

# FARM HYGIENE IN INTEGRATED WEED MANAGEMENT

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## Introduction

There are a number of steps in achieving good farm hygiene. These include the identification of threats (potentially damaging new diseases, insects and weeds that could inadvertently be introduced to the property), identifying any unknown species that may already be present, detecting any new pests or pests that have limited distributions (diseases, insects or weeds), cleaning soil and crop debris from machinery combined with farm hygiene and practicing integrated disease, insect and weed management. Each of these steps is important in achieving integrated pest management through farm hygiene on cotton farms.

## Threat identification

There are a number of weeds that are not present on most properties, but that cotton growers and all farm staff should be on the look out for. These are weeds that are problematic elsewhere in the industry or elsewhere in the world and are often relatively easy to identify if you know what to look for.

Examples include:

- Parthenium weed,
- Velvetleaf,
- Anoda,
- Sesbania, and
- Feathertop Rhodes grass

All staff should know what these weeds look like and there should be a system in place to ensure that suspect plants are investigated as soon as possible. Identification material for these weeds in all growth stages is available in the [Weed Identification and Information Guide](#), section A in [WEEDpak](#).



*Maintaining a productive cotton farm is the aim of an effective farm hygiene program.*

## Weed identification

A large number of weed species are likely to be present in every field and the range of weeds can vary from field to field. Over different 200 species of weeds have been identified through surveys of cotton fields, with 50 or more species commonly found in a single field. The person making decisions in the field should ensure they are familiar with all the weeds present in their fields and ideally should have a record of the common abundance of each species. These records will assist with making spray decisions and could be an early-warning of emerging problems. Keeping a record of the results for each field from the post-herbicide application weed audits required with herbicide tolerant cotton varieties (Roundup Ready Flex<sup>®</sup> or Liberty Link<sup>®</sup> varieties) would be a valuable way of doing this.

The positive identification of an unknown plant species is the first step in preventing the establishment of the species and controlling its spread. Positive identification can be achieved by using the [Weed Identification and Information Guide](#), section A in [WEEDpak](#), by referring to other publications, or by seeking expert advice from consulting agronomists, weed scientists, or botanists at the State herbaria.

## Weed detection

The early detection of a new weed, or one that has a limited distribution on the property, makes it easier to control and prevent it from spreading further. Knowledge of the weed's biology can be a vital piece of information for developing a targeted weed management plan and can be found along with the weed identification material in [WEEDpak](#).

Ensure staff are on the lookout for new weeds and know how to report a suspected problem.

Particular attention should be given to areas where machinery maintenance may have occurred, especially if contractor's equipment such as pickers or headers break down in the field. Small weed seeds, such as parthenium weed seed, can be lodged in machinery and released when panels are removed to make repairs.

## Communication

Everyone on the farm should be aware of the importance of problem weeds so that they can take precautions to prevent the spread of these weeds around the farm, or onto other farms. This includes:

- Workers,
- Consultants and visitors,
- Contractors/module carriers, and
- Neighbors.

In return, growers should be kept informed of any potential weed outbreaks that could affect their operation by agronomists and other farm staff.

There needs to be an established system for reporting suspect weeds and recording weed incursions to ensure that valuable observations aren't overlooked or lost during busy times. Any positively identified incursions need to be located on a centrally positioned farm map, with species information and GPS coordinates if possible.

Weed incursions don't get managed by chance, but need a dedicated approach to ensure their removal and long-term monitoring to ensure no viable seeds remain in the seed bank.

## Scouting

Agronomists who regularly inspect cotton fields for insects and diseases, can inspect for weeds at the same time. It is important to monitor risk areas, such as river, storages and channel banks for new weeds so that infestations can be controlled before they become widespread.

However, don't just leave this job to the agronomist. Every person of the farm can have an important role in looking for and managing weeds.

Ensure that all vehicles carry either a hoe or a pressure sprayer. It can be far easier to control an unknown weed when it first appears than to try to track it down later.



*Good farm hygiene is important to prevent the spread of weeds on farm machinery. Photo: Greg Salmond.*

## Farm hygiene

Weeds are easily spread between fields and farms, in soil and crop trash, attached to vehicles and machinery. Thorough cleaning practices for all farm vehicles and machinery during the entire year will help prevent the spread of weeds.

Clean off soil and crop debris from:

- Farm vehicles and tyres,
- Boots,
- Cotton pickers and strippers,
- Grain harvesters,
- Tillage implements,
- Stubble pullers and mulchers,
- Modules builders and loaders, and
- Earth movers and laser levelers.

Remember to inspect areas where machinery has broken down as seeds may have dropped from parts of the machinery that are not regularly cleaned.

It is important to clean machinery when moving between different areas of one farm and between different farms to prevent the spread of weeds.

A guide to cleaning vehicles and machinery is contained in the Appendix of the [Farm Hygiene](#) booklet of the [Best Management Practice Manual](#).



*Always remember to clean off machinery like this root cutter before moving the machinery to different areas. This will help to prevent the spread of weeds. Photo: Greg Salmond.*

## Managing weeds

(Also refer to [Integrated Weeds Management](#), section B in [WEEDpak](#) for further information.)

Integrated weed management needs to be a year round activity to prevent seed set and vegetative spread, because weeds grow at various times of the year. Remember that many weeds support harmful insects and disease causing organisms of cotton. Insects and diseases will be better controlled when weeds are controlled.

### Keeping farms clean

(Refer to [Managing weeds on Roads, Channels and Water Storages](#), section F3 in [WEEDpak](#) for further information.)

- Consider that the seeds of many species may be spread in irrigation water. Remove weeds from around irrigation channels and storages to help prevent this spread.
- Ensure that tail water and storm water run-off is retained on farm to prevent weeds spreading to clean farms.
- Maintain a strict weed control program in and around each field. This includes roadways, channels and fence lines.
- Minimise new weeds entering clean fields by cleaning machinery between fields and properties.

### Identification and planning

- Accurate identification of weeds on a farm is important for effective control (see case study).
- Make a priority list of weeds to control.
- Eradicate new weeds when they are in small patches.
- Maintain accurate records of weed control methods and effectiveness.
- Record the field locations of herbicide tolerant cotton varieties. Volunteer crop plants are often the most numerous weeds in the field and this is a particular problem where herbicide tolerant cotton is grown. Accurate field identification will help achieve effective control of herbicide tolerant volunteers. For example, it is important to use weed control tools other than glyphosate in fields following cotton with the Roundup Ready Flex<sup>®</sup> trait.
- Part of integrated weed management is the rotation of control methods. This will help prevent herbicide resistance (refer Section C, [Managing Herbicide Resistance in Cotton](#) in [WEEDpak](#)).

## Crop Management

- Select rotation crops that enhance the control of weeds in cotton crops.
- Maximising water use efficiency will reduce the amount of weed seeds brought onto farms in irrigation water.



*Selection of appropriate rotation crops will help manage weeds in cotton crops.*

## Herbicides

- Reduce herbicide rates or the number of herbicide applications on fields that you are confident have low weed pressure. Leave untreated strips in the field if you are uncertain of the size of the seed bank.
- Use shielded and weed detecting sprayers with non-selective herbicides.
- Use post-emergent herbicides and herbicide tolerant cotton varieties as another tool in integrated weed management. This will allow weeds to be sprayed after multiple germination events and only when they are present.
- Ensure that weeds that have escaped post-emergent herbicide applications are treated using a different weed control method, for example, cultivation, hand hoeing or the application of herbicides from a different herbicide group (refer to [Managing Herbicide Resistance in cotton](#), section C in [WEEDpak](#)).
- Continue the use of residual herbicides in combination with other weed management practices.

**Inspecting fields shortly after herbicide application for weed escapes is crucial.**

## Cultivation and hand hoeing

- Use hand hoeing to prevent weed escapes setting seed.
- Use inter-row cultivation to control weeds in the furrow.
- Beware of shifting weeds along rows and between cultivation sets. Spreading nutgrass tubers down a row, for example, is a common problem when cultivating through nutgrass patches when the soil is moist.



*Regularly clean weed from cultivation machinery to help prevent weeds spreading along rows and between sets.*

## Summary

Good farm hygiene involves:

- Identifying potential threats,
- Identifying any unknown weeds present,
- Detecting any new pests that have limited distributions,
- Scouting for weed escapes after herbicide applications,
- Preventing weeds from setting seed or spreading vegetatively.
- Cleaning soil and crop debris from machinery,
- Preventing weeds from establishing in new areas, and
- Practicing integrated weed management, effectively managing all weeds in the farming system.

## Acknowledgements

This article was modified from the [Australian Cotton Industry Best Management Practices Manual](#), September 2000, Editor Allan Williams.

For more detailed information please consult the manual.

# The importance of farm hygiene

## A grower's perspective

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**Nick Barton** the Northern Regional Agronomist for the Twynam Agricultural Group talks about the need for good farm hygiene to manage Velvetleaf (*Abutilon theophrasti* as pictured) on Telleraga Station where he was the former Head Agronomist.



*Velvetleaf is not a common weed in Australian cotton but has the potential to be very problematic.*

“It was during our BMP (Best Management Practice) audit that we **detected** a new weed that occurred in several small low spots down in our dryland fields beside the Mehi river. Since we didn't know what the weed was we decided to get it **identified** and it turned out to be velvetleaf. Apparently velvetleaf is not very widespread here in Australia but it one of the worst summer cropping weeds in the USA.

We decided that we would **regularly check** the patches of velvetleaf but the weed didn't seem to be spreading very far so we weren't too worried about it. We certainly made everyone on the farm aware that this was a weed to watch. **Good communication** between all the staff on farm, from the tractor drivers right through to the farm manager, is another one of the keys to containing potential weed outbreaks.

We pumped a lot of floodwater into our on farm storages during the floods of 1998. We also had a lot of overland water flows during that time, particularly onto our dryland country. Knowing that any water, and particularly floodwater can spread weed seed, we decided to check the inside of the storages and the dryland fields to see what weeds may have been spread onto the farm once everything started growing some months after the floods.

To our surprise we noticed a lot of velvetleaf that had come up inside the storage walls and in a number of new, low spots in various dryland fields where the water had sat for a while. Unfortunately the velvetleaf in the storages had already set seed and we had inadvertently spread it to our main return storage that was used to supply the whole farm with water. Apparently the mature seed heads and even the seed float quite well and had spread via the irrigation water throughout the farm.

We moved pretty quickly after that and ended up controlling the weeds inside the storage walls so that more seed would not be spread around the farm in the irrigation channels. We had a good success with what we did, but we ensured that we monitored the inside of the storages pretty closely after that to ensure that new plants didn't come back through. Hopefully having the storage full of water resulted in the seed rotting in the mud inside the storage.

The velvetleaf in the dryland fields was less of a worry, but we certainly got rid of it before it went to seed and spread any further. It is always better to try and get rid of any weed while ever it is in small patches that you can keep an eye on and control. We also made sure that we **cleaned down the machinery** that we used in the fields with this weed before we moved it onto clean areas, just in case the machinery spread seed in attached soil or crop trash.

It is so important to keep an eye out for potential new weeds, to have them correctly identified and to try and control them before they start spreading otherwise things can quickly get away on you. We had enough worry about with the current weeds that we had”.