders.

Due to its geographic isolation Australia has been protected from many pests that growers have to contend with overseas.

Biosecurity is crucial to maintain this favourable pest status, safeguarding the future profitability and sustainability of Australia's plant industries.

What is farm biosecurity?

Farm biosecurity is a set of management practices and activities used to protect a property from the entry and spread of pests.

Farm biosecurity practices will help to protect your farm from weeds, established pests and diseases and from exotic pests in the event of an incursion. It applies to crop and livestock farming.

Regional biosecurity

Since biosecurity threats can be introduced from neighbouring areas including nearby towns, native vegetation and local properties (especially abandoned or neglected farms), farm biosecurity can be considerably strengthened by working collaboratively on area-wide management.

Contact others in your area to work together. It will allow a shared understanding of the local area to be developed—knowledge of both the source and nature of potential threats and local expertise and resources that can help.

In Australia, biosecurity involves three layers of protection



New laws related to farm biosecurity

Everyone has a role to play in safeguarding Australia from established and exotic pests.

Queensland: the general biosecurity obligation

The *Queensland Biosecurity Act 2014* came into effect on 1 July 2016. Under the new Act, everyone needs to take an active role in managing biosecurity risks under their control.

The general biosecurity obligation in the Act means that everyone must take all reasonable steps to ensure that they do not spread a pest, disease, weed seeds or contaminant and that everyone has a responsibility to report unusual events that might be related to biosecurity.

You are not expected to know everything about all biosecurity risks, but you are expected to know about risks associated with your work or day-to-day activities.

For example, farmers are expected to be aware of the pests and diseases that affect their crops and manage them appropriately, including reporting unusual symptoms or pests.

Department of Agriculture and Fisheries
Biosecurity Queensland

New biosecurity laws for Queensland

Biosecurity is the protection of the economy, the environment and the community from animals and plant pests, diseases and contaminants. It is critical to market access and the profitability and sustainability of our industries. It also safeguards Queensland's natural assets, our health and our way of life.

The *Biosecurity Act 2014* (the Act) came into effect on 1 July 2016. This brochure outlines how this new Act will affect you.

Why change Queensland's biosecurity laws?

Queensland's former biosecurity legislation consisted of many different Acts that were developed independently over the past hundred years. Because of this, there were many inconsistencies as well as laws that were not flexible enough to meet the challenges of today's biosecurity environment.

Queensland is facing more biosecurity threats more often. Global travel, trade in animal and plant products, and diversity of land use – all of which increase biosecurity risk – continue to grow. Also, Queensland's environmental diversity and climatic conditions favour the establishment of many exotic pests and diseases, so we can expect more biosecurity incursions than any other state in Australia. To cope, we need more flexible and responsive laws.

The new Act will improve Queensland's biosecurity preparedness and response capabilities. Under the Act, we will now be able to focus on biosecurity risks that impact our economy, our agricultural and tourism industries, our environment and our lifestyle. We will also be able to better manage the health risks associated with zoonotic disease transfer between animals and people.

What has changed?

The new Act replaced a list of legislation you might be familiar with. Importantly, the Act allows a consistent, modern, risk-based and time-prescriptive approach to biosecurity in Queensland.

The Queensland Government will continue to take immediate action to manage biosecurity risks. In fact, under the new Act, action can be taken if there is a reasonable belief that a serious risk exists, without having to wait for scientific confirmation.

The Act deals with pests (such as wild dogs and wombats), diseases (such as foot-and-mouth disease) and contaminants (such as feed or grazing land).

Decisions made under the Act depend on the likelihood and consequences of the risk. This will mean risks are managed more appropriately.

All Queenslanders need to take an active role in managing biosecurity risks under their control. Under the Act, individuals and organisations whose activities pose a biosecurity risk have greater legal responsibility for managing them. This **general biosecurity obligation** means they must take all reasonable steps to ensure they do not spread a pest, disease or contaminant.

Queenslanders need to report unusual events that might be related to biosecurity, for example abnormally high mortality or morbidity rates in animals and sudden, unexplained falls in production. They also have obligations for registering some animals and reporting their movements to allow for disease tracing.

Biosecurity zones have been introduced by legislation and used to manage, reduce or eradicate pests or diseases (such as the ants and banyan disease) across all or part of the state.

Further information

For growers in Queensland, further information is available from the Queensland Department of Agriculture and Fisheries. See daf.qld.gov.au/biosecurity/about-biosecurity/biosecurity-act-2014.

New South Wales: the general biosecurity duty

The *NSW Biosecurity Act 2015* supports the principle that biosecurity is a shared responsibility between government, industry and the community.

The inclusion of a general biosecurity duty in the legislation requires everyone in NSW to do what is reasonable to prevent, eliminate or minimise biosecurity risk.

The new legislation is expected to apply from 2017.

GENERAL BIOSECURITY DUTY

WHAT IS MY DUTY?

- Prevent Biosecurity Risks
- Eliminate Risks
- Minimise Risks

As much as is reasonable

WHEN DO I HAVE A DUTY?

If you deal with, or deal with a carrier of biosecurity matter you have a duty

e.g. weeds, animals, plants or machinery...

And if you should know that there is a risk

HOW DO I FULFILL MY DUTY?

By referring to:

- State Strategic Plans
- Regional Strategies
- Local Plans
- Guidelines & Advisory Material
- Codes of Practice & Industry Standards
- Mandatory Measures

How will the General Biosecurity Duty apply to me?

You are not expected to know about all biosecurity risks, but you are expected to know about risks associated with your industry, business, day-to-day work and your hobbies.

Further information

For growers in NSW, further information is available from the NSW Department of Primary Industries. See dpi.nsw.gov.au/content/biosecurity/biosecurity-act-2015.



Easy ways to protect your farm

Pests and diseases can severely affect your farm. It makes good business sense to reduce the risk by taking measures to improve biosecurity.



Simple practices can reduce the chance of pests, diseases or weed seeds entering and establishing on your farm. Each practice should be embedded in everyday management activities.

Use pest-free propagation material and varieties that are recommended for your region

Ensure sugarcane planting material (stalks, setts, billets, tissue culture plants) is purchased from reputable sources, and that it is free from pests, diseases and weed seeds. Request and maintain records that state the source and testing history of planting material to allow the origin of pests or diseases to be traced.

Do not move planting material between Queensland Sugar Cane Biosecurity Zones without approval. For more information see bit.ly/moving-restrictions

Manage people movement and the risks posed by vehicles and equipment

People can inadvertently carry pests and diseases. The use of biosecurity signs will alert visitors and contractors to any biosecurity measures that are in place on the farm.

Moving machinery between farms can spread pests and diseases. Ensure that staff and contractors comply with your biosecurity requirements.

Do not move sugarcane equipment between Queensland Sugar Cane Biosecurity Zones without approval. See above.

Adopt industry best management practices

Industry schemes such as Smartcane BMP which have pest management as a core component will assist in minimising pest risks on-farm.

Monitor your farm and report anything unusual

Ongoing vigilance is vital for early detection and control of pests and diseases. Check crops and fallow areas regularly for pests, diseases and weeds. Record the results of monitoring, even if you don't find anything. Become familiar with the pests in your area and be on the lookout for anything unusual. Factsheets on exotic pests of sugarcane are provided in the back of this manual.

If you suspect a new pest or disease may be present report it immediately to the Exotic Plant Pest Hotline. Early detection provides the best chance of eradication.

Abide by the law

Be aware of and support laws and regulations established to protect the sugarcane industry.

If you see anything unusual, call the Exotic Plant Pest Hotline



Farm biosecurity practices

This section outlines the recommended biosecurity practices for all sugarcane producers. Assess the strengths and weaknesses of your current arrangements using the Biosecurity Checklist on pages 28-31. Make a plan to address any gaps that might leave you at risk.

The biosecurity essentials

When thinking about implementing biosecurity measures on your farm, the six biosecurity essentials are a good place to start.

The biosecurity essentials are:

1. Farm inputs
2. People, vehicles and equipment
3. Production practices
4. Farm outputs
5. Feral animals and weeds
6. Train, plan and record

The actual management practices you choose will vary from site to site, depending on the size of your property(s) the infrastructure and the day-to-day management of operations.

If you are already following an accreditation scheme or industry best management practice guidelines (such as Smartcane BMP) it is likely to already include a biosecurity component.

There are many measures that you can put in place to improve biosecurity. To assist you in planning and prioritising improvements, there are Farm Biosecurity planning tools available.

Make a biosecurity plan using the six essentials.

A map of the property should be used to consider the best places to locate biosecurity zones or checkpoints. This could include signs at entrances, parking areas near the house or site office, where deliveries are picked-up or dropped off in relation to storage facilities, vehicle wash-down areas and roads or tracks for movement within the property. Think about what you can do to minimise the risk of introducing diseases, pests and weed seeds at each of the checkpoints.

Farm biosecurity

Simple everyday practices can help protect your property from biosecurity risks. The Farm Biosecurity website has resources for all Australian producers, including:

- crop and livestock specific information
- templates for records and signs
- biosecurity manuals
- checklists
- personal biosecurity toolkits
- information on exotic plant pests
- videos
- links to useful sites
- biosecurity action planner.

Find out more at:

farmbiosecurity.com.au

Secure your farm

...against diseases, pests and weeds



The Farm Biosecurity website farmbiosecurity.com.au/videos has a series of short videos on the six biosecurity essentials that show how easy it can be to implement simple but effective biosecurity measures on your farm. See page 27 for information on The Farm Biosecurity Action Planner and the FarmBiosecurity app.

Farm inputs

Almost anything moved onto your property can be a potential source of pests and diseases.

Monitor plant materials that enter the property, as well as sources of water (e.g. dams, drains or creeks) and fertiliser.

Ensure seeds for alternative crops and sugarcane planting material (stalks, setts, billets and tissue culture plants) are purchased from reputable sources, and that they are free of pests and diseases. Request and maintain records that state the source and testing history of planting material to allow the origin of diseases, pests or weeds to be traced.

Do not move planting material between Queensland Sugar Cane Biosecurity Zones without approval.



Monitor materials and equipment that enter your property

Choose sugarcane varieties recommended by Regional Variety Approval Committees which are free of pests, weeds and diseases.

Reduce the risk of purchasing contaminated or non-compliant fertiliser by ensuring that the supplier is following the Fertilizer Industry Federation of Australia (FIFA) Purchasing Code of Practice or has equivalent quality controls in place.

Purchase planting material from reputable sources

Infected planting material is a key risk to your business. Often, you will not be able to assess the quality of planting material just by looking at it. Plants that appear to be clean and healthy may still contain pests. It is therefore essential to source planting material from accredited suppliers.



Infected planting material can spread many pests, including Fiji leaf gall and Leaf scald

Sugarcane Productivity Services operate approved seed plots and coordinate the supply of tissue culture plants in all cane growing areas. The approved seed or tissue culture plants provide a nucleus that is multiplied on farm to supply commercial plantings.

Growers should purchase this nucleus source at least every one to two years. It must be planted into fallow land to prevent contamination by pests and diseases that could spread from volunteer plants.

Where possible, only plant cane that has been ratooned twice from the nucleus source and obtained from an approved seed plot or tissue culture. All plant sources should be inspected by your Sugarcane Productivity Service.

How to order sugarcane tissue culture

Creating new options for variety release and adoption

Also you will need to be set up to the QCANESelect™ ordering system as a user and sign the required contracts with SRA on conditions of agreement to receive supply of Tissue Culture plantlets.

Who can order sugarcane tissue culture seed cane:

- Growers via their local Productivity Board.
- Productivity Boards.

Contractual Agreements you will need to agree to:

- One between you/your organisation and SRA. (Agreement for the production and delivery of plantlets to a nursery) – SRA to organise.
- One between you/your organisation and Nursery. (Agreement for nursery harvesting and growing tissue culture plantlets to a stage ready for final planting) – you/your organisation to organise.

Order process:

- Contact George Piperidis on (07) 4963 8806, g.piperidis@sugarresearch.com.au or Prueann Lukinman on (07) 3355 3374, p.lukinman@sugarresearch.com.au

Stage	Deadline for advance planting	Deadline for spring planting
Grower/Productivity Board places order to SRA	1 July	23 November
SRA orders Mother Stock to Tissue Culture Company (TCC)	15 September	23 January
TCC supplies plantlets to Nursery for potting out/finishing	1 February	1 June (for Northern region) 23 June (for Southern region)
Grower/Productivity Board receives established plantlets from Nursery	Agreed date between Grower/Productivity Board and Nursery (should be ready from 1 March)	Agreed date between Grower/Productivity Board and Nursery (should be ready from August)

Recommended varieties of cane

The Australian sugar industry relies on using sugarcane varieties that are resistant to disease. It is vital that all producers adhere to this strategy to protect individual crops and the industry in a region.

QCANESelect™
variety selection made easy

QCANESelect™ is an online tool that provides growers with the ability to select the best variety for their region based on their local conditions and requirements. It is a free tool that is available to all growers.

Consult QCANESelect™, the SRA online variety information and decision support tool, to choose a variety for planting. Go to tools.sugarresearch.com.au/QCANESelect.

If you have to purchase planting material from another grower, or a planting contractor offers to supply you with planting material, ask questions about where the plants or propagation material come from, and always purchase cane that has been inspected by a Sugarcane Productivity Service provider. Once planted, regularly monitor growing plants for signs of pests or disease.

Never use poor quality or diseased planting material as it has the potential to infect your entire crop.

It is also recommended that you maintain a register of propagation material. Record information like the variety, crop class, the purchase date, the source of planting material used in each block, the area planted, and the block where the material was planted (paddock, date, etc.)

Follow the recommendations at QCANESelect, but double check your options with Productivity Services staff. Through the Regional Variety Approval Committees, Sugar Research Australia works closely with regional growers, Productivity Services and mill representatives to ensure that varieties are available that have good levels of resistance to the diseases in your area.

The varieties listed meet the requirements for minimising risks of disease and pest epidemics in each region. Every year the list is reviewed and new varieties are added.

Using only approved sugarcane varieties is a way to meet your general biosecurity obligation or duty under state legislation and assist in the prevention of a disease epidemic.

Since sugarcane is a perennial crop an epidemic could have serious long-term economic consequences for a district. In the event of a disease outbreak the industry cannot quickly replace susceptible varieties with resistant varieties.

More information about recommended varieties is at sugarresearch.com.au.

Use certified fertiliser

Fertilisers are another input that can potentially introduce diseases, pests and weeds to your farm. Organic fertilisers such as manure and compost can be a source of weeds if they are not composted thoroughly.

Reduce the risk of purchasing contaminated or non-compliant fertiliser by ensuring that the supplier is following the Fertilizer Industry Federation of Australia Purchasing Code of Practice, or has equivalent quality controls in place. See fertilizer.org.au for more information.



Fertiliser application

Reduce the risk of purchasing contaminated or non-compliant fertiliser by ensuring that the supplier is following the Fertilizer Industry Federation of Australia Purchasing Code of Practice

It is also recommended that producers record the source of organic fertilisers, delivery and application dates so that any problems can be traced back to the origin.

Keeping records of inputs and outputs is an essential part of good farm biosecurity.

Look for compliance with the Australian Standard AS4454 2012 that applies to compost, soil conditioners and mulches.

Here are a few things you can do to secure your farm against the biosecurity risks associated with the use of compost:

- Ask suppliers for testing history or assurances of quality.
- Keep a record of when batches were used on your farm and where they were applied.
- Regularly check the area for signs of new pests, diseases or weeds.
- If you are making your own compost, don't include source material that you know comes from diseased plants or animals.



People, vehicles and equipment

People, vehicles and machinery can carry pests and weeds onto and around your farm. Simple procedures can reduce this risk.



Pests and weeds can be spread in soil and on plant material that adheres to vehicles, equipment, footwear and clothing.

For this reason, anyone visiting your farm and any vehicles, equipment or machinery coming on to the property poses a potential biosecurity threat that can and should be managed.

Control people movement

Controlling and limiting access to production areas is a simple way to minimise biosecurity risks.

Although fences are not common practice in sugarcane production, ideally, there should be only one access point to the property. This minimises potential entry points for new pests and weeds and makes it easier for you to monitor and control visits.

Provide a designated parking area away from production areas and ask all visitors to let you know when they arrive.

Anyone who travels from farm to farm and region to region is an increased biosecurity risk to your property. This could include farm contractors, itinerant workers, earthmoving companies, employees of utility providers, research personnel, consultants, mining operators, and rail and road workers.

Get into the habit of doing a visitor risk assessment by asking them a few simple questions about their day, and where they have been recently to decide what kind of risk they might pose.

If you cannot reduce the risk by providing cleaning equipment or alternative clothing or footwear, it's okay to refuse access to parts of your property.

Ask all visitors to stick to paths and designated roadways as much as possible when moving around the farm.

Clean clothes and boots

Since weed seeds and pathogens like rusts can enter on people's footwear and clothing, it helps to have a clean clothes and boots policy for employees and visitors.

Provide scrubbing brushes and footbaths for people arriving with muddy boots, or give them rubber boots to wear in your production areas. Boots and equipment should also be cleaned when people leave your farm.

Boot covers and protective clothing should also be used in any areas of the property that you know to be contaminated with a notifiable or declared pest or weed.



Make sure that hygiene supplies are available for use where appropriate (e.g. hand sanitiser, gloves, disinfectant foot baths, scrubbing brushes and disposable overalls).

People who have recently returned from overseas pose more potential risk than others, if they have been in regions that have exotic pests. Make sure that they have clean footwear and clothes before entering the farm.

Biosecurity signs

Biosecurity signs like the one from the Farm Biosecurity Program help to control movement onto and around your property.

Signs at the main entrance to your property alert visitors to the need to comply with the measures you have in place. Other signs can show visitors where to park and where to clean down their vehicle or equipment, if needed.

Inform visitors of your biosecurity requirements

Make sure that staff, guests, regular visitors, and anyone entering your property knows about your biosecurity requirements.

Biosecurity signs are a good way to alert visitors of potential risks that their visit poses to your business and inform them of your requirements while on your property.

Parking restrictions will limit any problems posed by their vehicles.

Make sure workers know about any biosecurity risks in the region or issues on the property. They should also be familiar with everyday pests on the property and know how to report anything unusual.

If you hold a field day or equipment demonstrations on your farm, clearly indicate any entry requirements and be especially careful in checking for new pests and diseases afterwards.



Keep a record of visitors

It is good practice to maintain a visitor register to document who has been on your property, where they have come from, and where they are going on the farm, and after they leave. A suitable record sheet is on page 50.

Visitor or contractor records are useful tools in the event of an incursion because they can allow investigators to trace the origin and spread of a pest or disease.

A Contractor Biosecurity Checklist is available from the Farm Biosecurity website, farmbiosecurity.com.au. You can provide this information to visitors when they sign in, or leave copies near entrance gates to help raise awareness of farm hygiene.



Reduce risks posed by vehicles

It is impractical to stop all vehicle movement onto and around the property, but there are steps you can take to minimise the risks that they pose.

Best practice is to make sure that all vehicles are either restricted to a designated parking area or cleaned before entering production areas. Having a parking area on the property allows you to inspect a vehicle and decide what, if any, action you need to take.

Whenever possible, use dedicated farm vehicles to move through production areas. Those vehicles should not leave the farm. Otherwise provide a wash-down facility to clean vehicles before allowing them access to production areas.

Reduce the risks posed by machinery and equipment

Any machinery coming onto your property poses a risk of spreading pests and weed seeds. This is particularly the case with contractors involved in harvesting, planting or fertilising sugarcane or other crops.

Billets left in a billet planter, harvester or haul-out bin could be infected with diseases like ratoon stunting disease, leaf scald or Fiji leaf gall. If these billets are planted on your farm, they could introduce or spread these and other diseases around your property.

Providing a suitable wash-down facility away from production areas is a good way of assisting people to comply with requests to clean machinery.



Billets, harvester or haul-out bins could be infected with diseases

You have the right to ask contractors to clean machinery before entering and leaving your farm.

Another alternative is to only engage contractors who are signatories to an industry-recommended hygiene protocol or program.

To ensure that your property does not become a source of pests for others, you have a responsibility to inform visitors of any declared or notifiable pests present on your farm, such as Fiji leaf gall, to prevent spread.

Disinfect equipment

Wash and disinfect all planting equipment including harvesters, cane knives, whole-stalk cane cutters, planters and haul-out bins.

Always cut and plant the cane with machinery that has been thoroughly cleaned and disinfected.



Cleaning machinery reduces the risk of spreading pests between properties

Wash-down facilities

All vehicles and equipment that need to enter production areas can be cleaned more easily using high pressure water or compressed air.

Locate a wash-down area between the driveway and farm roads, and away from production areas. A sealed (concrete or bitumen) surface or a pad of packed gravel is ideal, with a sump to collect waste water and debris. Make sure mud, soil and plant material are kept away from crops, storage areas and waterways.

Inspect the area around the wash-down facility regularly for the presence of pests or weeds, and treat as required.

The wash-down area may be the same as that used for chemical wash-down of vehicles and equipment. If so, all occupational health and safety issues associated with chemical wash-down areas must be taken into account.

An on-farm wash down facility can also be used to clean machinery before moving between Queensland Sugar Cane Biosecurity Zones, however the machine will still need an inspector's approval first.

Queensland Sugar Cane Biosecurity Zones

It is vital to the sugarcane industry to stop the spread of unwanted pests and diseases. As a result, there are six biosecurity zones in place in Queensland with restrictions that must be adhered to.

Sugarcane machinery must be cleaned and inspected by an authorised inspector before it is allowed to move between Sugar Cane Biosecurity Zones.

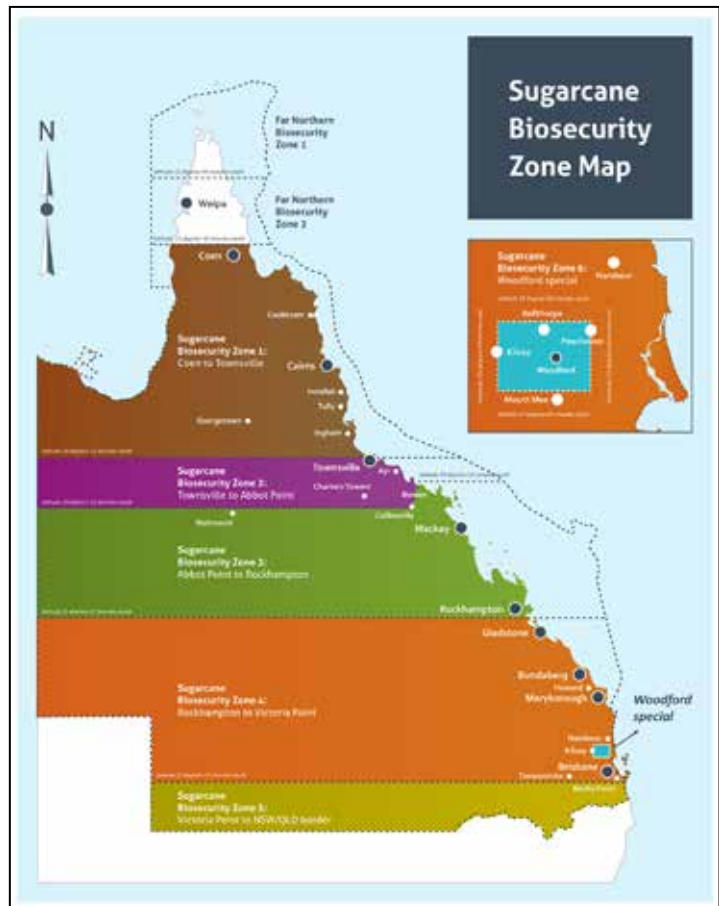
These biosecurity zones have been established to protect the industry from the spread of serious diseases like Fiji leaf gall.



Fiji leaf gall is caused by planting diseased setts or by infected planthoppers feeding on the plant

Sugarcane planting material is not allowed to be moved between biosecurity zones without approval from an inspector.

Always comply with these biosecurity restrictions to prevent the spread of pests and weeds.



Sugar Cane Biosecurity Zones are:

- Zone 1 – from Coen to Townsville
- Zone 2 – from Townsville to Abbot Point
- Zone 3 – from Abbot Point to Rockhampton
- Zone 4 – from Rockhampton to Victoria Point
- Zone 5 – from Victoria Point to the New South Wales/Queensland Border
- Zone 6 – Woodford special area.

A map of these areas is available from the Queensland Department of Agriculture and Fisheries website: bit.ly/sugar-zones

To locate an inspector or for more information contact the Queensland Department of Agriculture and Fisheries. See page 49.

Production practices

You can reduce the risk of spreading pests and diseases by using simple biosecurity measures as part of your everyday farm management practice.



Monitor crops and fallow areas for pests and diseases

Monitoring your crops and fallow areas provides the best protection against new pests, diseases and weeds. Any unusual pests or symptoms should be reported.

Importance of early detection

Monitoring the health of your crop is a fundamental part of farm management and gives the best chance of spotting a new pest soon after it arrives. You, your workers, Productivity Services, contractors or consultants should be looking over your farm on a regular basis.

Finding a new pest or disease on your property early gives you the best chance of controlling it.

Pay particular attention to high risk areas where pests are most likely to enter and establish on your property such as cane loading areas (sidings or pads), near wash-down areas, and along public roads, creeks, drainage lines and railways.

Fallow areas should also be monitored for signs of new weeds, or volunteer plants that can shelter pests between cane growing periods.

Record the results of monitoring activity

Surveillance involves looking for pests and diseases, any symptoms, or plant health issues on your farm, and recording their presence and population levels, or their absence.

In addition to assisting with farm management, pest surveillance is important for maintaining the biosecurity status of the Australian sugar industry.

An example of a pest surveillance record sheet is provided on page 51. Recording the absence of pests is just as important as recording what you do see.



A symptom of sugarcane smut is the formation of smut whips which can spread spores

Learn about exotic pests

Pest surveillance increases the chances that a new pest is detected early enough to be contained and eradicated. A new pest on your farm might also be new to the region or even the country.

To increase the chances of early detection, make yourself familiar with existing pests and the exotic pests that pose the greatest risk to the Australian sugarcane industry.

From page 32 there is a series of fact sheets on exotic pests and some significant established pests and weeds, showing what they look like or the symptoms that they cause.

Report unusual pests and diseases

Prompt reporting of new pests is vital to minimise the long-term impact of exotic pests on your farm and the sugarcane industry as a whole.

While Australia has one of the strictest border control systems in the world, there is always the chance that an exotic pest will make it into the country.

The number of passenger arrivals and imported goods continues to increase so a serious exotic pest of the sugarcane industry could be a few hours' flight away.

There is also a constant risk of sugarcane pests and diseases moving by natural means from Papua New Guinea and the Torres Strait south into production regions.

In addition to the general biosecurity obligations, growers have a legal responsibility to report suspect pests because the sugarcane industry is a signatory to the Emergency Plant Pest Response Deed (see page 22).

What happens when you call the Exotic Plant Pest Hotline?

Calls to the Exotic Plant Pest Hotline are forwarded to an experienced person in your state or territory government, who will ask some questions and arrange for an assessment of what you've found.

If the hotline in your state operates only during business hours, leave your full contact information and a brief description of the issue and your call will be followed up as soon as possible.

If you see anything unusual, call the Exotic Plant Pest Hotline



What to do if you think a pest or disease is exotic

If you find a pest that you think might be exotic, take the following precautions to contain the pest and protect other parts of your farm:

- Mark the site where you saw the pest and limit access to the area.
- Do not touch, move, or transport affected plant material. Take a photo of the pest or disease symptoms instead.
- Wash hands, clothes and footwear that have been in contact with affected plant material or soil.
- Without delay, call the Exotic Plant Pest Hotline on 1800 084 881, report it to your state or territory department of agriculture, or speak to your local Productivity Services, agronomist or SRA staff.
- Restrict the movement of people, animals and equipment near the affected area.
- Restrict operations in the area while waiting for identification.

Incorrect handling could spread the pest further or make the samples unfit for diagnosis so always speak to an expert before taking a sample.



Regular monitoring and sampling is an important part of farm biosecurity

Fencing and property cleanliness

Secure boundary fences make it easier to control the movement of people, vehicles and equipment onto and around your property, minimising the risk of diseases, pests and weeds from entering and becoming established.

While fences are not common in cane production areas they will limit access by wild or feral animals that can carry pests and weed seeds. Feral pigs, for example, can pick up sugarcane pests and diseases while foraging elsewhere and carry them onto your property in the soil and mud attached to them. Feral pigs are also a problem because they can carry human diseases like brucellosis, Q fever and leptospirosis.

Ensure all personnel working on farm are appropriately vaccinated (e.g. Q fever).

Rubbish dumps can attract pests or wild animals that carry diseases onto your property, so remove or contain anything that is likely to attract them.

Agvet chemicals

Inappropriate or persistent use of chemicals may lead to insects and weeds becoming resistant, making control difficult. This can cause more widespread and ongoing biosecurity problems.

Follow the instructions on the label and observe withholding periods. Seek training in agvet chemical use (e.g. AusChem or ChemCert™).

Keep a record, for example a spray diary, of chemical treatments used, application rates and weather conditions.

Report a 'resistant' variety that is heavily infected

Sugarcane varieties that are rated as 'resistant' to particular pathogens can become sensitive to that pathogen over time.

It might be that the pathogen has evolved to overcome plant resistance, or it could be a new strain that has entered Australia. An example of this was the outbreak of orange rust in Q124 in 2000.

Varieties that are rated as resistant may include a few plants that can be infected. But if a resistant variety becomes widely infected with a disease, you should report it immediately.

The Emergency Plant Pest Response Deed (EPPRD)

The EPPRD is the formal, legally binding agreement between Plant Health Australia (PHA), the Australian government, all state and territory governments, and plant industry signatories, which sets out how pest incursions are handled in Australia, and how the cost of a response is shared between industry and governments.

Having signed the EPPRD, CANEGROWERS has a seat at the decision making table in the event of an emergency plant pest incursion.

If a response plan is agreed by the signatories to the EPPRD, CANEGROWERS will have a say in what happens. The industry may also have to contribute funds to implement an approved Response Plan.

Also under the EPPRD, the sugarcane industry has a responsibility to report suspect pests. This is because the earlier a new pest is detected, the greater the chance an eradication response will be mounted and the more likely it will be successful.

More information on the EPPRD is at planthealthaustralia.com.au/epprd

Owner Reimbursement Costs

An underlying principle of the EPPRD is that growers are not worse off as a result of reporting an Emergency Plant Pest.

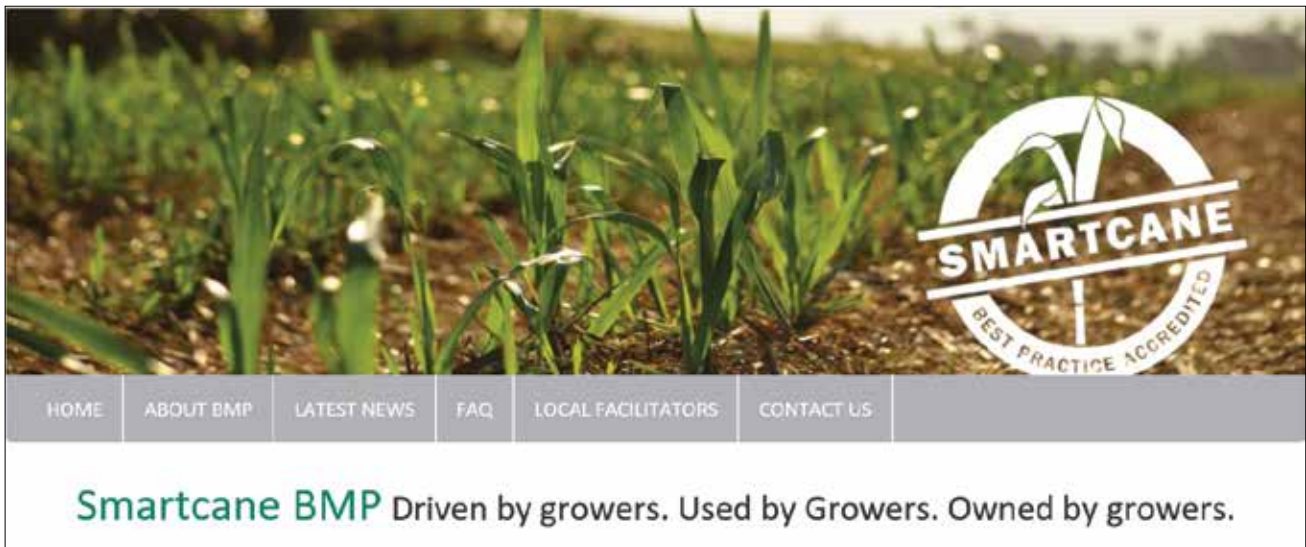
The agreement allows for payments to growers, known as Owner Reimbursement Costs (ORCs), for direct costs incurred as a result of the implementation of an approved Response Plan.

ORCs may cover direct grower costs or losses as a result of the destruction of crops, enforced fallow periods, replacement of crops and additional chemical treatments.

Calculation of ORCs is prescribed in the EPPRD, with different formulae being used depending on the type of crop grown, and a specific formula has been developed specifically for sugarcane. For more information, see: planthealthaustralia.com.au/owner-reimbursement-costs.

It is important to remember that ORCs only apply to approved Response Plans aimed at eradication, which is more likely to occur if a pest is found and reported early.

Smartcane Best Management Practice



Smartcane BMP

Smartcane BMP is an industry-led, government-supported, best management practice system for cane growing across Queensland.

In addition to allowing growers to demonstrate how well they manage farming operations, Smartcane BMP also lets growers identify improvements in practices that they can implement.

Grower participation is entirely voluntary – Smartcane BMP is designed to support your business productivity and profitability.

Most diseases of sugarcane are not managed by crop protection products alone. Instead they are managed using a combination of hygiene practices, variety selection, fallow management, and the use of clean propagation material of recommended varieties.

The Weed, Pest and Disease Management and the Crop Production and Harvesting Management modules of Smartcane BMP support biosecurity principles and actions and are recommended for all sugarcane producers.

You can answer a series of assessment questions and the system will tell you how you rate against the industry standard for each practice.

If any practice is below the industry standard, Smartcane BMP will tell you what you can do to reach that mark. Go to smartcane.com.au for more information or contact your Productivity Service.

Smartcane BMP has seven modules and a science-based review system to support continuous improvement on-farm and within the industry:

1. Soil Health and Nutrient Management (core)
2. Weed, Pest and Disease Management (core)
3. Irrigation and Drainage Management (core)
4. Crop Production and Harvesting Management
5. Natural Systems Management
6. Farm Business Management
7. Workplace Health and Safety

Local facilitators can help you to adopt changes recommended by Smartcane BMP modules.

Farm outputs

Responsibility for biosecurity does not end when your crop leaves your property. The measures in place on your farm support biosecurity in your region.



Maintain good farm hygiene

Maintaining good hygiene practices on farm can help to minimise the spread of pests onto and around your farm.

In addition to cleaning machinery before it is used on your property (described earlier), it is also important to clean machinery before it leaves your property.

Harvest practices recommended in Smartcane BMP to minimise cane loss also minimise the risk of infestations of pests.



Pests can be spread during transport of cane to mills in bins carried by trains

Post-harvest risks

There is a risk of spreading pests and diseases after harvest, when moving harvesters between blocks and farms, during transport to the mill or through burning.

After harvest, sugarcane is transported from the farm directly to the sugar mill in bins carried by trucks or by sugar mill cane railways. Some pests or weeds can be spread in the process.



It is difficult to minimise the biosecurity risks of transport to the mill but producers are advised to consider their options, particularly in the event of a specific local pest incursion.

Although green harvest and trash blanketing of harvested fields is common practice, some farmers still burn sugarcane before harvest for irrigation or crop agronomy reasons.

While burning can reduce the risk of spread of some pests and diseases during transport, the updraft in front of a fire can launch spores of a disease on thermal winds, increasing the risk of spread.

Feral animals and weeds

Wild and feral animals pose a risk to your property through direct impact on production and potentially carrying diseases, pests and weed seeds onto and around your property.



Itch grass poses a significant challenge to cane growers

Vermin like rats can damage crops, spread diseases and contaminate water sources. Rat management not only reduces loss of yield; it also reduces the risk of cane deterioration caused by rat damaged stalks.

Weed species are significant biosecurity problems in their own right, as well as being alternative hosts for some pests and diseases.

The measures recommended to protect your crop from pests and diseases also work to prevent the entry of new types of weeds.

Wild and feral animal access

To protect the health of your crops, and to prevent damage to cropping land, it is important to minimise the risks associated with wild and feral animals.

- Develop an integrated wild and feral animal control program.
- Protect water sources.
- Regularly check and mend any broken fences.
- Ensure farm buildings are in good repair.
- Dispose of any animal carcasses properly and promptly.
- Work with neighbours and other producers in your local area to implement a coordinated approach to animal management.

Volunteer plants and weeds

Volunteer plants and weeds in production areas can create a 'green bridge' which can harbour pests or diseases between seasons. Pests then have the potential to cause early re-infection of the next crop.

Ensure that crop destruction and follow-up controls remove all volunteers in paddocks. Control volunteers and weeds in other areas, such as roadways and head ditches.

Establish a weed management plan for your property, including plans to eradicate, contain or manage current weeds on your property, and to prevent the introduction of new ones.

You are likely to need a combination of practices to manage existing weeds, including herbicides and cultural practices like trash blanketing, strategic tillage, and farm hygiene.

Property and land damage

Fires, floods and storms can often provide an opportunity for pests and weeds to become established, and for animals to come onto your property.

To ensure this does not become an issue, regularly inspect your property for the presence of diseases, pests, weeds and ferals, particularly areas that have been recently landscaped (e.g. new roads or dams) or damaged in storms (e.g. fences).

For example, keep an eye out for new weeds in the areas where flood waters may have run across your land from neighbouring properties.

Train, plan and record

An important part of farm biosecurity, and also of managing your business, is ensuring staff are well trained, that you have the ability to trace where planting material came from, and that you have records of purchases, sales and movements.



Biosecurity planning

The best defence against pests and diseases is to implement sound biosecurity practices on your farm. Quick and simple measures built into everyday practice will help protect your farm and your future.

An on-farm biosecurity plan will help you prioritise the implementation of biosecurity practices relevant to your property.

The Farm Biosecurity Action Planner is a free booklet developed by the Farm Biosecurity program to help you create your own tailor-made plan. It is based on the six biosecurity essentials used in this manual.

There's also a free smartphone app called FarmBiosecurity, available from the App Store and Google Play.

To make your biosecurity plan using FarmBiosecurity, simply select the actions that apply to you from the suggestions, or type in your own actions. Your selections become a to-do list that you can share with others. You can attach photos as reminders or to let others know what needs to be done.

If you have multiple properties or sites, that's not a problem. You can add as many as you like.

Devise a plan for your property, prioritise actions, and update the implementation table as you achieve goals.

Completing the Biosecurity Checklist on page 28 will also help identify biosecurity strengths and weaknesses to minimise the risks of introducing diseases, pests and weed seeds at each point.

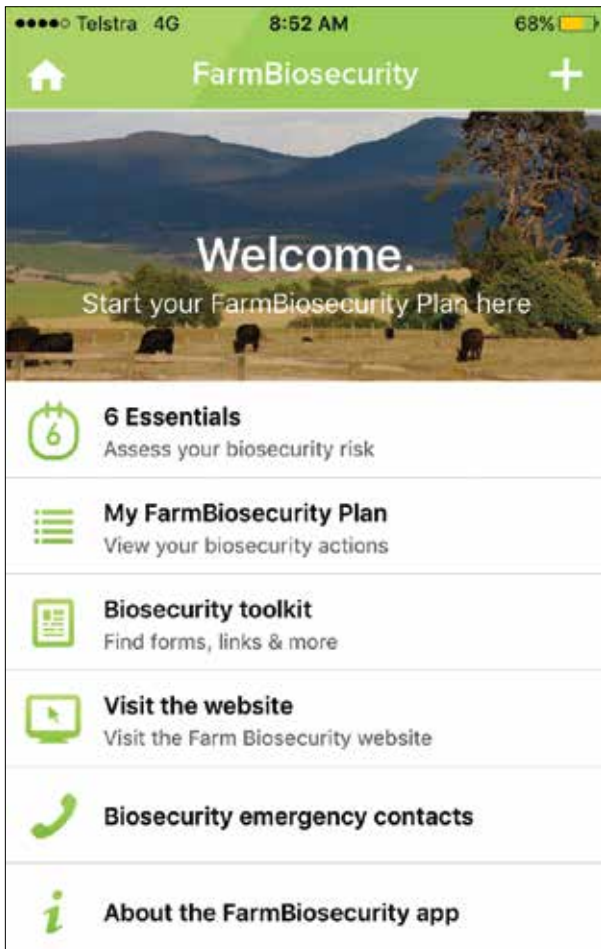
If you build your plan around daily, monthly or yearly farm routines, then biosecurity should become a habit.

Train staff

Anyone working on your property (including friends, family and contractors) may not know how easily diseases, pests and weeds can spread and how to prevent this from happening. Inform staff of the biosecurity standards required on site, and provide training if necessary. Have signs to remind staff of the importance of biosecurity.

Make sure that your staff keep a lookout for unusual pests. In particular, make sure that they can recognise established and key exotic pests, and that they know how to report them.

Copies of the Farm Biosecurity Action Planner are available from the Farm Biosecurity Toolkit at farmbiosecurity.com.au/toolkit



The FarmBiosecurity app is available for free from the App Store or Google Play

Keep records

In the event of a biosecurity emergency, valuable time can be lost trying to determine how far the disease or pest may have spread. Sound record keeping can speed up this process and prevent the spread of the disease or pest.

It is important to keep records of the sources of all inputs. In addition to fertiliser, record the sources of planting material and contractor machinery as well as where products and other material are shipped to (e.g. where bailed trash is sold).

Smartcane BMP mobile app

The Smartcane BMP app allows you to collect and upload farm records using your mobile phone.

Working through the menus you can add blocks, and record treatments used on the blocks.

The app links directly to the Smartcane BMP platform and automatically updates the growers' records within the system.

The Smartcane BMP app is free to registered Smartcane BMP growers. The Smartcane BMP app can be downloaded now from Google Play for Android and the iTunes App store for Apple by searching for 'smartcane records'.





Biosecurity checklist

The following checklist can be used to identify the strengths and weaknesses of your farm biosecurity activities.

To ensure your farm has the best protection against the introduction and spread of new pests, use the following self-assessment questions to identify the strengths and weaknesses of your farm activities.

Date of biosecurity check: _____

RECOMMENDED PRACTICES	ASSESSMENT	ACTION REQUIRED
Farm Inputs		
Monitor all materials that enter the property as well as sources of water.		
Source sugarcane planting material and seeds for alternative crops from reputable suppliers.		
Abide by Queensland Sugar Cane Zone rules.		
Only plant sugarcane varieties recommended by SRA.		
Planting material checked and found to be free from pests.		
Approved seed or tissue culture plants purchased regularly (at least every 1 to 2 years).		
Productivity Service asked to inspect all seed sources.		
Use certified fertiliser.		
Plant cane only ratooned twice.		
Maintain a register of propagation material.		
People, Vehicles and Equipment		
Limit access to production areas.		
Put up biosecurity signs at entrances.		
Provide a designated parking area.		
Assess risks posed by visitors.		
Stick to paths and designated roadways.		
Clean muddy boots or replace with rubber boots.		
Ensure visitors' clothing, footwear and tools are free of soil or plant matter on entering or leaving the farm.		
Ensure anyone recently returned from overseas has clean footwear and clothes before entering the farm.		
Make hygiene supplies available where appropriate (e.g. hand washing facilities, hand sanitiser, gloves, disinfectant foot baths, overalls, equipment steriliser like Sterimax).		
Use boot covers and protective clothing in contaminated areas.		

RECOMMENDED PRACTICES	ASSESSMENT	ACTION REQUIRED
People, Vehicles and Equipment <i>continued</i>		
Train workers on biosecurity requirements.		
Take care on and after field days.		
Keep a record of visitors.		
Use dedicated farm vehicles where possible, or wash vehicles down.		
Inspect and maintain wash-down facility and surrounds on a quarterly basis.		
Ensure that machinery coming onto your property is clean.		
Make available steriliser and high pressure water and air to remove plant material and soil from equipment and machinery.		
Disinfect equipment including harvesters, can knives, can cutters planters and haul-out bins.		
Production Practices		
Monitor crops and fallow areas for pests, diseases and weeds.		
Conduct pest surveillance regularly and record results even when nothing is found.		
Learn about exotic pest threats and teach your staff and contractors.		
Report any unusual pests and diseases and make sure your staff know how to as well.		
Install fencing to keep out movements of people, vehicles and animals that can spread pests, diseases and weeds.		
Vaccinate all personnel against disease risks.		
Undertake training in use of agvet chemicals and always follow label instructions.		
Keep records of chemical treatments used.		
Report resistant varieties that become heavily infected.		
Follow the Smartcane BMP weed, pest and disease management module.		
Farm Outputs		
Maintain good farm hygiene.		
Consider post-harvest risks including during transport to mill.		
Contractors and visitors made aware if property has a declared or notifiable pest.		
Record where all outputs are sent to.		

RECOMMENDED PRACTICES	ASSESSMENT	ACTION REQUIRED
Feral Animals and Weeds		
Develop integrated wild and feral animal control program.		
Protect water sources.		
Dispose of any animal carcasses promptly.		
Control volunteer plants that can harbour pests and diseases.		
Manage weeds with a combination of practices.		
Inspect your property after landscaping, fires, floods and storms for new incursions.		
Train, Plan and Record		
Develop an on-farm biosecurity plan.		
Make biosecurity part of everyday practices.		
Share plan with staff and work through improvements.		
Train staff and visitors on biosecurity requirements.		
Use the Smartcane BMP app to keep records.		



Exotic pests

Exotic pests pose a major threat to the Australian sugarcane industry. The climate of Australia's production regions would allow each of these pests and diseases to survive, spread and establish, should they be introduced into the country.



High priority exotic pest threats to the sugarcane industry

Make sure that you, your staff and your contractors are familiar with these pests and diseases, any of which would have serious consequences should they make it through border controls.

Any suspicious pests or symptoms should be reported to the Exotic Plant Pest Hotline on 1800 084 881 or to your state or territory department of agriculture.

Additional information on many of these pests and diseases is included on the Plant Health Australia website planthealthaustralia.com.au/industries/sugarcane.

Downy mildew

Causal agents: *Peronosclerospora philippinensis* and *P. sacchari*

IMPACT

- Significant yield losses, with losses of up to 40% reported overseas.

SYMPTOMS

- Cream-white leaf stripes that redden with age.
- Stunting of infested stools.
- Down may be seen on the underside of infested leaves, especially under humid conditions.
- Leaves may become shredded at cooler times of the year.

HOW DOES IT SPREAD?

- Spread with infected planting material.
- Wind-borne spores for short distance dispersal, due to short lifespan of spores.



Symptoms, note reddened leaf stripes

Grassy shoot disease

Causal agent: *Sugarcane grassy shoot phytoplasma*

IMPACT

- Significant yield losses, with some milling areas in Vietnam suffering 50% reductions in yield due to the disease.

SYMPTOMS

- Excessive tillering that fails to develop into mature stalks.
- Yellow chlorotic shoots.
- Shoots may not develop after harvest causing a very patchy ratoon crop.

HOW DOES IT SPREAD?

- Infected planting material.
- May be spread by insects.



Symptoms, note tillering

Remain vigilant for anything unusual in your farm.

If a pest, disease or unusual symptom is found that is not normally present, it should be reported as it may be new not only to your plantation, but to the region, state or even Australia.

Report anything unusual to the Exotic Plant Pest Hotline 1800 084 881.

Leaf scorch

Causal agent: *Stagonospora sacchari*

IMPACT

- Significant yield losses of up to 30% overseas.

SYMPTOMS

- 50-200 mm long, 5-10 mm wide spindle (cigar) shaped leaf lesions with dead tissue in the centre.
- Favoured by rain and warm conditions.

HOW DOES IT SPREAD?

- Spores are spread by wind and wind-blown rain.



Mosaic viruses

Causal agent: Sugarcane streak mosaic, Sorghum mosaic and Sugarcane mosaic viruses

IMPACT

- Significant yield loss.

SYMPTOMS

- Irregular mottled green pattern on leaves.
- Symptoms are more easily seen in young leaves, and tend to fade as the leaves age.

HOW DOES IT SPREAD?

- Infected planting material.
- Transmitted by aphids that feed on infected plants.
- Knives used on infected plants may also spread the disease.



Ramu stunt

Causal agent: Unknown *Tenuivirus*

IMPACT

- Plant death and failure of ratoon crops in susceptible varieties.

SYMPTOMS

- Stunting of individual shoots or whole stools.
- Leaves develop small cream-green flecks, which grow to become 2-5 mm long yellow-green streaks.

HOW DOES IT SPREAD?

- Vectored by the island sugarcane leafhopper (*Eumetopina flavipes*), which is not present in sugarcane-producing areas of Australia.
- Propagation material can also spread the disease.



White leaf disease

Causal agent: *Sugarcane white leaf phytoplasma*

IMPACT

- Reduced yields and sugar content. Losses of up to 100% have been reported overseas in susceptible varieties.

SYMPTOMS

- Leaves develop cream-white coloured stripes parallel to the midrib, which eventually cover the whole leaf.
- Infected leaves are narrower than healthy leaves.
- Plants tiller profusely, have short internode length & look bushy.
- Poor ratooning after harvest, which results in patchy crops.

HOW DOES IT SPREAD?

- Transmitted by the exotic leafhoppers *Matsumuratettix hiroglyphicus* and *Yamatotettix flavovittatus*.
- Infected propagation material can also spread the disease.



Exotic borers

Chilo auricilius, *C. infuscatellus*, *C. sacchariphagus*, *C. terrenellus* and *C. tumidicostalis*: *Eldana saccharina*, *Polyocha depressella*, *Scirpophaga excerptalis* and *Sesamia grisescens*

IMPACT

- Significant yield loss including total crop destruction can occur. Damage depends on the borer species and cane variety grown.
- Most severe losses occur with:
 - Top borer (*Scirpophaga excerptalis*)
 - Ramu shoot borer (*Sesamia grisescens*)
 - Stalk borer (*Chilo sacchariphagus*)
 - Stalk borer (*Chilo terrenellus*)

DESCRIPTION AND SYMPTOMS

- Adults are medium sized grey or white moths.
- Larvae create tunnels in the stem.
- Feeding may cause damage to the growing point and causes the formation of dead heart in young plants.
- Small holes may be visible on infested stalks.

HOW DOES IT SPREAD?

- Adult moths are able to fly over short distances.
- Larvae can be spread inside infested planting material.



Sugarcane top borer (*Scirpophaga excerptalis*)



Stalk borer damage, note exit holes



Ramu shoot borer (*S. grisescens*) larva and damage

Sugarcane planthoppers (*Perkinsiella vastatrix* and *P. vitiensis*)

IMPACT

- In exceptional circumstances high populations can reduce yield and sugar content.
- *Perkinsiella vastatrix* and *P. vitiensis* can act as vectors of Fiji leaf gall.

DESCRIPTION AND SYMPTOMS

- Similar to the sugarcane planthopper (*Perkinsiella saccharicida*) in size and appearance, being a 4-6 mm long, brown coloured, leafhopper.
- Copious excretion of honeydew may cause development of sooty mould.

HOW DOES IT SPREAD?

- Insects can fly many kilometres.
- Insects and eggs can be carried on sugar-cane stalks and leaves.



Planthopper

Sugarcane pyrilla (*Pyrilla perpusilla*)

IMPACT

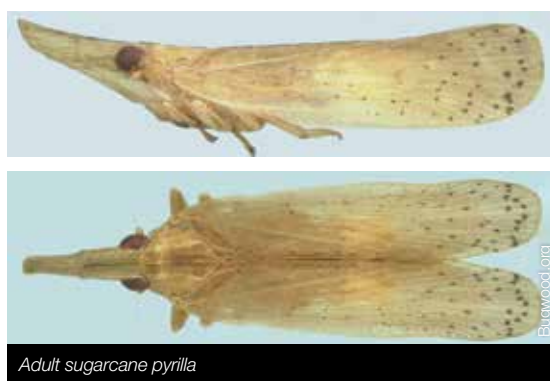
- Feeding causes yield losses and reduced sugar content.

DESCRIPTION AND SYMPTOMS

- Adults are 10 mm long and 2-4 mm wide, light yellow-brown colour.
- Feeding causes yellow spots on their leaves, especially around the midrib on the underside of the leaf.

HOW DOES IT SPREAD?

- Plant material can potentially spread the pest between areas.



Adult sugarcane pyrilla

Sugarcane whitefly (*Aleurolobus barodensis*)

IMPACT

- Significant yield loss.
- Severe infestations may result in yield reduction of up to 65%.

DESCRIPTION AND SYMPTOMS

- Nymphs are oval shaped white to grey in colour and feed in groups on the leaves.
- Adults are winged, dull white and 1-3 mm in body length.
- Feeding causes leaves to appear pale.
- The excretion of honeydew may support the growth of sooty mould.

HOW DOES IT SPREAD?

- Movement of infested plant material.



ICAR-National Bureau of Agricultural Insect Resources

Sugarcane woolly aphid (*Ceratovacuna lanigera*)

IMPACT

- Significant yield loss, with losses of up to 30% reported overseas.

DESCRIPTION AND SYMPTOMS

- Small (2 mm long) white coloured aphids that have a woolly appearance.
- Copious excretion of honeydew may cause development of sooty mould.

HOW DOES IT SPREAD?

- Spreads with the movement of infested plant material.
- Potentially wind dispersed.



SRA





Established pests and diseases

Becoming familiar with established pests and diseases can help you to recognise new pests. Some of these pests are limited to specific areas or districts: if you see them in a new area it is important to report them to limit their spread.



Established pests and diseases of the sugarcane industry

Make sure that you and your staff are familiar with these pests and if you spot any suspicious pests or symptoms in your field call the Exotic Plant Pest Hotline on 1800 084 881 or to your state or territory department of agriculture.

Fiji leaf gall

Causal agent: Fiji disease virus

IMPACT

- Significant or complete yield losses in susceptible varieties.

SYMPTOMS

- Green or white galls between 1-200 mm long, 1-4 mm wide and 1-2 mm high form on the underside of the leaf blade and midrib.
- Leaves at the top of the plant look ragged.
- Causes stunting, profuse tillering and plant death.

WHERE IS IT NOW?

- Reported from NSW north to Nambour. Has occurred from Maryborough to Mackay in Queensland, but has not been reported in these districts for many years. Has never been recorded in the districts north of Bowen.

HOW DOES IT SPREAD?

- The sugarcane planthopper (*Perkinsiella saccharicida*) spreads the disease between plants.
- Infected planting material also spreads the disease.

HOW IS IT MANAGED?

- Use resistant varieties.
- Use disease free planting material.



Leaf scald

Causal agent: *Xanthomonas albilineans*

IMPACT

- Significant yield losses. Complete crop losses can occur in highly susceptible varieties.

SYMPTOMS

- Chlorotic (white) stripes and patches on leaves.
- White pencil-line visible along the middle of the white leaf stripes.
- When stalks are sliced, the vascular bundles are red in the nodes.
- Side-shooting from the base of the plant.
- Causes poor ratooning and stalk death in susceptible varieties.

WHERE IS IT NOW?

- Present in all sugarcane growing regions in Australia.

HOW DOES IT SPREAD?

- Infected planting material.
- Contaminated cutting implements including knives, harvesters, whole stalk and billet planters.
- Wind-blown rain.

HOW IS IT MANAGED?

- Use disease free planting material.
- Grow resistant varieties.
- Disinfect planting material.



Pachymetra root rot

Causal agent: *Pachymetra chaunorhiza*

IMPACT

- Significant yield losses of up to 40% have been reported in susceptible varieties.

SYMPTOMS

- Larger roots exhibit a soft flaccid rot.
- Infection may cause excessive stool tipping and loss of plants at harvest and poor ratooning.

WHERE IS IT NOW?

- Widespread in Northern, Herbert, Central Queensland districts and Condong mill area in NSW.
- There is limited distribution in Burdekin and other NSW cane growing areas.

HOW DOES IT SPREAD?

- It is spread in soil carried on machinery or attached to stalks of cane.

HOW IS IT MANAGED?

- Strategic planting of resistant varieties.
- No fungicides are effective against *Pachymetra* at economical rates.



Pachymetra root rot symptoms



Pachymetra root rot symptoms

Ratoon stunting disease

Causal agent: *Leifsonia xyli* subspecies *xyli*

IMPACT

- Average yield loss of 15-20% (up to 60% if conditions are favourable for the disease).

SYMPTOMS

- Visible stunting, causing an uneven appearance in the cane fields.
- Red-orange dots are often visible in the nodal tissue, visible when stalks are sliced in half.

WHERE IS IT NOW?

- All sugar growing districts of eastern Australia.

HOW DOES IT SPREAD?

- By planting infected cuttings.
- Use of contaminated cutting implements.

HOW IS IT MANAGED?

- Plant approved disease free seed.
- Destroy all volunteer cane.
- Disinfecting planting and harvesting equipment.



Ratoon stunting disease causes small orange to brown dots in the nodes when stalks are sliced open. Diseased left, healthy right

Sugarcane mosaic virus

Causal agent: *Sugarcane mosaic virus (Strain A)*

IMPACT

- Significant yield losses of 20-30% in susceptible varieties.

SYMPTOMS

- Mottled pattern on leaves with light green to yellow and dark green patches.

WHERE IS IT NOW?

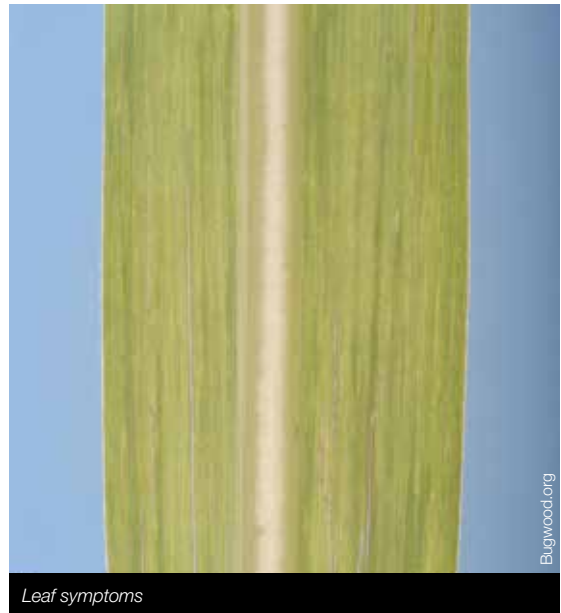
- Has been reported from all regions. Currently restricted to the Bundaberg and Childers districts.

HOW DOES IT SPREAD?

- Transmitted by aphids.
- Infected planting material.

HOW IS IT MANAGED?

- Resistant varieties and use of disease free planting material.
- If infected plants are found, destroy them immediately to reduce spread.
- Manage weed hosts of the vectors.



Leaf symptoms

Sugarcane smut

Causal agent: *Sporisorium scitamineum*

IMPACT

- Yield losses of 30-100% reported.

SYMPTOMS

- A black whip-like structure develops from the growing point of the sugarcane plant.
- Severe stunting, thin grassy stalks and death of plants.

WHERE IS IT NOW?

- All sugar growing districts of Australia.

HOW DOES IT SPREAD?

- Wind dispersal.
- Planting infected cane cuttings.
- Can be spread on machinery, shoes etc.

HOW IS IT MANAGED?

- Resistant varieties.
- Hot water treatment can be used to eliminate smut from infected planting material but treated plants can be reinfected after planting.
- Fungicides such as, Sinker® (a.i. Flutriafol) can protect plants from reinfection for several months and is approved for use against sugarcane smut.



A black whip-like structure is a characteristic symptom of Sugarcane smut

Sugarcane striate mosaic virus

Causal agent: Sugarcane striate mosaic-associated virus

IMPACT

- Significant yield losses of up to 100% due to stunting and plant death in susceptible varieties.
- Failure of ratoon crops.

SYMPTOMS

- Short, fine (0.5 mm wide by 0.5-2 mm long), light green striations on leaves.
- Symptoms first appear on the young leaves.
- Susceptible plants become stunted and die.

WHERE IS IT NOW?

- The Burdekin district.

HOW DOES IT SPREAD?

- Sett and soil-transmitted.
- Contaminated machinery.
- Soil on feral animals such as pigs.

HOW IS IT MANAGED?

- Resistant varieties.
- Disease-free seed cane.
- Clean machinery.
- Feral animal control.



Sugarcane striate mosaic virus symptoms

Sugarcane weevil borer

Rhabdoscelus obscurus

IMPACT

- Reduced sugar content with losses of up to 2 CCS units.

DESCRIPTION AND SYMPTOMS

- Adults are dark coloured 12-15 mm long, with a long snout.
- Eggs are laid into cavities chewed in the stalk or into damaged cane.
- Larvae feed inside the internodes of the stalk (often only in the lowest ones) and fill the stalk with frass (waste).

WHERE IS IT NOW?

- In districts from Plane Creek (near Mackay) to Mossman.

HOW DOES IT SPREAD?

- Infested planting material.
- Adult weevils can fly.

HOW IS IT MANAGED?

- Managing harvest residues.
- Reduce stalk damage and lodging as damaged cane attracts the pest.
- Resistant varieties.
- Insecticides.



Adult Sugarcane weevil borer



Damage caused by larvae feeding in stalk



Regionalised weeds

Weeds can have significant impacts on production and can be a biosecurity risk in their own right. Some weeds are limited to specific areas or districts and their management or movement may be controlled under state legislation. If you see them in new regions it is important to report them to limit their spread.

Regionalised weeds of the sugarcane industry

If you spot any unusual weeds call the Exotic Plant Pest Hotline on 1800 084 881. For further information on weeds, go to the Weeds in Australia website environment.gov.au/biodiversity/invasive/weeds, or contact your state department of agriculture.

Giant sensitive plant

Mimosa diplotricha

DESCRIPTION

- Shrub to sprawling vine 2-3 m tall, with 4 angled stems with small prickles along the stems.
- Bright green, 10-20 cm long fern-like leaves that close up when touched and at night.
- Flowers are 12 mm wide, pale pink coloured, fluffy balls.

HOW DOES IT SPREAD?

- Seeds are transported by water, vehicles, machinery, on the coats of livestock and feral animals, and contaminated soil.

WHERE IS IT NOW?

- Far North Queensland around Mackay and from Ingham to Cooktown.



Itch grass

Rottboellia cochinchinensis

DESCRIPTION

- Large, 3 m tall grass with blue-green coloured leaves.
- Leaves and stems covered in stiff irritating hairs.

HOW DOES IT SPREAD?

- Seeds are transported by water, vehicles, machinery, on the coats of livestock and feral animals, and contaminated soil.

WHERE IS IT NOW?

- Occurs in coastal areas from the NSW-Queensland border to North Queensland. Also present in the Northern Territory.



Olive hymenachne

Hymenachne amplexicaulis

DESCRIPTION

- A perennial grass that can grow 2.5 m tall.
- Stems are erect and contain white pith.
- Leaf blades are 10-45 cm long and up to 3 cm wide. The base of the leaf curls around the stem.
- Flowers are spike-like and 20-40 cm long.
- It is capable of growing in permanent wetlands.
- Listed as a weed of national significance

HOW DOES IT SPREAD?

- Grows from seed and broken stem fragments.
- Seeds are spread by water movement and birds.

WHERE IS IT NOW?

- Cape York in Queensland to Casino in NSW.



Red witchweed

Striga asiatica

DESCRIPTION

- A parasitic weed that grows attached to the roots of a host plant.
- It grows 10-40 cm tall, with leaves arranged in opposite pairs along the stem.
- The flowers are usually red, but can be white, yellow or pink.

HOW DOES IT SPREAD?

- The seeds are dust like and can drop into the soil easily, enabling it to spread.
- Wind dispersal, soil movement, or via animals and people.

WHERE IS IT NOW?

- Eradication process is ongoing in the Mackay region.



Red witchweed, note small seeds

Siam weed

Chromolaena odorata

DESCRIPTION

- A dense tangling bush that can grow up to 2-3 m tall. The root system is fibrous and shallow in most soils.
- Leaves are green, hairy, soft and triangular.
- The plant produces masses of pale lilac flowers from May to July and again in September to October.

HOW DOES IT SPREAD?

- Windborne seeds.
- Carried on vehicles, clothing, footwear and animals.

WHERE IS IT NOW?

- North Queensland.



Siam weed flower

Sicklepod

Senna obtusifolia

DESCRIPTION

- Woody shrubs to 2 m in height.
- Small yellow flowers.
- Leaves are made up of 2-3 pairs of leaflets, each leaflet is around 4 cm long.
- Long thin sickle shaped seed pods up to 18 cm long.

HOW DOES IT SPREAD?

- Seeds spread with water, harvested sugarcane or mud on machinery.
- Seeds can also be spread by livestock and feral animals.

WHERE IS IT NOW?

- Darwin and surrounding areas of the NT. In Queensland around Mackay, Ingham and parts of the Atherton Tablelands.



Mature plant: note long seed pods and large leaves



Sicklepod flower

Singapore daisy

Sphagneticola trilobata

DESCRIPTION

- Ground cover with glossy green leaves.
- Yellow to orange-yellow daisy flowers 2 cm in size.
- Flowers all year.

HOW DOES IT SPREAD?

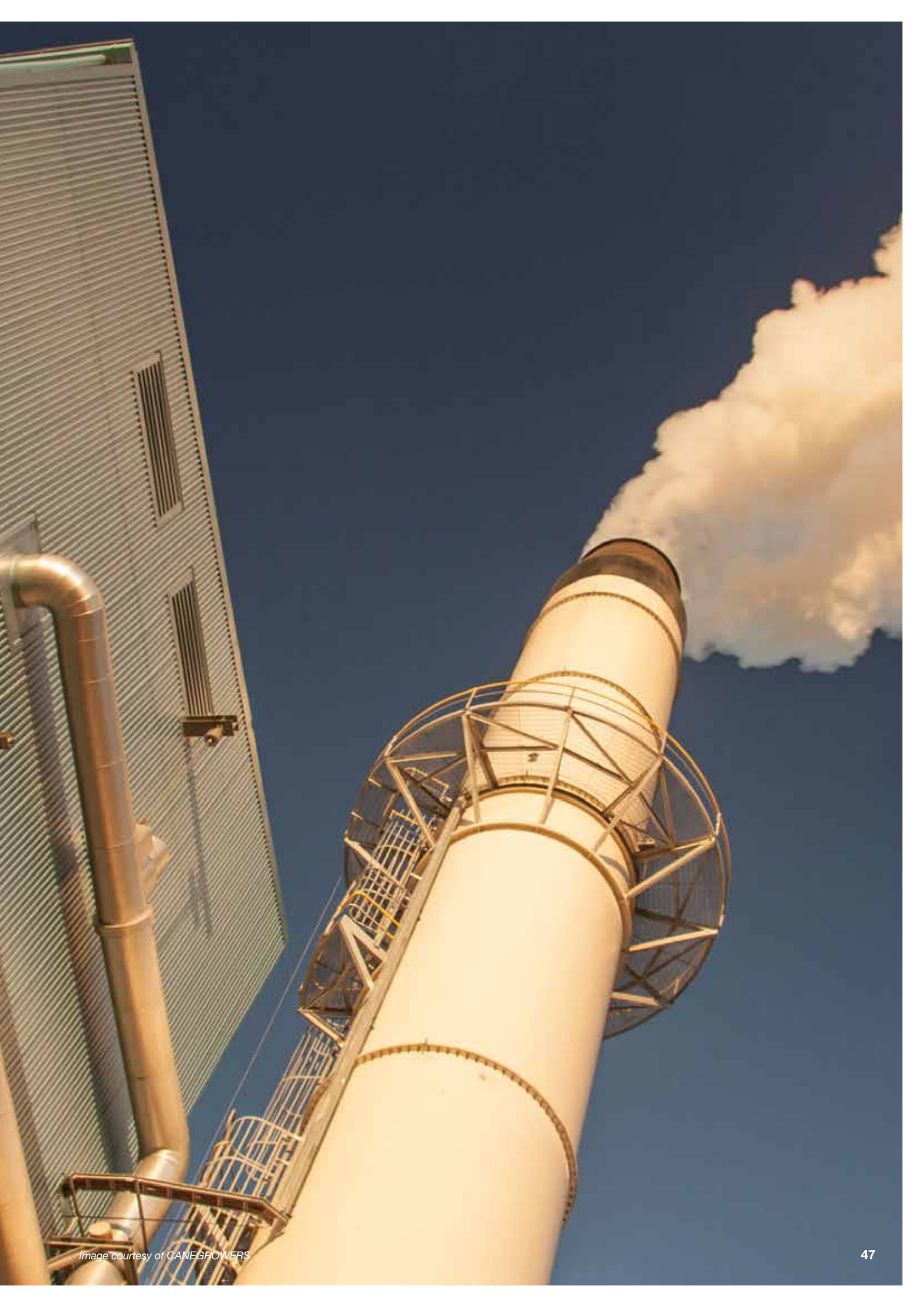
- The plant is capable of regrowth from cuttings.
- It is spread primarily by cuttings that are created when slashing and pruning.

WHERE IS IT NOW?

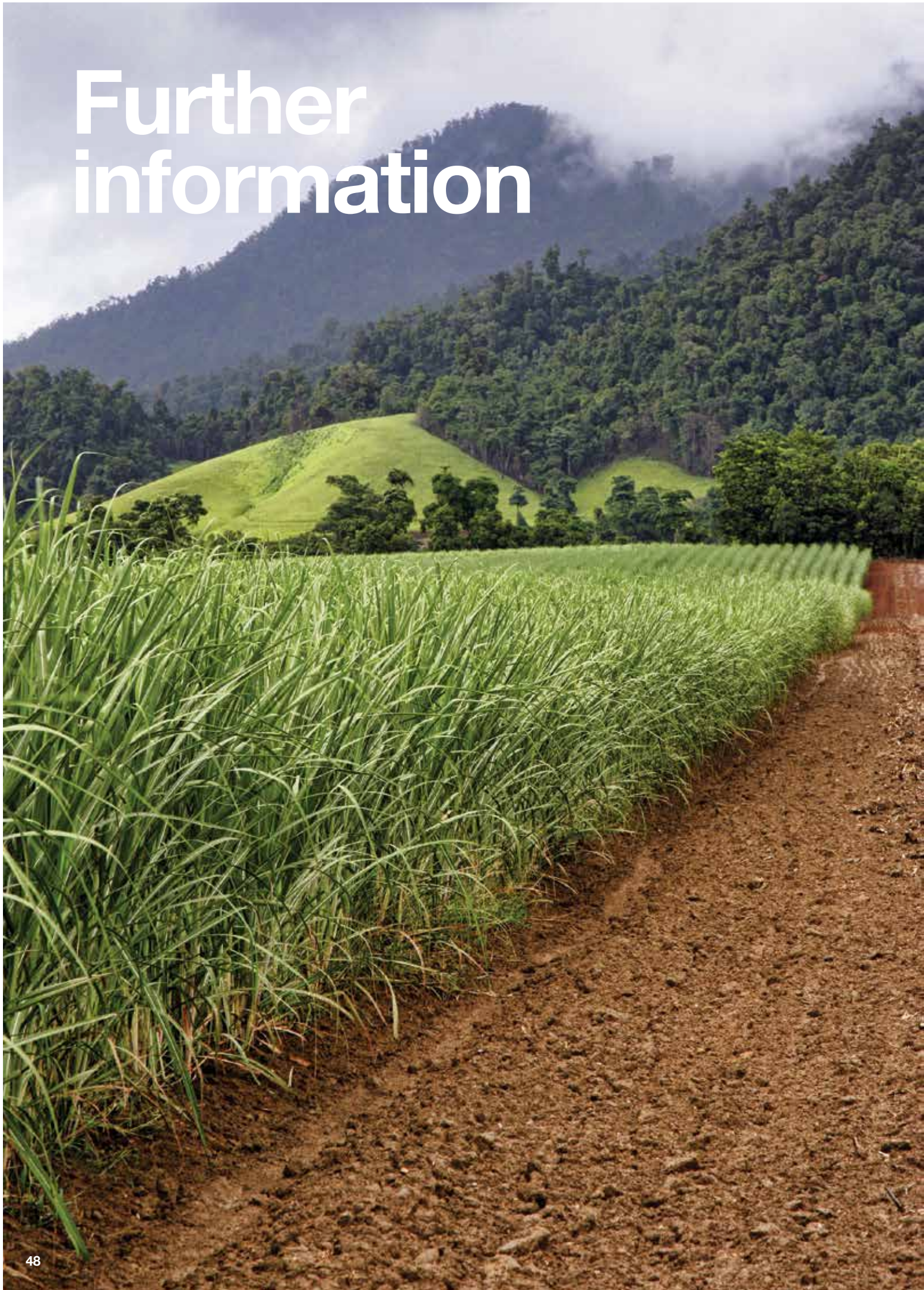
- The east coast of Queensland.



Singapore daisy forms dense colonies



Further information



Useful contacts

More information on biosecurity can be found through the following sources.

Contact details	
ORGANISATION	
CANEGROWERS	Phone: 07 3864 6444 Website: canegrowers.com.au
Australian Sugar Milling Council	Phone: 07 3231 5000 Email: asmc@asmc.com.au Website: asmc.com.au
Sugar Research Australia	Phone: 07 3331 3333 Email: sra@sugarresearch.com.au Website: sugarresearch.com.au
Plant Health Australia	Phone: 02 6215 7700 Email: biosecurity@phau.com.au Website: planthealthaustralia.com.au
Farm Biosecurity	Phone: 02 6215 7700 Email: info@farmbiosecurity.com.au Website: farmbiosecurity.com.au
GOVERNMENT	
Australian – Department of Agriculture and Water Resources	Phone: 02 6272 3933 Website: agriculture.gov.au
New South Wales – Department of Primary Industries	Phone: 1800 808 095 or 02 6391 3100 Website: dpi.nsw.gov.au/biosecurity
Northern Territory – Department of Primary Industry and Fisheries	Phone: 1800 808 095 or 08 8999 5511 Website: nt.gov.au
Queensland – Department of Agriculture and Fisheries	Phone: 13 25 23 or 07 3404 6999 Website: daf.qld.gov.au
Western Australia – Department of Agriculture and Food	Phone: 08 9368 3333 Website: agric.wa.gov.au
PRODUCTIVITY NETWORKS	
Productivity networks are listed on the Sugar Research Australia sugarresearch.com.au .	

If you see anything unusual call the Exotic Plant Pest Hotline 1800 084 881



Visitor register

Please enter your details to assist us with our sugarcane biosecurity records

Date	Time on property		Name	Reason for visit	Vehicle registration and mobile	Location/date of last contact with sugarcane
	Arrival	Departure				

EXOTIC PLANT PEST HOTLINE
1800 084 881

If you see anything unusual, call the Exotic Plant Pest Hotline on 1800 084 881

An electronic version of this Visitor register can be downloaded from the Farm Biosecurity website farmbiosecurity.com.au

Pest surveillance record

Farm: _____

Name of person inspecting: _____

Date: _____

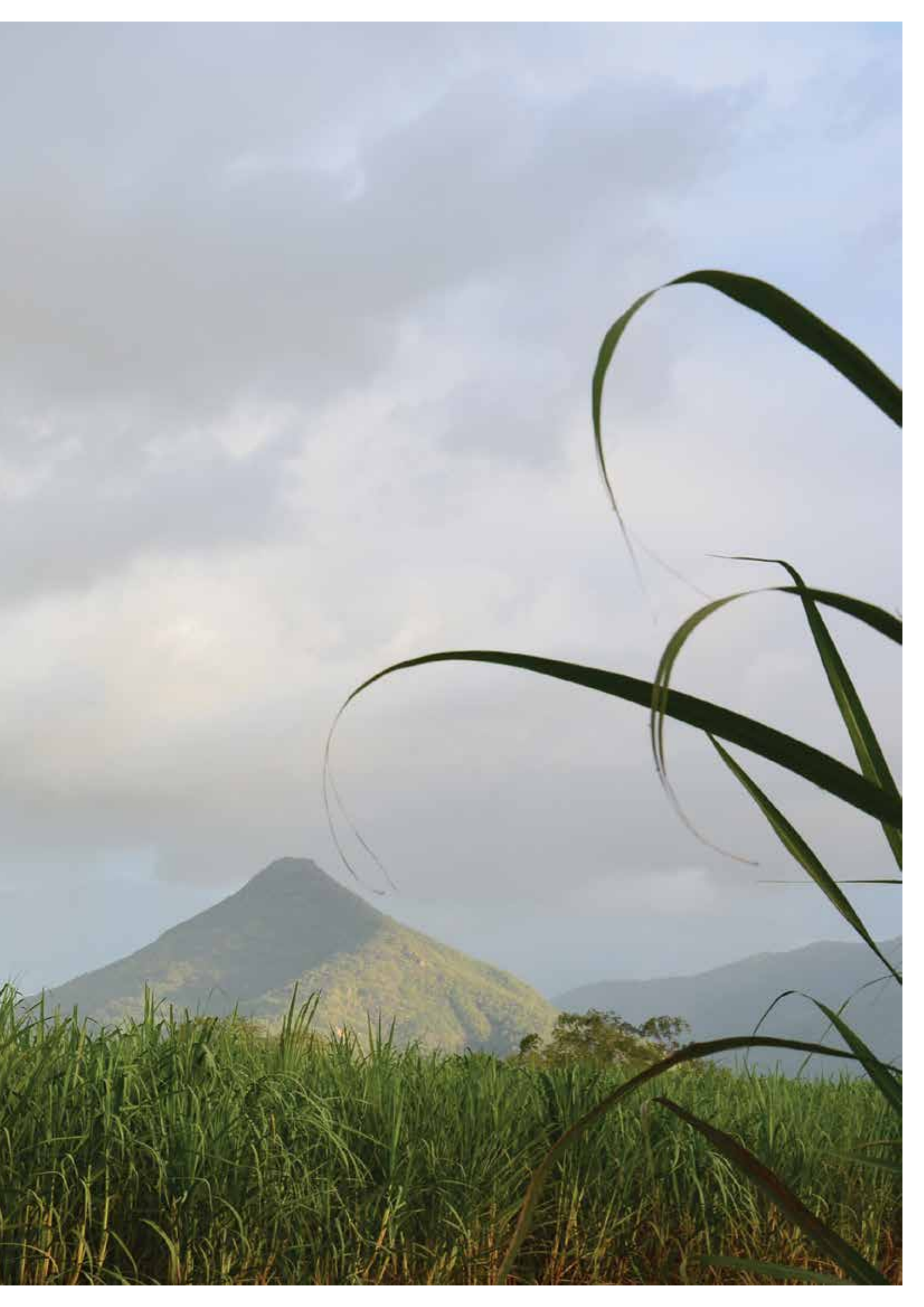
Paddock	Established pests				Exotic pests*			Comments	
	No. sites	Pest 1	Pest 2	Pest 3	Pest 4	Pest 1	Pest 2		Other pests found

EXOTIC PLANT PEST HOTLINE
1800 084 881

If you see anything unusual, call the Exotic Plant Pest Hotline on 1800 084 881

* Estimate pest infestation level (e.g. zero/low/med/high or % trees affected) for both endemic and exotic pests and diseases.
An electronic version of this Pest surveillance datasheet can be downloaded from the Farm Biosecurity website farmbiosecurity.com.au





Plant Health Australia

ABN 97 092 607 997
Level 1, 1 Phipps Close
Deakin ACT 2600

Phone 02 6215 7700

Fax 02 6260 4321

Email biosecurity@phau.com.au
www.planthealthaustralia.com.au

