

# ALL ABOUT ALMONDS

## ORCHARD MANAGEMENT



## IMPLEMENTING BEST PRACTICE FOR ORCHARD HYGIENE

### KEY POINTS

- ▶ Level orchards to maximise nut pickup during harvest and nut destruction afterwards.
- ▶ Re-shakes should be conducted in accordance to weather conditions and in the opposite direction to harvest.
- ▶ Remove nuts from the tree line then use a flail mower or mulcher to destroy mummies to minimise overwintering. Slower speeds and multiple passes may be needed.
- ▶ Diseases such as Hull Rot can increase stick tights.
- ▶ Overwintering nuts in the dripline creates an optimal environment for Carpophilus Beetle to thrive.

### THE IMPORTANCE OF HYGIENE

**As our industry grows, the potential for Carpophilus Beetle and Carob Moth populations to survive over winter and damage the new season crop is increasing.**

Australia's reputation of producing high quality almonds has been at risk in recent years. Whilst California faces an ongoing battle with kernels damaged by Navel Orange Worm, we now face a similar situation with Carpophilus Beetle and Carob Moth damage. As California has shown in their current management practices, the solution is not simple and multiple approaches are needed. A holistic management program is required using available insecticide chemistry, biological control methods, best-practice harvesting techniques and orchard sanitation. It is critical that this issue is adhered to by all growers in all regions to make it as hard as possible for survival of the beetle and moth during winter and spring. A major step towards achieving this is removing the maximum number of overwintering almonds from the orchard to reduce the food

source and thereby lessening pest populations. This document provides the best management practices for orchard sanitation and hygiene based on seasonal activities. The following timeline is supported by the Almond Board of Australia's Production Committee. For those with little or no current damage from insects, efforts to ensure the pests do not establish themselves in the orchard is worthwhile, as prevention is much better than cure.

### APRIL-MAY

#### ORCHARD FLOOR & RE-SHAKING PRACTICES

Achieving optimal orchard hygiene begins with orchard floor preparation. If the floor is not level, it will be near impossible to achieve effective mummy nut destruction. Using an x-plane to achieve a level floor directly after harvest when the soil is dry will provide better soil movement and give the best results. After harvest, a mound in the centre of the row is usually created from multiple sweeping passes (Figure 1). In this instance, x-planning is a must as nuts can be buried in this mound and allow Carpophilus Beetle to burrow down and survive the winter in buried mummy nuts.

Once the ground is level, effective removal of almonds stuck on the trees through good re-shaking practices is key. Re-shakes should be conducted in accordance with weather conditions. The best re-shaking results occur when the fruit is heavier, therefore early season rains, foggy and dewy mornings are key opportunities to act when the hull and shell have absorbed moisture. It is believed that shaking in the opposite direction to harvest can result in a more effective re-shake. Re-shakes can be done up until early June so long as next seasons buds are still dormant.

**When shaking in late May and early June, carefully monitor the shaker and tree to make sure the following season's flower buds are not being dislodged!**



Figure 1: An example of a soil mound created from harvest. X-planning is needed.



## JUNE TO JULY REMOVAL & DESTRUCTION OF MUMMY NUTS

In the worst areas consider poling for removal of nuts remaining in the tree even after re-shaking. This will occur in situations where there was high disease pressure. If unsure about the need for poling, collect a sample of mummy nuts throughout the winter months, crack them out and look for any *Carpophilus* Beetle (Figure 3) or Carob Moth (Figure 5). In this case ignorance is not always bliss. However, by leaving the nuts on the trees there is potential that *Carpophilus* Beetle and Carob Moth will over winter in these nuts and will damage the new season crop later in the year.

Upon completion, the resulting nuts should be swept or blown into the midrow. This process is critical as nuts lying within the dripline and wetted area create optimal conditions for *Carpophilus* Beetle breeding (Figure 2). Three options for blowing nuts off the drip line are:

1) Utilise your air mist sprayer fan. If you have directional veins on the air mist they should be directed to the tree line. If you have no directional air veins, consider using sheet metal to block the upper part of the air mist to direct the air towards the ground. For longevity of your pump, partly fill the spray vat so the pump is not running dry.

2) Make up a dedicated unit for blowing nuts off the tree line. This can be done by mounting two small sweeper fans on the front of the tractor that are hydraulically driven. For a low-tech option, make up a frame with a surplus air mist fan and a sheet metal shroud to direct the air towards the tree line.

3) In areas of low mummy nuts using the fans on your sweepers may suffice (Figure 4).

The practice of blowing debris from the tree line has been common place in a couple of South Australian orchards who utilise hydraulically driven sweeper fans mounted on the front of a tractor to blow leaf material



Figure 2: Mummy nuts on the dripper line create an optimal environment for the *Carpophilus* Beetle to feed on.

and nuts from underneath the tree line whilst applying pre-emergent herbicides. This setup can also be used while foliar spraying to remove mummy nuts during spring. Nuts should be destroyed using a flail mower or removed from the orchard altogether using traditional harvesting equipment. Flail mowers can differ in specifications, where some units can create a vacuum to destroy nuts that may be under the soil surface; this can be promoted through blade selection. Current machinery doesn't always provide a complete breakdown of nuts in the first attempt, therefore multiple passes may be needed to increase the effectiveness. The speed of flail mowing is also critical, a slower speed may be required depending on the quantity of almonds on the orchard floor. Any remaining nuts could encourage an increase in the *Carpophilus* Beetle population, so the earlier this practice is completed, the better.



Figure 3: *Carpophilus* Beetle (*C. Davidson*).

Source of Image: Walker, K (2007) OaDIL - <http://www.padi.al.gov.au>



Figure 4: Use the sweeper blower to remove overwintering nuts from the dripline.



## AUGUST TO DECEMBER MONITORING PEST ACTIVITY

During this time monitor the pest and disease activity using appropriate trapping, mating disruption and fungicidal methods (Figure 5). For more information on these methods review the fact sheets and videos available on <https://growing.australionalmonds.com.au/category/orchard-management/pest-diseases-weeds/>. Diseases such as Hull Rot can cause a rise in stick tights when it comes to harvest due to the toxins released. If Hull rot is low, then the need for re-shaking is reduced and the blocks that need it can be done more effectively. Effects of these pest and diseases can be seen in figures 6 & 7.

To achieve less hull rot, consider cultural methods to reduce the incidence of Hull Rot i.e. slight Regulated Deficit Irrigation at hull split and seasonal hedging to increase airflow in the orchard. New approaches through chemical applications are being developed with some products showing good results to mitigate. However, it is important these products are used in a good intergrated pest management program.



Figure 5: Using sticky traps are a good way to monitor Carob Moth activity in the orchard.

## JANUARY TO APRIL MONITORING PEST ACTIVITY

Just as ground preparation is important for harvest it is equally as important for pest management. Ensure the orchard floor is clean and the irrigation system is well maintained to minimise pooling of water. Pooling of water on nuts creates a climate where Carpophilus Beetle will thrive. It is important to ensure harvest crews are properly trained to shake the trees correctly to remove nuts efficiently whilst minimising tree damage. It is sometimes tempting to reduce shake time to quicken the harvest process however this can leave nuts on the tree. Usually a 5-7 second shake is what is required on a mature tree and varying revs can create different shaking frequencies. A 10 second shake could be used if required. For young trees up to the fifth leaf ensure adequate shaking times are used. Anecdotally, shaking slightly greener may also help remove more nuts during the shaking process (slightly heavier fruit weight) and may reduce the incidence of hull rot (reducing stick tights). Naturally, the crop will need to dry on the orchard floor for a slightly longer duration as it is still important to make sure the crop is only stockpiled at a maximum of 6% kernel moisture or 12% hull moisture to ensure food safety standards are met.



Figure 6: Hull rot causes mould growth and potential gumming.



Figure 7: Potential Damage from Carpophilus Beetle and Carob Moth.

### USEFUL RESOURCES

Carpophilus Beetle Monitoring Guidelines 2016-17 Season

<https://growing.australionalmonds.com.au/2017/03/01/carpophilus-guidelines-2016-17/>

Carob Moth Monitoring Guidelines

<https://growing.australionalmonds.com.au/2015/08/05/carob-moth-in-almonds-monitoring-guidelines/>

Charles Burk on Insect Pest Management

<https://growing.australionalmonds.com.au/2018/01/05/charles-burk-on-insect-pest-management/>

In a Nutshell - Summer 2017/18, p.10 - Navel

Oragne Worm in the Kern County, California  
<https://growing.australionalmonds.com.au/articles-fact-sheets/in-a-nutshell/>

### MORE INFORMATION

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Orchard Hygiene Best Practice

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