IPM Notes 2.0 Sucking Bugs

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Bugs, there's no better way of describing them, they really suck. The true bugs needle-like mouths puncture and suck buds, flowers and even fruit, causing crop loss. The unique fruit structure of raspberries and blackberries means that damage to just a few drupelets can make fruit unmarketable.

Which bugs? True bugs are a huge group of over 40,000 species. In Australia, two groups are particularly bothersome to Rubus, the shield bugs and mirids.

SHIELD BUGS

- Green Vegetable Bug (GVB - *Nezara viridula*)
- Green Stink Bug (GSB - *Plautia affinis*)

Figure 1. Green Vegetable Bug (GVB – *Nezara viridula*) on raspberry. Photo credit: Michele Buntain

Figure 2. Green Stink Bug (GSB – Plautia affinis). Photo credit: Brisbaneinsects.com

MIRIDS

- Crop mirid (*Sidnia kinbergi*)
- Green mirid (*Creontiades dilatus*)
- Brown mirid (*Creontiades pacificus*)

Figure 3. Crop mirid adult (L) and juvenile (R), (*Sidnia kinbergi*). Photo credit: Denis Crawford

Figure 4. Green mirid (*Creontiades dilatus*) on raspberry. Photo credit: Emma Nightingale

Others such as Cottonseed bug (*Oxycarenus luctuosus*), Potato mirid (*Calocorus norvegicus*), Brokenback mirid (*Taylorilygus apicalis*) and Rutherglen bug (*Nysius vinitor*) can also be troublesome in some regions in some seasons particularly in dry years when vegetation surrounding the crop is able to provide them with the resources they require to survive. Exotic bugs high on the biosecurity radar but not currently resident in Australia include Brown Marmorated Stink Bug, Consperse Stink Bug, Tarnished Plant Bug, and the Glassy Winged Sharpshooter, a vector for Xylella disease. So, keeping an eye on bugs in your crop makes good sense.

Damage

The key issue with bugs is the way they feed, when they feed, and what this does to a berry. Their mouth structure, technically a stylet, is designed to pierce, puncture and suck from soft plant tissue. Some also release enzymes that help dissolve and digest the plant causing death of surrounding tissues. To make matters worse, the feeding mechanism bugs use provides a clear pathway for bacterial and virus transmission. They target high sugar loaded soft tissue, with young buds, flowers and fruit being super susceptible. Infuriatingly, bugs can often go undetected until after the damage becomes obvious and they have moved on leaving deformed or aborted flowers and fruit. GVB and stink bugs hiding in fruit clusters become an unwelcome stinky contaminant. Despite their elusive behaviour, they can cause significant damage with research showing mirid feeding can cause not just deformed, unmarketable fruit but also a 57% decrease in berry weight.

Figure 5: Damage caused by sucking bugs to blackberry.
Photo credit: TIA

Distribution and breeding

Complicating sucking bug control is their wide host range and distribution across Australia. In warmer climates, adults can be present in a crop all year round.

In cooler regions, adult green vegetable bugs (GVB) and green stink bugs (GSB) overwinter on other hosts such as weeds and pasture, under bark or even in farm sheds. GVB adults are relatively long lived (37-50 days) and have a high reproductive capacity of between 200- 350 eggs per female. Mirids usually overwinter in low numbers and the population increases again as temperatures rise. They disperse by short flights or migrate longer distances on wind currents for example both green mirid and Rutherglen bugs occur in Tasmania solely due to adult migration on northerly air flows from mainland Australia. Others such as the Australia crop mirid can breed and produce more than one generation in a crop, with generation times of 3-4 weeks under favourable conditions.

Management options in Rubus

Monitoring

The first step to management is knowing when, what and how many bugs are in your crop, particularly at vulnerable plant growth stages.

Emma Nightingale, Tasmania's Costa Rubus agronomist, studied mirids in her final year at UTAS in 2016. Emma tested sticky, water and light traps, beating buckets, sweep netting, vacuum collection. The most effective method for all life stages of mirids was sweep netting in the mid to late afternoon (3 pm to 6 pm) along the top of the canopy. This takes around 2 minutes/100 m of row. Beat sheet and bucket sampling have been used in other crops for shield bugs (GVB and GSB). Insect 'Zappa' traps that use UV wavelengths specific to pest species including GVB and mirids have been successfully trialled in cotton for pest monitoring, particularly as an early warning system for migrating mirids.

More recently, research has focused on the identification of specific insect pheromones. Researchers from Australian company EcoKimiko IPM have developed a pheromone specific to green mirid which they sell under licence.

Cultural management

Cultural management poses the question of whether we remove plants that are attractive to pests from around the crop or deliberately plant specific trap crops that the bugs prefer. GVB is known to breed on weeds such as wild turnip, wild radish and variegated thistle so removing these should be a priority. New Zealand field scale research found black mustard to be an effective trap crop for GVB whilst lucerne is a preferred feeding host for mirids and lygus bugs in the US. Emma Nightingale's research in Tasmania collected over 80 mirids/sweep from lucerne compared to a maximum of 25/sweep in neighbouring raspberries. With further research on their management, trap crops could play an important role in the IPM of sucking bugs.

Biological management

There are many generalist predators of mirids including the assassin bug, damsel bug and small mirid. Other natural enemies include the Lynx spider and the Yellow Night Stalker. A Queensland study in the late '90s found a range of predators of GVB with the most effective being the 2 wasp egg parasitoids *Trissolocus basalis* and *Telenomus* sp. Both GVB and GSB eggs turn black once parasitised. Ants, spiders and predatory insects (e.g. lacewing larva) predate on the nymphs whilst the final instar and adult are parasitised by the tachinid fly (*Trichopoda giacomellii*) recently introduced into NSW and Qld cotton.

Chemical management

Currently there are very limited options for non-disruptive chemical management of bugs in Rubus.

Transform® (*sulfoxaflor*) is toxic to bees, whilst Pyrethrin is a broad-spectrum knockdown.

MainMan® (*flonicamid*) is more compatible with IPM programs when used at low rates and is selective for sucking insects like mirids, aphids GVB and GSB.

In the pipeline is the new IPM compatible product Sivanto® Prime (*flupyradifurone*) which will undergo efficacy and residue trials in Rubus over the next 2 seasons.

Both Mainman and Sivanto Prime are restricted in the number of applications per season so if approved will need to be used very strategically as a component of a well-developed IPM program.

Putting it all together

Like any pest within an IPM system, sucking bug management in Rubus is going to require multiple strategies if successful control is to be achieved.

Although chemical controls may alleviate sucking bug damage, these gains will be short lived without the use of other non-chemical controls aimed at reducing ongoing pest pressure.

Similarly, the over utilisation of chemical controls may also suppress natural enemies (including those you've introduced) and create secondary pest outbreaks, which may require further interventions that impact on your profitability.

Despite having this understanding, IPM in Australian Rubus is still in its infancy particularly within protected cropping systems. For this reason, more research on how to combine the best monitoring options, trap cropping, weed management and the appropriate use of new chemistry is needed to make sure that the system performs at its best, and is sustainable for years to come.

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