



# INTEGRATED PEST MANAGEMENT

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## Integrated Pest Management - IPM

IPM involves the selection, integration and implementation of pest control (biological, chemical or cultural) based on predicted economic, ecological and sociological threshold. Consideration must be given to the cost of the ecosystem and human society.

IPM incorporates three important concepts:

1. No single pest control method is always used. All of the control options — biological, chemical and cultural — must be considered. Chemical control is used only when needed.
2. Monitoring (sampling) of the pest is constantly needed to evaluate the status (not present, present but not causing economic damage, present and causing economic damage, etc.) of a pest population.
3. The presence of a pest is not a reason to justify action for control.

IPM has been confused in the past to be 100% biological, and organic management technique resulting in pesticide free management. This is not the case; in fact the chemical control approach may be warranted if it fits with the goals of the IPM program to reduce or eliminate high threshold pests.

## Monitoring

Monitoring pest activity and population levels is the key to successful IPM. Unfortunately, most growers feel monitoring must be a complicated and a time-consuming process where someone must constantly watch each and every plant. This is simply not true. Monitoring of pests in vineyards can be done in a multitude of ways — from visual inspections, temperature-dependent (degree-day) developmental models and using indicator plants for specific pests.

## Biological control

Biological control is the use of parasites, predators and pathogens (diseases) to control pests. In the vineyard, there are a multitude of beneficial insects and mites that can prey on pests. In many cases, these naturally-occurring beneficials will do a good job of controlling the pests if they are not disturbed too much.

Disruption of an IPM system is generally caused by over-using

pesticides that kill the beneficials to a greater extent than the pests. Biological control can be implemented through the introduction of exotic parasites, predators or diseases; conservation is the use of control tactics that have the least impact on beneficials and the provision of habitat or food to attract beneficials and ensure their survival; and augmentation which involves the raising and releasing of biological control agents.

## ***Augmentation is the control method employed by the Murray Valley Citrus Board to control gall wasp at Hollands Lake.***

A "good" biological control option has the following characteristics:

1. High Reproductive Potential — be able to keep up with the high reproduction of the pests.
2. Good Mobility — be able to search out the pests or come into contact with the pests.
3. Host-specific — not be generalists that may adversely affect other, sometimes beneficial, organisms.
4. Persistent — have the ability to exist when pest populations decrease and remain season to season.
5. Easily Reared & Encouraged — to be inexpensive and competitive with other controls.
6. Tolerant of Other Controls — to fit into a true IPM system, tolerant of cultural and chemical controls.

## Examples

1. Ladybirds have many generations per year, eat a narrow range of pests (aphid, mite or scale specialists), usually overwinter well and can often withstand some of the softer pesticides, especially soaps and oils.
2. Green Lacewings are not to be confused with the lace bug pest. The larvae feed on aphids, scales and mites. The larvae must search for the pests as they do not have wings.
3. Syrphid Flies (Hover Flies) are common yellow and black flies that have voracious larvae (maggots) that eat aphids.

## Case Study

In 2010/11 Murray Valley Winegrowers' Inc. initiated a small conservation field trial using Buckwheat as an attractant / habitat. Buckwheat (*Fagopyrum esculentum*) is a broadleaf, herbaceous plant that flowers prolifically. It is a versatile, easy-to-grow, short season grain crop. It tolerates poor soils and is often used to improve soil fertility. Buckwheat establishes bloom and reaches maturity in 70-90 days after planting. The plant breaks down quickly, suppresses weeds and attracts beneficial insects and pollinators with its prolific blooming flowers.

The trial commenced in August 2010 with Buckwheat seeds direct drilled in the mid-row of alternative rows in an established Coomealla Shiraz vineyard. The recommended rate was 75kg/Ha, full cover, across seven mid-rows. Control rows were incorporated to compare any difference in beneficial insect populations. The vineyard was under drip irrigation, the buckwheat was dependent on rainfall for soil moisture.

Fortnightly inspections were conducted. Three yellow sticky traps (240 x 100mm) were attached to the dripper wire 40m apart and 30cm above the ground in each buckwheat row, collected fortnightly and an identity/count of the insects trapped was recorded.



Flowering Buckwheat Trial Mid November 2010

Photo R. McClintock (RDVS)



Sticky Trap for Insects Identification

Photo R. McClintock (RDVS)

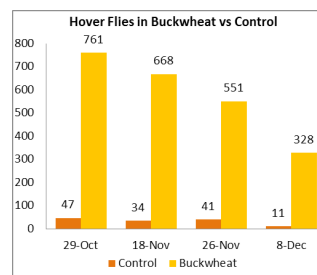
## Results

The results revealed an increase in beneficial insects (Hover flies, Green Lacewings and Ladybirds); numbers were significantly higher in comparison to the Control rows where numbers were lower. Hoverflies were the most dominant insect. The Hoverflies numbers were highest earlier in the flowering cycle of the Buckwheat and as time progressed the number declined due to the health of the plant. During early November two foliar applications of NPK were applied by the grower to maintain plant health.

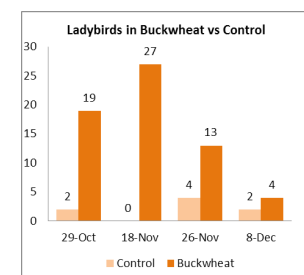
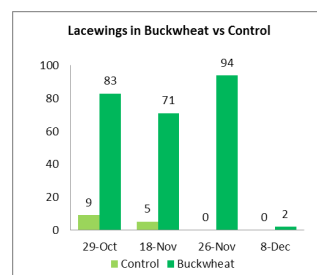
Four sets of insect data were recorded between 29th October – 8th December 2010. The final reading of traps were completed on the 8th December 2010 due to the Buckwheat having collapsed and yellowed-off in significant areas of the mid-rows. No rainfall was received for 12 days in early November in which a heat spike occurred on the 9th-12th November with temperatures of 31.2-37.5°C. These hot days are most likely to have been detrimental to the Buckwheat life span. Heavy rainfall followed after these hot days (60.4mm) but did not result in revitalising plant health nor sustaining the longevity of the cover crop.

With the use of sticky traps in the field, an assessment could be determined of the number and type of inter-vertebrate present

within the trial. This was the most cost effective way of sampling the different groups. A total of 2,621 beneficial inter-vertebrates were trapped in the Buckwheat rows over the period of the trial compared to 155 in the Control rows, a significant difference.



Hover Fly resting on a Buckwheat leaf  
Photo R. McClintock (RDVS)



## Conclusion

The Buckwheat (*Fagopyrum esculentum*) progressed very well in the first month after seeding, germinating quickly and leading into flowering. Within the first three weeks, the plant stems were on average 8-10cm tall and healthy with good soil moisture from August and September rainfall.

By early November the crop was 80-90% flowering attracting many hover flies. The hover flies assist with pollination of the flowers by feeding on blossoms or aphid colonies. The larvae of the flies are important predators to thrips and caterpillars.

The main implication of buckwheat decline was a dry spell of weather in mid-November. Sections of the buckwheat showed signs of heat stress.

The amount of rainfall received across Sunraysia during these four months was not typical in the region. The combination of hot days and heavy precipitation may have impacted on the longevity of the cover crop. Although rainfall contributed to good soil moisture content, the period in between these rain events was hot, dry and humid. However, in vineyards under low throw sprinklers or overhead irrigation this could be ideally grown with extra soil moisture to the mid row.

## References

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