CHAPTER 14

Reducing pesticide use – saves costs

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Ecosystem services are the benefits that people get from the environment. Natural pest control is one of the most important ecosystem services for sustainable cotton production. Provision of this service is dictated by the populations of beneficial insects, birds, bats and other insectivorous creatures in the landscape and their ability to move between habitats. Perennial native vegetation provides an alternative habitat for beneficials, especially when fields are in fallow thus, maintaining their population in the nearby landscape. The following principles can be used to guide native vegetation management to maximise its value for natural pest control. Managing native vegetation also enhances other ecosystem services including carbon sequestration, erosion control, nutrient cycling, water filtration and climate regulation.

BE AWARE OF

- Beneficial insects can help reduce pesticide costs.
- Actively managing native vegetation and planting tree corridors enables beneficial insects to move through the landscape and into crops.
- Plant shrubs as well as trees. Native vegetation with many different tree, shrub and groundcover species provides the best habitat for beneficial insects.
- Minimise spray drift onto areas of native vegetation and only spray once thresholds have been reached.
- Encourage birds and bats as they can consume 50% of the pests in a crop.
- Control weeds and volunteer crop plants that act as hosts for pest species.
- Protect and enhance native vegetation by revegetating near water sources for maximum natural pest control.
- Managing native vegetation also enhances carbon sequestration, erosion control, nutrient cycling, water filtration and climate regulation.

Many beneficial insects have limited dispersal ability. Connect isolated remnants with other remnant vegetation in the landscape to facilitate dispersal of beneficials and maximise natural pest control services. (PHOTO: G. Roth, Roth Rural and Regional)

Principle 1: Think beyond the crop

Think about the size and configuration of native vegetation in the region. Small, isolated remnants provide 'stepping stones' across the landscape, but the most effective natural pest control is attained from well-connected areas of native vegetation located nearby the crop. Native vegetation corridors or 'bridges' between remnants facilitate the dispersal of beneficial insects through the landscape. Where there is little remnant vegetation in an area, start a revegetation program

Dense, complex vegetation near crops provides habitat opportunities for a range of beneficial insects and maximises natural pest control services. (PHOTOS: Top, L. Wilson, CSIRO & bottom, CSIRO)

concentrating on creating corridors between remnants. Fence line plantings, wind breaks and roadside verges provide habitat to beneficials and allow movement between patches of remnant native vegetation.

Tips on what species to plant for different purposes on cotton farms, and where and how to plant them can be found in the *Trees on cotton farms guide*.

Principle 2: Encourage beneficial insects with complex vegetation

Vegetation condition for natural pest control is best where vegetation is complex. Complex vegetation has many layers (i.e. trees, shrubs, grasses and herbs) and a range of different plant species. Complexity is achieved in pastures by incorporating a variety of different growth forms including tussocky grasses, sprawling grasses, herbs and creepers (e.g. native legumes). Further complexity is achieved by incorporating logs, dead trees and litter. When planning revegetation for natural pest control, incorporate trees and shrubs that flower prolifically, such as eucalypts and melaleucas, these attract a range of beneficial insects. The pictures on the previous page illustrate native vegetation in good condition for natural pest control.

Principle 3: Do not disturb

Making well informed and rational pest management decisions will provide the best opportunity to reduce the overall need to spray and hence help conserve beneficial populations. This involves frequent and accurate insect sampling, correct identification of the insect and observations of predatory insects and parasitoid activity (e.g. thrips in mite colonies or syrphid or ladybird larvae in aphid colonies or brown or black immature stages in a whitefly colony). It is equally important to consider the overall health of the crop and any pest damage that the crop may have incurred. Remember that a vigorous, healthy crop can recover from a degree of early season damage with no reduction in yield or delay in maturity. Managing pest and damage levels using industry thresholds will help avoid economic losses inflicted from pests.

In addition, growing Bollgard II® cotton varieties dramatically reduces the need to spray for *Helicoverpa spp*. and other lepidopteran pests so will assist in retaining good populations of beneficial insects in the crop.

If it is necessary to apply an insecticide, it is very important to consider the selectivity of the insecticide, its efficacy on the target pest/s and its impact on beneficial insect species. Also bear in mind whether this insecticide may flare other pests because of the effect on beneficial insects. Consider the use of biological insecticides and also the use of reduced rates of synthetic insecticides mixed with either salt or spray oils (in some instances) to provide greater selectivity and better efficacy.

Sampling techniques, industry pest and plant damage thresholds and insecticide impact tables are updated annually in the *Cotton Pest Management Guide*.

Principle 4: Consider birds and bats as beneficials

Birds and bats alone can eat more than half the insects in a cotton crop. Both birds and bats live in a variety of different habitat types, including farmlands, pastures, wetlands and woodlands, but many forage over crops. By

Remember that native vegetation provides an excellent habitat for many beneficial insect species so it is important not to use these areas as spray drift buffer zones. This also applies to areas of remnant vegetation on neighbouring properties. (PHOTO: J. Wark, CSD Toowoomba)

Microbats and birds provide a valuable pest control service. Bat boxes provide a place for microbats to roost through the day where other habitats are unavailable. (PHOTOS: Top, P. Spark, Northwest Ecological Services & bottom, G. Roth, Roth Rural and Regional)

incorporating different types of habitat on farm, a diverse range of beneficials will be available to provide natural pest control services. Revegetation complements areas of native vegetation and can be improved through the installation of bat boxes where mature trees are scarce. To minimise impacts on birds and bats, be aware that they are most active and vulnerable at dawn and dusk.

Principle 5: Control weeds in and around the farm

Many cotton pests use volunteer cotton plants and weeds as alternate hosts prior to migrating into cotton fields. Such weeds include marshmallow (*Malva parviflora*), clovers and medics (*Trifolium* and *Medicago* spp.), capeweed (*Arctotheca calendula*), nightshade (*Solanum* spp.), bladder ketmia (*Hibiscus trionum*), thornapples (*Datura* spp.), Paddy melon (*Cucumis myriocarpus*) and cobblers peg (*Bidens* spp.). It is therefore important to control weeds and volunteers in native vegetation, especially those actively growing prior to and at the time of cotton planting. However, it is necessary to remember that some native vegetation is sensitive to chemicals, so alternative weed control measures such as chipping may be necessary.

Principle 6: Consider water availability

More invertebrates inhabit vegetation located near a water source as water increases and stabilises vegetation condition, especially during drought. This applies to both revegetation and remnant vegetation. Revegetation positioned near water sources, e.g. channels, storages, head and tail ditches or table drains along road sides is highly valuable for natural pest control. Riparian vegetation is also highly valuable habitat for many beneficials. Floodplain woodlands such as those dominated by river red gum, coolibah and black box rely on floodwater to persist and remain in good condition in semi-arid environments. Allow floodwaters to reach these woodland communities to maintain healthy vegetation and to maximise natural pest control potential.

For more information

'2011 Cotton Pest and Beneficial Insect Identification Guide' (released August 2011).

The Cotton CRC: http://www.cottoncrc.org.au/content/Catchments/Home.aspx

'Growing Trees on Cotton Farms: A Guide to Assist Cotton Farmers to Decide How, When, Where and Why to Plant Trees' – available from CRDC, Narrabri.

'Managing Riparian Lands in the Cotton Industry' – available from CRDC, Narrabri.