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# Citrus Harvesting

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## 2 Orchard Sanitation

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### Learner Guide

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This module forms part of the Citrus Postharvest Series. It has been repackaged to address the specific need of training permanent and seasonal workers for harvesting citrus fruit.

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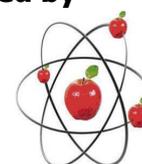
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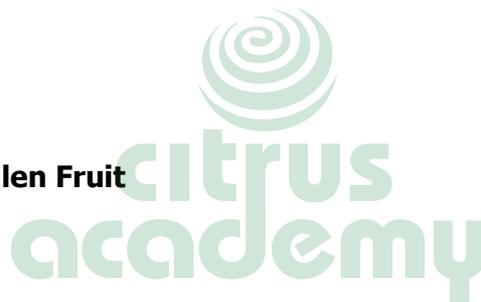
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## Introduction

A packhouse is not a hospital for sick fruit. No treatment or process that can be applied in a packhouse, no matter how well it is done, can repair damaged, injured or sick fruit coming from the orchard.

Regular orchard sanitation and good picking practices is very important so that we can be sure that there is less chance of fruit being damaged, injured, and infected by fungal spores, and arriving in the packhouse in a 'sick' condition, where it can spread the fungal spores to the other export fruit. Always remember that fruit is a perishable product.

## Postharvest Pathogens – Fungi

There are twelve different **pathogens** that we must prevent from contaminating fruit in the orchard.

Remember that the word 'pathogen' is used for anything that can cause a disease, such as viruses, bacteria, and fungal organisms. Fungal organisms are the sort of pathogen that makes citrus fruit sick. Fungal organisms spread through spores, almost like the pollen of a plant. It is these spores that we must prevent from getting onto and especially into our fruit.

### definition

#### Pathogens

Pathogens are anything that can cause a disease, such as bacteria, a virus or a fungal organism.

### Wound Pathogens

The most important pathogens are those that get into the fruit through a wound on the fruit.

This can be avoided simply by making sure that the fruit is not injured or damaged during picking so that the pathogens have nowhere to get in. This is also why it is important that fruit with injuries are not placed with the other fruit, because they may be carrying these pathogens to the packhouse.

### Latent Pathogens

Then there are also latent pathogens. The word 'latent' means something that is there, but not active and just waiting for the right conditions to attack.

Latent pathogens live on deadwood in the trees. When it rains, fungal spores are washed down from the deadwood onto the fruit rind or into the button tissue, where the spores lay dormant until the ideal conditions occur for infection to take place.

The ideal conditions for fungal spores to grow are where it is warm and humid, out of direct sunlight. In the packhouse, and especially in degreening rooms, the pathogens will find these ideal conditions.

Older fruit, and fruit that is picked towards the end of these season, is also much more vulnerable to latent pathogen infections.

## definition

### *Latent Pathogens*

Latent pathogens are there but not active, just waiting for the right conditions to attack.

### *Soil Pathogens*

Then we must remember that there are pathogens that live in the soil. If they get a chance to get onto the fruit, they will infect the fruit and start to spread, producing more and more spores. (Have you ever seen rotten fruit on the ground in the orchard? Those fruit rot because the pathogens in the soil got into the fruit and started spreading.)

Fruit fall on the ground for different reasons. They may have fallen off the tree after being stung by a pest insect, or they may have dropped on the ground during picking. Fruit that hang low in the tree, close to the ground, can also get soil pathogens on them. When it rains, water can splash up onto the fruit, carrying the pathogens with it.

## Orchard Sanitation Tasks

We can now start to see what we must do to keep our fruit safe and healthy.

Firstly, now that we know latent pathogens live on deadwood in the trees, we can remove the deadwood so that they have nowhere to live.

Secondly, we can make sure that there are no branches that can carry fruit that will hang so low that pathogens that live in the soil can get onto the fruit and into the tree, by skirting the trees.

In the third place, no fruit that has fallen on the ground in the orchard must ever be picked up and placed with other export fruit, because it has soil pathogens on it.

And lastly, we must make very sure that we remove all the waste fruit lying on the orchard floor often, so that the pathogens cannot propagate in this fruit and stay in the orchard. Also remember that pest insects, like false codling moth and fruit fly, lay their eggs in fruit.

If rotten fruit is allowed to stay in the orchard, the eggs will hatch in the fruit and the larvae will grow. By leaving the rotten fruit in the orchard you allow the pest insect also to stay ready to attack more fruit.

## Removing Deadwood

Deadwood is twigs, stems and branches which do not have any leaves or fruit on them and that has become dry and hard. Deadwood is normally found inside the canopy of a citrus tree. Deadwood is removed when the trees are pruned, normally just after the harvest.

To remove deadwood, you need a pair of anvil pruning shears and sometimes a pruning saw. Take care of your own health and safety while using these tools – they are sharp and they can injure you.

Before you start cutting out deadwood, make sure that the shears are working well, that the blades are sharp and that the bolts and nuts are tight.

The shears and saw must be sterilised before you start working, because they can spread latent pathogens that may be living on the deadwood that you are cutting to other trees in the orchard.

The blades of the shears and the saw must be lightly oiled when they are not being used.

The anvil shears are used to cut the deadwood off where it meets the main branch or trunk. If the branch is too thick for the shears, use the saw.

After it has been removed, the deadwood must be taken out of and away from the orchard and burnt or dumped.

skills

Please see the skills sheet on **Removing Deadwood**.

### Skirting

Skirting means cutting off the low hanging branches of trees. This is usually also done when trees are pruned.

In terms of equipment, you will need a skirting stick to make sure that all the trees are skirted to the same height. This can be any piece of stick or tubing that is cut to the right length, normally between 600 and 800 millimetres.

To cut the branches, you will also need pruning shears or a pruning saw. For the softer wood you may use bypass shears, instead of anvil shears.

Remember to sterilise the tools and check that they are working properly before using them. Use the skirting stick to measure the skirting height from the ground, and cut off the branches that hang below that height, preferably where it joins the scaffold, or main, branch. But be careful **not to remove too much plant material**, especially on young trees.

## information

### *Production Guidelines*

Please consult volume II, section 5 of the CRI Production Guidelines for more information on crop manipulation.

## skills

Please see the skills sheet on **Skirting**.

### *Removing Decayed and Fallen Fruit*

Now we look at how to keep the orchards floor free from fruit that can host pathogens. All fruit lying on the orchard floor must be picked up and removed out of the orchard. This must be done once a week during the season, and twice a week from after colour break until picking in the orchard is finished. A stick can be used to pick up the fruit and place it in a bag.

From here, the fruit must be taken out of the orchard. In dry climates, the fruit can be chopped up and spread out to dry in the sun, away from the orchard and not on the orchard floor. But this may cause problems in more humid climates, where the pathogens will still develop in the chopped up fruit. The best practice is to bury the waste fruit at least 30cm deep and at least 400 meters away from the orchard.

## skills

Please see the skills sheet on **Removing Decayed and Fallen Fruit**.

### *Removing Over-Mature and Out-of-Season Fruit*

Fruit that ripens late in the season is not as healthy and vigorous as earlier fruit, and it is risky to export such fruit. This fruit is sometimes stripped off the trees, and also disposed of as waste fruit.

After picking all fruit should be stripped from trees, even hard, dry fruit, as these fruit can be infected with pathogens that will hang in the tree until the next season before spreading and infecting more fruit.

It is also important to remove out of season fruit during the year, starting just after physiological fruit drop in November, when the fruitlets are still only the size of marbles. Out of season fruit is fruit that ripens at a different time from the other fruit. They can carry pest insects and pathogens from one season to the next. This fruit must also be disposed of as we already discussed.

## active learning

**Watch the DVD clips, read through the learning material and do workplace research to gather the knowledge and information to complete the assignments below.**

### Activity 1 – True or False

Tick true or false next to each statement in this table, and motivate your answer.

Statement	True	False	Motivation
I can add fallen fruit to my picking bag.			
All fruit must be removed from the trees after picking.			
Waste fruit should be buried 100m away from the orchard and 30cm deep.			
Fruit lying on the orchard floor must be picked up every four weeks.			
Skirting means cutting off the low hanging branches of trees.			
Tools should be sterilised and checked that they are working properly once a month.			
Deadwood is twigs, stems and branches that do not have any leaves or fruit on them and that has become dry and hard.			
Latent pathogens live only in the soil under trees.			
There are two different pathogens that we must prevent from contaminating fruit in the orchard.			

### Activity 2 – Workplace Logbook

You have to take part in practical orchard sanitation as part of your learning, by removing fallen fruit for one day, and by skirting trees en removing deadwood for 2 days. Make sure that you follow your company's standard operating procedures for all these tasks.

Please make sure that your workplace supervisor or team leader observe you while completing these duties and sign your logbook.

# Activity 1 – True or False

Tick true or false next to each statement in this table, and motivate your answer.

<i>Statement</i>	<i>True</i>	<i>False</i>	<i>Motivation</i>
I can add fallen fruit to my picking bag.			
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Latent pathogens live only in the soil under trees.			
There are two different pathogens that we must prevent from contaminating fruit in the orchard.			





# Removing Deadwood

## CAUTION:

**Deadwood is twigs, stems and branches which *do not have any leaves or fruit* on them and that has become *dry and hard*, and is normally found inside the canopy of a citrus tree.**

## Requirements

- Anvil pruning shears
- Pruning saw
- Sterilising agent

## Method

1. Make sure that blades of shears are sharp and bolts and nuts are tight
2. Sterilise blades of shears and saw
3. Cut off deadwood off where it meets the trunk, using shears
4. Use saw for thicker branches
5. Take cut deadwood out of orchard
6. Burn or dump deadwood away from orchard

# Skirting

## **CAUTION:**

**Do not remove too much foliage when skirting trees, especially on young trees**

## **Requirements**

- Skirting stick (stick or tubing, 600-800mm)
- Bypass and anvil pruning shears
- Pruning saw
- Sterilising agent

## **Method**

1. Make sure that blades of shears are sharp and bolts and nuts are tight
2. Sterilise blades of shears and saw
3. Use skirting stick to measure skirting height from ground
4. Cut off branches hanging below skirting height, preferably where it meets main branch
5. Use bypass shears for soft wood, anvil shears for harder wood, and pruning saw for thicker branches
6. **DO NOT REMOVE TOO MUCH PLANT MATERIAL**, especially from young trees

# Removing Decayed and Fallen Fruit

**NOTE:**

**Do TWICE A WEEK from colour-break until picking is finished**

**Do ONCE A WEEK during rest of year**

## Requirements

- Stick or other implement to pick up fruit
- Large bag
- Implement to chop up fruit
- Spade

## Method

1. Pick up all fruit from the orchard floor using stick or other implement
2. Place fruit in bag
3. Carry fruit OUT OF and AWAY from orchard
4. IN HOT, DRY CLIMATE: Chop up fruit and spread out on ground to dry in sun
5. IN HUMID CLIMATE: Use spade to bury fruit at least 30cm deep, at least 400m away from orchard