CottonInfo

CottonInfo | In this together – Pest Management

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Managing Silverleaf whitefly to maintain Australia's fibre quality reputation

KEY POINTS:

UP FRONT TACTICS:

- Use IPM across the farm and throughout the year to build beneficial insect numbers, including using thresholds to avoid unnecessary sprays, selecting soft options where possible and managing host weeds across the farm.
- Coordinate tactics, such as tight planting window, delaying use of disruptive insecticides and shared adherence to IRMS, through Area Wide Management.
- Create a host free period, by destroying crop residues immediately after harvest, controlling host weeds in and around cotton fields, and use of non-host crops in rotation.
- Plant okra-leafed varieties.

ACTIVE TACTICS:

- Check for SLW twice weekly from peak flowering using presence/absence sampling. Sample at least 20 leaves per 20-25 ha.
- Score the proportion of leaves (at 3rd, 4th, or preferably 5th leaf nodes from the terminal) infested with > 2 adults / leaf, in relation to crop stage, using day degrees (dd).
- Refer to the SLW threshold matrix for timing and product choice. The CottASSIST SLW tool can assist in recording population development against day degrees.
- Adhere to the Insecticide Resistance Management Strategy (IRMS). Avoid repeated applications of products from same chemical group. DO NOT apply more than the maximum number of applications. DO NOT apply apply Admiral more than once within a season.
- Late SLW adult immigration and developmentally delayed crops are not covered by the threshold matrix. In these situations focus on avoiding honeydew contamination of lint, using options such as early defoliation, a knockdown insecticide and if sufficient time, an IGR.

STICKY COTTON

- It is important that the industry uphold best management of silver-leaf whitefly to maintain Australia's reputation for uncontaminated cotton by avoiding contamination with honeydew.
- If sticky cotton is suspected, delay harvest and allow weathering time, especially rain, dew or high humidity. Recent research has shown that decline in honeydew on bolls appears to be slow in the absence of rainfall.

Silverleaf Whitefly - The IPM Enforcer (Richard Lloyd, Qld DAFF)

Silverleaf Whitefly (SLW) is a major pest due to its ability to contaminate cotton lint with honeydew. Management of SLW requires a year round Integrated Pest Management (IPM) approach as SLW are highly mobile, can quickly build resistance to many insecticides and numbers can rapidly expand especially if natural enemies are reduced by insecticides. This document provides recommendations for effective monitoring and best management of SLW in Australian cotton.

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Queensland Government

CSIRO

Australian Government
Cotton Research and Development Corporation

What can I do to suppress SLW on my farm? Up front tactics

1. Correct identification

Species verification

Correctly identifying which whitefly species are present is very important. Two main types of whitefly are found in Australian cotton fields:

- Silverleaf Whitefly (SLW) Bemisia tabaci – biotype B also referred to as Middle East-Asia Minor 1 (MEAM1)
- Greenhouse whitefly Trialeurodes vaporariorum.

There is another biotype of Bemisia called Australian native (AN), which is rarely encountered in cotton and isn't considered a management issue.

Greenhouse whitefly adults can be easily distinguished from SLW adults on the basis of size and wing positioning. Similarly the nymphs of each species can be distinguished by shape and hairiness (see photographs).

Species composition within a field may change rapidly during the season due to factors such as insecticide applications and climate. If Greenhouse whitefly are identified early in the season, continue to monitor for the arrival of SLW.

Biosecurity

Although biotype B whitefly is present in Australia there is a risk of other biotype B strains and other biotypes e.g. biotype Q, with different insecticide resistance profiles, entering the country. Whitefly can also be vectors of damaging exotic viruses such as cotton leaf curl disease.

Monitor for any unusual plant symptoms, pests or abnormal responses to pesticide. If you see anything unusual, call the Exotic Plant Pest Hotline on 1800 084 881.

Beneficial insects

If beneficial insect populations are disrupted, SLW populations build faster. SLW parasitoids such as *Encarsia formosa*, *Encarsia azimi*, *Eretmocerus hayati*, and *Eretmocerus mundus* are important beneficials that are sometimes overlooked because they are very small and secretive. Whitefly predators include big-eyed bugs, minute pirate bugs, lacewing larvae and ladybeetles.

Note absence of hairs on SLW nymph (left) compared to presence on Greenhouse whitefly (right). (Richard Lloyd, Qld DAFF)

Note the gap between the wings for SLW (left) compared with overlaping wings for Greenhouse whitefly (right). (Richard Lloyd, Qld DAFF)

2. Take a year around approach

Seasonal conditions and farming practices during winter and early spring can have a big influence on summer SLW population. For a SLW outbreak to occur, SLW require a suitable climate (especially mild winters), a sequence of hosts (winter weed or alternative crops) and management that disrupts natural SLW enemies). Plan tactics to reduce the potential for these outbreaks to occur.

3. Think of the farm and surrounding vegetation as a whole system

Silverleaf whitefly numbers can build rapidly, and adults can move around the farm and between farms to find suitable hosts. Consider all potential hosts in cropping and non cropping areas.

Area wide management (AWM)

AWM involves sharing and coordinating tactics with neighbours, and has been found to be effective in management of SLW. Strategies may include coordinated planting windows, weed management, consensus about delaying the use of disruptive insecticides to conserve beneficials, shared adherence to IRMS, and enhancement of native vegetation areas, such as coordinated weed and pest animal control or tree planting.

Build beneficial numbers

Build beneficials across the farm, by using an IPM approach to manage all crops, not just cotton. This includes using thresholds to avoid unnecessary sprays, selecting a soft option where possible and managing weed hosts

Species verification and resistance monitoring

Pack the leaves in a paper bag and then inside a plastic bag. Pack this in an esky with an ice brick that has been wrapped in newspaper.

Ensure samples are clearly labelled including: collector's name and contact details, farm & field, region, date of collection as well as any other relevant information such as insecticide usage. Send by overnight courier to;

Jamie Hopkinson, Qld DAFF, 203 Tor Street, Toowoomba QLD 4350, Phone (07) 4688 1315

across the whole farm.

Native vegetation both on farms and in the region can also be an important source of beneficials. Refer to the Cotton Production Manual for ways to enhance the IPM value of areas of vegetation.

Host free period

Where possible allow a host-free period within the cropping rotation. Non-host crops include sorghum, maize, winter cereals and chickpeas. Whitefly have a wide host range, crops other than cotton that are important hosts include tomatoes, melons and soybean.

Consider co-ordinating host free periods with neighbours to enhance their effectiveness

4. Have good on-farm hygiene

As SLW spend their winter on plants, removing hosts and maintaining a host free period during this time will reduce the starting population for next season. Higher numbers in spring, even with careful management it is likely that you will reach threshold quicker.

Control farm weeds all year round. Favoured weed host species include: Bladder ketmia, native rosella, Rhynchosia, vines (cow, bell, potato), sow thistle, rattle-pod, native jute, burr gherkin and other Cucurbitaceae weeds, Josephine burr, sunflowers when young, Euphorbia weeds, and volunteer cotton. Maintain a zero tolerance of volunteer/ratoon cotton throughout the year.

Destroy crop residue from all susceptible crops immediately after harvest. This is critical for cucurbit crops that may regrow and act as whitefly reservoirs.

5. Consider options to escape, avoid or reduce pests

Coordinated planting

Aim for a tight cotton planting window. This will limit the availability of young, attractive crops late in the season when whitefly populations are at their maximum. It will also help to minimise the number of whitefly generations in the season and consequently the scale to which the population can build up.

Late planted cotton crops may pose a higher risk for sticky cotton. As populations become displaced from earlier defoliated crops, SLW will move and concentrate in the remaining decreasing crop acreage. Refer to below for management of mass immigration of adult SLW into crops.

Field selection

If cotton is planted in close proxim-

ity to other good SLW hosts, such as melons or soybeans, the risk of mass movement of adult SLW to the later maturing crop may be similar to late planted cotton. The greater the isolation from susceptible crops, the less likely there will be mass movement of SLW between crops.

Varietal Selection

Okra-leaved varieties are generally less susceptible to SLW than normal leaf.

Remove SLW host weeds such as Bladder ketmia (left) and Native Rosella (right) (Dave Kelly)

What can I do to manage SLW in my crop? Active tactics

6. Choose insecticides wisely to conserve beneficials

Natural enemies can play a vital role in the successful management of whitefly. Avoid early season use of broad spectrum insecticides, particularly synthetic pyrethroids and organophosphates. There are only a few products registered for the control of whitefly in cotton in Australia. The SLW threshold matrix identifies the optimum strategic times for use of these limited products.

7. Aim to grow a healthy crop

Schedule irrigations to avoid moisture stress. Moisture stress increases whitefly severity and honeydew production.

Optimise nutrition and water inputs to avoid delaying maturity, or extended unproductive growth at the end of the season.

8. Apply good resistance management principles

SLW can quickly develop resistance. When SLW was first identified in Australia in 1994 it already possessed resistance to many older insecticide groups. The SLW Threshold Matrix is designed to minimise the need to intervene with chemical control as well as to delay the development of resistance. Compliance with the IRMS will ensure that the limited products available for SLW control will remain efficacious into the future.

- Avoid repeated applications of products from the same mode of action group.
- DO NOT apply more than the maximum number of applications.
- Do not apply Admiral more than once within a season.
- Refer to SLW Threshold matrix and IRMS.

9. Sample crops effectively and regularly

Effective sampling is the key to successful management. SLW populations will naturally fluctuate so it is essential to conduct frequent population monitoring to use the Threshold Matrix effectively.

Sampling should commence at flowering and occur twice weekly from peak flowering (1300dd).

a. Define your management unit

- A management unit can be a whole field or part of a field – no larger than 25 ha.
- Each management unit should have a minimum of 2 sampling sites.
- Sample 10 leaves/site (20 leaves/management unit).

For example a 50ha field, should have 40 leaves sampled from 4 sampling sites (2 management units).

b. Choose a plant to sample

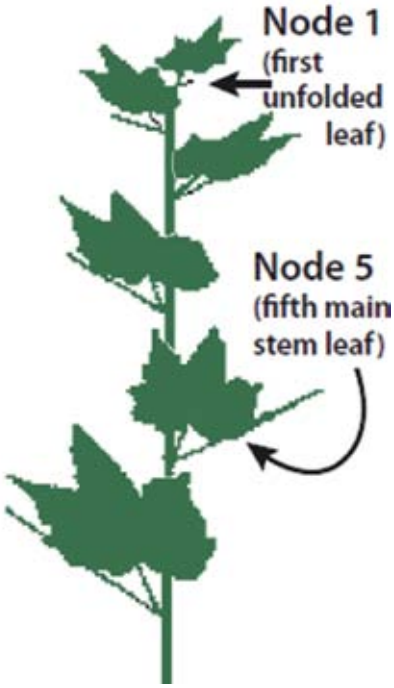
- Move at least 10 m into the field before choosing a plant to sample.
- Choose healthy plants at random, avoiding plants disturbed by movement or other sampling methods.
- Take only one leaf from each plant.
- Sample along a diagonal or zigzag line. Move over several rows, taking 5–10 steps before selecting a new plant.

c. Choose a leaf

- From each plant choose a mainstem leaf from either the 3rd, 4th or preferably 5th node below the terminal of the plant, as shown in the diagram. Using the leaf from the 4th node allows these same leaves to be collected and scored for aphids and mites.

d. Score leaf

- Binomial sampling (presence/ab-



For a an outbreak to occur, SLW require a suitable climate, a system with hosts (crop/weeds) in sequence and management that disrupts natural enemies.

sence) is highly recommended as it is less prone to bias than averaging the number of whitefly/leaf.
- Score leaves with 2 or more whitefly adults as 'infested'. Score leaves with 0 or 1 whitefly adults as 'uninfested'.

e. Calculate percentage infested

Either manually calculate percentage of infested leaves or enter sample data into the SLW Threshold tool on www.cottassist.com.au

Sampling considerations and limitations

- The 3rd, 4th or preferably 5th node has been selected as it is convenient and an accurate predictor of SLW population growth beyond cutout (~1450dd). A rigorous binomial modelling process has been used so that an estimated proportion of leaves infested can be equated to an actual density of adults per leaf and this is built into the threshold matrix.
- During the season, SLW change preference for location within the canopy and this needs to be considered when interpreting sampling results. The bulk of the SLW population will be lower in the canopy in pre-flowering and flowering stages and gradually moves upwards until cutout. As a consequence of monitoring the 5th node, it is not unusual to experience a rapid increase in sampled population around cutout as this population moves up the canopy.
- To better understand how the population is building, it can be informative to monitor the 8th, 9th or 10th node for nymphs and adults as well as the 4th or 5th node up until about cutout (~1450dd). As the modelling has not been done at these lower leaf nodes, there are no definitive guidelines for sampling, however based on knowledge of within-plant adult distribution and how that changes over the growing season, it could be expected that adult density at nodes 8 or 9 in the period from squaring to a little after peak flowering (but before cutout) will be around 1.5-2 times the density at nodes 4 or 5.
- After cutout nodes 4 and 5 become a more accurate predictors of population growth whereas density lower in the canopy will fall sharply.
- The SLW population dynamics can be quite cyclic – with peaks and troughs in adult numbers. While nymphs aren't used in the threshold, the presence of nymphs, indicates the population is reproducing and supports the assumptions that underpin the Threshold Matrix. An absence of nymphs at any stage may suggest that the adult population is a mass migration. Refer to the Late Season SLW Management section.
- During the heat of the day, whitefly tend to shelter lower in the crop. Aim to sample fields at a similar time each morning.
- Temperature is the major driver of SLW populations. Cool conditions are likely to slow population increase. Heavy rainfall, may affect some adults, but does not normally have a lasting impact on population growth, as nymph populations are unlikely to be affected. Consider additional sampling if a change is forecast.

Sampling should commence at flowering and occur twice weekly from peak flowering.

10. Evaluate pest abundance against established thresholds

SLW Threshold Matrix

Control options for SLW are limited, meaning the timing of any spray is critical. The threshold matrix is designed to manage the risk of honeydew contamination of lint. The matrix is based on rates of population increase relative to the accumulation of day degrees (dd) and crop development.

There are separate thresholds for early season suppression, for control and for knockdown late in the season. The Threshold Matrix has been developed to assist in the interpretation of population monitoring data.

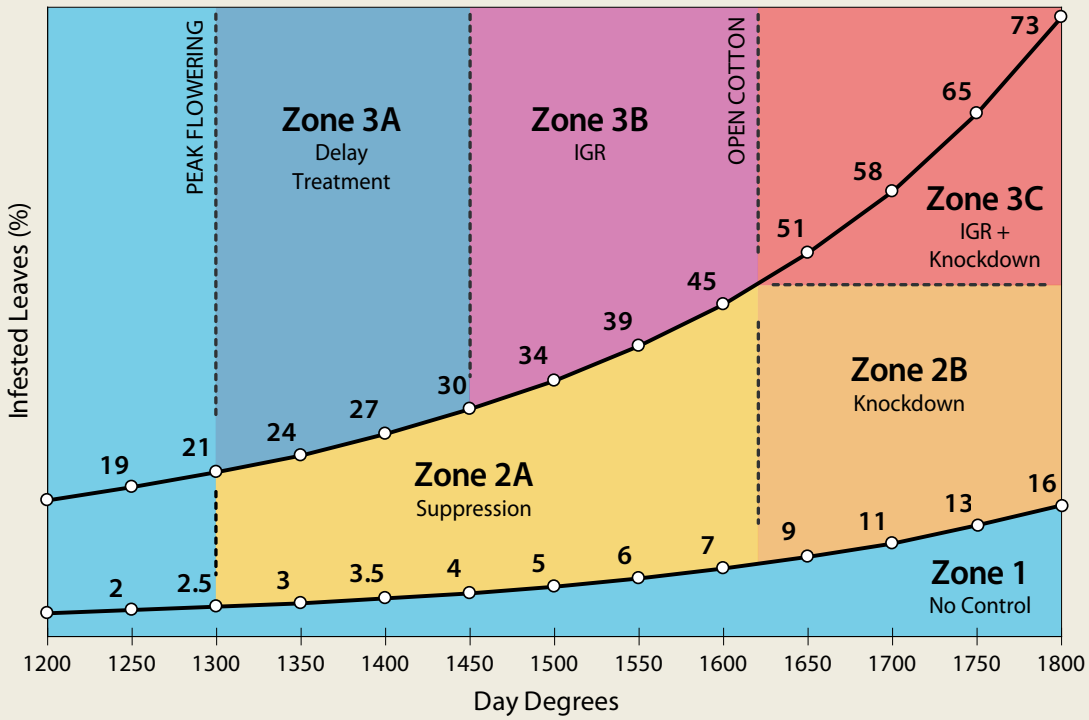
The CottASSIST SLW threshold tool helps with interpretation of the threshold matrix based on the SLW population (%), day degrees and crop stage. Using this web-based tool is a simple option as it automatically finds the accumulated Day Degrees and crop stage.

Always follow label directions.

Knowledge of the registered products can help to improve management decisions.

- Bifenthrin (Pyrethroid) – provides some knockdown of adults, however is highly disruptive to beneficials, and resistance levels are high and widespread.
- Diafenthiuron (Pegasus, Difen, Receptor) - is most effective at targeting low, early season populations and has contact, translaminar and vapour activity. It is activated by light as well as insect enzymes so will be less effective in cloudy weather.
- Pyriproxyfen (Admiral) - is an insect growth regulator (IGR). It does not kill adult SLW, but provides population control by preventing eggs from hatching and the progression to adult stage, as well as sterilising adult female insects. This means it will take 10-14 days before the population declines. The threshold matrix accounts for this delay. Admiral provides up to 2 weeks residual and has been shown to be effective even on high populations of SLW. It would be expected to give 4-6 weeks of control.
- Spirotetramat (Movento) - is a highly systemic, slow acting compound that targets the nymphal development stage, and has little direct activity against adults or eggs. Nymphs and pupae stop feeding shortly after application. Control of these life cycle stages is expected 5-7 days after application, with control extending 3-5 weeks, depending on rate. Control in stressed cotton (drought, waterlogged) will be adversely affected due to poor translocation of the product.
- Cyantraniliprole (Exirel) - is now registered for use in cotton. It is a new mode of action for SLW control which rapidly stops the pest feeding on the cotton plant. Exirel has activity on multiple life stages, although the most impact occurs when targeted at the early nymph stages. Do not use more than 2 applications per season. Refer to the label for details for use and rates.

SLW THRESHOLD MATRIX



NOTES	
Sampling protocol	Sample 20 leaves 3rd, 4th or 5th node below the terminal/25 ha weekly from first flower (777 DD) and twice weekly from peak flowering (1300 DD). Convert to % Infested leaves. Infested leaves are those with 2 or more adults. Uninfested leaves are those with 0 or 1 adult.
Day Degrees	Daily Day Degrees (DD) are calculated using the formula; DD = [(Max °C – 12) + (Min °C – 12)] ÷ 2 For day degree information from your nearest SILO weather station visit www.cottassist.cottoncrc.org.au For a mid-September planting in Emerald, long term average weather data predicts the duration of Zone 3A is 9 days, Zone 3B is 11 days and Zone 3C is 14 days.
Zone 1 No Control	Insecticide use is not warranted for fields with low SLW densities. In this zone the risk of yield loss or lint contamination is negligible, even when populations are sustained throughout flowering and boll fill.
Zone 2A Suppression	This Zone represents a wide window of opportunity for the most economic and low-risk control of SLW. Conventional (non-IGR) insecticides, such as diafenthiuron (Pegasus), can control or provide useful suppression of low-medium density populations. Movento can control a wide range of nymphal population densities.
Zone 2B Knockdown	Lint contamination can result from uncontrolled medium density populations in crops with open bolls. Early action in Zone 2A can prevent the need for higher-risk remedial action in Zone 2B. Pegasus may be effective for remedial control (knockdown) of population densities up to 45% infested leaves in Zone 2B. (NOTE: The Pegasus label indicates that the product may not give satisfactory control of populations >25% infested leaves. This is based on an overseas sampling model. For Australian conditions this equates to ~45% infested leaves). Efficacy will depend upon coverage and environmental conditions. For higher densities approaching the Zone's upper boundary, an application of Zone 3B products may ultimately be required.
Zone 3A Delay Treatment	Controlling high density populations before 1450 DD is not recommended due to the likely resurgence of the population and need for additional control to protect lint from honeydew. Delay control until Zone 3B.
Zone 3B Control	Where populations are mid to high density, targeting an application when the crop is between 1450 and 1650 DD, (allowing the product to be come active prior to the onset of boll opening), greatly reduces the risk of lint contamination and the need for further controls. IGR products such as pryiproxifen, trade name Admiral, and non-IGR products such as Spirotetramat (trade name Movento), are effective in this zone. ENSURE ONLY A SINGLE APPLICATION OF ADMIRAL OCCURS WITHIN A SEASON. Delaying IGR use beyond 50% infested leaves or 1650 DD can result in yield loss, lower efficacy of the IGR and significant lint contamination. Do not apply more than 2 applications of Movento within a season. Use the higher rate when periods of high pest pressure or rapid crop growth are evident, when longer residual control is desired or when crops are well advanced.
Zone 3C Salvage	Once the populations exceeds 50% leaves infested, the use of an IGR by itself is unlikely to prevent lint contamination due to the inherent time delay in population decline following application. Rapid knockdown of the population using a conventional insecticide is required before applying the IGR (or similar). The lack of insecticides offering robust knockdown of SLW at high densities make this a 'high risk' zone.

Cyantraniliprole (Exirel) is now registered for use in cotton. Refer to the label for details for use and rates.
Check the APVMA website for other control options that may become available in cotton under permit – www.apvma.gov.au

Refer to the resistance profile in the cotton pest management guide for information on resistance issues.

Using the Threshold matrix

SLW threshold matrix helps to manage the compromise between

- Wanting to delay treatment, to reduce the risk of reinfestation, and need for re-treatment.
- Targeting populations small enough for products to be effective.

Management decisions should take these issues in to account, with the overall aim to reduce the risk of honey dew contamination on lint. The threshold matrix may not be an accurate predictor of SLW population where there is large migration of adult SLW, and/or delayed or late crops. Refer to Late Season Management.

What if I use Zone 3B products at lower thresholds?

Earlier use of control products will be more conservative in terms of reducing the risk of honey dew and will probably have a greater immediate impact on the population. However this will also increase the period of time from treatment until defoliation, allowing for potential reinfestation and honeydew build up.

A lower threshold would be effective as part of an area wide strategy where all crops were planted within a tight window, were controlled at the same time, and there were no other large sources of SLW population (e.g. other host crops, weeds). As pyriproxyfen (Admiral) is strictly one use per season, using this option early will limit the late season response options.

What if I have sustained low populations of silverleaf whitefly?

Sustained low SLW populations can still contribute to lint contamination. Where populations are maintaining in Zone 2A, consider a suitable 'Suppression' product, especially if honeydew sheen is noted.

What if I have a sudden immigration of SLW adults into my crop?

The SLW threshold matrix is designed to manage a SLW population that builds gradually in the crop and follows a predictable growth pattern. Large populations of adult SLW migrating into cotton crops will therefore reduce the reliability of the threshold matrix. This can occur if SLW adults leave crops that have been defoliated and seek new hosts. In this situation refer to Table 1 as a guide to manage these influxes.

Late season SLW Management

Control of whitefly in delayed or later maturing crops is complex, as day degree accumulation is unlikely to align with the matrix, and SLW may be a combination of both resident population and recently dispersed adults from earlier maturing defoliated crops. These could be crops that are being pushed for prolonged growth to achieve high yields. Such crops remain extremely green and lush right up until defoliation and are at high risk of reinfestation and/or honeydew accumulation. Similarly some crops may have been development delayed due to flood or hail damage.

For developmentally delayed crops or those fields that suffer influxes of adult SLW, control decisions should focus on avoiding lint contamination by considering facts such as crop development stage, the likely efficacy and residual impact of insecticide options, and rate of honey dew accumulation. Due to the prolonged or delayed development, use of the threshold matrix needs to be modified and a two insecticide strategy may be required.

A 'Suppression' product, such as Diafenthiuron, applied during the later half of Zone 2A, may collapse the population sufficiently, so no further sprays will be required. However if conditions are suitable for SLW, a follow up control product such as Pyriproxyfen may be required to see the crop through to defoliation. Refer to Table 2: Zone 3 decision matrix.

Crop development stage -

Prior to open bolls, delay in treatment will allow more settling time for the likely inward flow of SLW before treatment, reducing risk of having to retreat.

Expected time to defoliated leaf drop is an important consideration. Once defoliant is applied, adult SLW will generally leave the crop and falling leaves will take the nymphs with them.

If there is an earlier and later maturing phase of bolls in the crop, ie bottom and top crop, it is important to manage the risk of contamination of the earlier bolls.

The likely efficacy and residual impact of insecticides -

Slower acting products with longer residuals such as an IGR require up to

Crop with low or no SLW experiences a mass immigration of SLW adults	>3 wks till leaf drop	Eggs may have time to develop to nymphs that could produce honeydew	Little or no honeydew on leaves in lower canopy	Monitor Timely defoliation (60% open)
			Heavily speckled leaves in lower canopy	Control with IGR
	<2 weeks till leaf drop	Too little time for nymph population to develop so manage adults.	Little or no honeydew on leaves in lower canopy	Monitor
			Heavily speckled leaves in lower canopy	Salvage: Knockdown &/or defoliate early &/or delay picking for rain if bolls contaminated

Table 1: SLW mass immigration scenario

14 days to be fully effective, whereas knockdown products, provide quick but limited control.

Where risk from contamination is high, early defoliation can be considered.

As the risk of resistance is very high, strategic use of products is required. Follow good resistance management principles.

Rate of honey dew accumulation on the crop canopy and lint -

It is difficult to determine at exactly what point honeydew levels may become problematic once bolls begin to open. Once leaves appear to have a 'honeydew sheen', then generally corrective action needs to be implemented.

Zone 3C: Salvage – a sticky situation

SLW feed on the phloem vessels that transport the sugar rich products of photosynthesis around the plant. During digestion, a proportion of plant sugars (sucrose, glucose, fructose) are altered into new sugars e.g. trehalulose and melezitose, resulting in a combination of sugars passed out

Honeydew sheen on leaves

of the SLW in the form of honeydew. The honeydew leads to problems in the spinning mills when the sugars cause fibres to stick to machinery, eventually necessitating shut-down for cleaning.

Compared with aphid honeydew, which is evident as thick, wet, sticky honeydew coating leaves and bolls, SLW honeydew often dries to an almost lacquer-like consistency and though visible on the leaves and bolls, may be dry to touch. This is deceptive - the main sugar, trehalulose, has a low melting point and is hygroscopic (attracts moisture). In the spinning mills, visually "clean" cotton can suddenly cause problems as heat generated through friction causes the trehalulose to melt. It then attracts moisture and becomes sticky. Fields with contaminated lint must be managed carefully. It is best to leave harvest of these fields as late as possible to allow time for honeydew levels to decline.

Recent research has shown that rainfall can significantly reduce the amount of honeydew on contaminated bolls, but the decline in sugar levels on bolls is slow in the absence of rainfall. This poses a problem where crops with open bolls are contaminated, the honeydew dries and appears non-sticky then the crop is defoliated and harvested during a dry period. In this situation the lack of rainfall means that much of the sugar will still be present and may cause later problems. Further, contaminated lint gradually grows sooty moulds especially where the crop experiences humid conditions or light rainfall. This is a risk as the effect of sooty mould on grade is unknown.

For more information:
Cotton Pest Management Guide
CottonInfo team

	10% open bolls 115-118 DAP ~1650 DD	30% Open bolls 145 DAP ~2000 DD	60% Open Bolls 155 DAP ~2150
Pop. Density < 50% infested leaves	• Continue to monitor SLW and consider forecast temps and rainfall outlook • Consider knockdown#, IGR# or Difenthiuron#	• Use Difenthiuron # and look out for re-infestation • Early defoliation if necessary*	• Look for nymphs. If none possibly late season migration • Use Difenthiuron # or early defoliation
Pop. Density > 50% infested leaves	• If there are still a few weeks to go until defoliation, the residual effect is important. • Use IGR# (residual 7-10 days) with knockdown#	• Use IGR# (residual 7-10 days) if defoliation is >3 weeks away. • Consider knockdown if defoliation is < 2 weeks • Early defoliation if necessary	POTENTIAL BIG PROBLEM Salvage: Use Difenthiuron # &/or defoliate early &/or delay picking for rain if bolls are contaminated
WORST CASE: Honey dew contamination of lint		• Defoliate as soon as possible • Harvest last • Allow weathering time – especially rain, dew high humidity	
*Normal defoliation is usually at 60-65% open boll . #Refer to label for WHP restrictions.			

TABLE 2: Zone 3 decision table