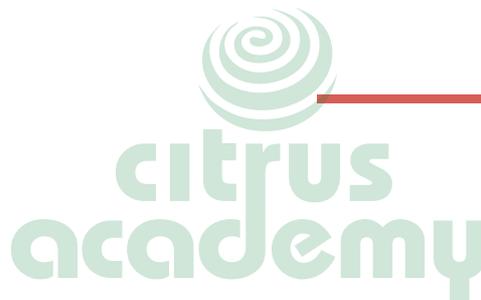

Citrus Packing

4 Sorting and Grading

Learner Guide



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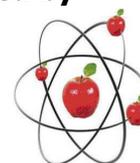
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For more information on sorting and grading practices, please consult the CRI Production Guidelines, volume IV.

Introduction

In any packhouse there are at least two places where fruit is sorted or graded, and in many packhouses more than two.

At the sorting and grading stations the fruit is separated firstly for the different market segments that it is going to, which are the export market, local market or processing, and then the export fruit is separated into different classes, according to the packing specifications that come from the export agent.

The skills that workers need to work at any of the sorting or grading stations are the same – the better you get at your job and the more experience you have, the further up the packline you work.

Pre-Sorting

Pre-sorting is where fruit that is clearly not fit for being sold as fresh fruit is removed before the fruit enters the packhouse. This is done for two reasons.

Firstly, by taking out fruit that is obviously infected with postharvest diseases, we keep that fruit out of the packhouse and away from the other fruit so that it does not increase the spore load in the packhouse.

Secondly, by not letting that fruit go into the packhouse we save the money of treating it with fungicides and wax.

During pre-sorting all fruit must be removed that is:

- ❖ Decayed
- ❖ Stung
- ❖ Injured
- ❖ Squashed
- ❖ Burst
- ❖ Puffy
- ❖ Green
- ❖ Under- or oversized

Some of this fruit is good enough to be sold on the local market, while fruit that is in a worse condition is sent to the factory where it is processed into fruit juice or citrus oils.

You may also find fruit that is very badly infected and diseased, even though this fruit should be taken out already in the orchard when the fruit is picked. This fruit must be destroyed. If you find a lot of badly infected fruit, tell your supervisor so that he can tell the picking team in the orchard.

The role of pre-sorting differs from packhouse to packhouse. Some packhouses expect growers to do thorough pre-sorting in the orchard while harvesting, while others are happy to receive all the fruit that comes off the trees and sort it at the packhouse. The best practice is to pre-sort fruit already in the orchard as it is being picked. If this is done, all fruit that is clearly not in a state to be sold as fresh fruit is removed. But even then some poor quality fruit can still end up being sent to the packhouses.

Grading

Grading is when the fruit that has been prepared for export in the packhouse is separated into different grades, or classes. This happens after the fruit has been treated with fungicides and waxed and usually before the fruit is sized.

In some packhouses, an optic sizer is used that can also detect fruit shape, colour and blemishes, but in most cases sizers only separate the fruit into size categories, and it is up to graders to manually separate the fruit into classes.

Fruit Classes

Export fruit can be separated into any number of classes, depending on the citrus type and the packing specifications and instructions from the export agent, which in their turn depend on the target export market. But to explain grading in this module, we will assume that our fruit is graded into two major export classes, being class 1 and class 2. Fruit that is below class 2 quality is either exported as industrial fruit, or sold locally as fresh fruit or sent for processing.

Export Standards

How do we then know whether a fruit is class 1, class 2 or below class 2? We use the minimum export standards that are issued by the Department of Agriculture, Forestry and Fisheries for our citrus type. These are international standards and requirements, meaning that these are the standards that are used for grading export citrus across the world.

Market Requirements

There can also be specific requirements from your target markets or buyers that may be above these minimum standards. It is important for a grader to know the minimum standards for all the citrus types that you work with in your packhouse, but you must also know if the buyer wants you to apply higher standards. The supervisor or packhouse manager will inform you about the standards that you need to apply.

Grading Fruit

The standards that we use to grade fruit into classes have to do with the internal and external quality of the fruit.

Internal Quality

Fruit samples are taken and tested to make sure that the fruit comply with the internal quality specifications. These specifications have to do with what goes on inside fruit, and includes:

- ❖ Juice percentage
- ❖ Level of granulation
- ❖ Seed content
- ❖ Sugar (brix)
- ❖ Acid content
- ❖ Sugar : acid ratio

External Quality

External quality is what the grader looks at, and this has to do with the:

- ❖ Shape
- ❖ Colour
- ❖ Blemishes
- ❖ For some citrus types, skin texture

Methods and Equipment

Methods and equipment used for grading and sorting is different at various packhouses. In this module, we discuss procedures that are a guideline to show how grading and sorting takes place in most cases.

Training and Selection of Graders

Colour Blindness Test

Before the packing season starts, sorters and graders are selected and trained. It is important to make sure that sorters and graders can see small colour differences, and packhouse management may choose to give potential sorters a test to see if they are colour-blind. These colour vision examinations are very basic and can either be done by an outside firm or by the packhouse itself, using tests like the commonly available Ishihara test.

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Ishihara Test

The Ishihara colour blindness test can be obtained from www.ishiharacolourblindnesstest.com or can be ordered from Internet shopping sites such as www.kalahari.net.

Colour and Blemish Charts

After sorters and graders have passed the colour blindness test, they are introduced to the Colour Prints for Blemish Standards. These charts are published by Citrus Research International and are available to all packhouses. On these charts are pictures of fruit with colours varying from green to orange, and pictures of fruit with varying degrees of different kinds of blemishes, fruit with various shapes, and fruit with different rind textures.

Sorters and graders are taught to see the difference between fruit that can be exported, sold on the local market or that must be sent to processing, and the differences between the grades of export fruit.

The colour and blemish charts are an international standard, with the same pictures used all over the world in every packhouse to grade citrus fruit.

The charts are used by comparing the fruit that you have in your hand with the picture on the specific chart. Colour and blemish charts should be put up at all the sorting and grading stations, so that the sorters and graders can refer to them to refresh their memories.

The DAFF minimum export standards tell you exactly the shape, colour, blemishes and skin texture that is allowed for fruit in every class, by using the colour and blemish charts.

In the minimum standards document it says for instance for class 1 Navel oranges, using colour chart number 34: 'Maximum colour print no. 5 with a tolerance of 20% to print no. 6'. If we now look at colour chart number 34, we can see what this means: the Navel oranges that can be exported as class 1 must be the same colour as picture number 5, with a maximum of 20% that can be the same colour as picture number 6.

This is an example of a blemish chart, showing wind scarring blemishes. The level of blemish that is allowed for the different grades are also prescribed by the export standards and requirements.

Can you find the export standards for the citrus types that you work with, and identify the colour charts and pictures that you must use when grading the fruit?

Testing and Placement

After training, all sorters and graders, old and new, are tested. This test involves sorting fruit into different classes and grades. The higher you score on this test, the later you will be placed in the sorting and grading line. Usually the lowest scores are used for pre-sorting and the highest scores for final grading and sorting.

The sorters used for pre-sorting can then again be put into two groups.

The first group, standing at the beginning of the line, concentrates on removing fruit that is decayed, stung, badly injured and squashed.

The second group concentrates more on blemishes and colour. Fruit taken out by the first group is usually sent for processing or destroyed, while fruit taken out by the second group will be sent to the local market.

Protective Clothing and Personal Hygiene

In the Packhouse Process Flow module we discussed the protective clothing and personal health and safety rules that everyone in the packhouse must comply with. Please remember that you are working with a perishable product that can be injured, damaged and infected.

Sorting Tables

The design of the grading table is important to make sure that the graders and sorters can do their work properly.

The recommendation is that a grading table should be 0.9 metres high with rollers moving the fruit along the table. Fruit on belts have to be turned by hand so that the graders can inspect them and this can slow the process down and lead to injuries. The norm is for that the maximum width between rollers should be 26 millimetres, but it can be less if you are handling soft citrus that is prone to injury.

Normally a grading table is 1.2 meters wide, with a 300 millimetre division in the middle where fruit that is removed can be placed, but this differs from packhouse to packhouse.

In some instances, fruit that is removed are placed on another line above the grading table. This other line will take fruit to the next step in the packhouse, which can be to the processing bins or to where fruit is packed for the local market. When you are grading export fruit, fruit belonging to the different classes will be placed on different lines.

When standing or seated next to the table, you must be able to reach across the grading line without too much stretching. It is important that you can reach all fruit passing before you.

Lighting over grading tables is very important. If wrong lights are used or if the lights are too dull, graders and sorters will get the wrong impression of the fruit colour and they may remove fruit from the line that should have stayed on. Best practice is to use fluorescent daylight tubes number 5.

Lights should be installed 1 metre above the tables. All lights must be covered with plastic screens to protect the light and so that glass will not fall onto fruit if the light should break. Normally shields on the side of the lights prevent light from shining directly into the graders' eyes and blinding them.

If you are not comfortable with the lighting at your grading table, if it is too bright, shining in your eyes or too dull, inform your supervisor.

Sizing

In most packhouses pre-sorting takes place after the first sizing. Here fruit that is too small or too large is removed from the line and automatically sent for processing. This sizing is done by a machine that is operated by the supervisor. If you see fruit on your grading table that is very small or very large, and you think that the sizer may be allowing fruit through that it should be removing, you must tell the supervisor immediately.

Export fruit is normally sized mechanically after being graded. There are different types of sizers that are used for this purpose. This is discussed in more detail in the module that about Sizing.

Sorting Practices

The sorting and grading procedures that we look at in this module are for when we use a grading table with a tray with a conveyor belt in the middle of the table. It may be different in your packhouse, so check with your supervisor and make sure that you understand your system.

Fruit comes from the dump and fruit washing system to the sizer if you are pre-sorting, or from the drying tunnel after it has been waxed if you are grading export fruit, and passes over the grading table in front of you.

Know the Standards

Before you start sorting or grading, make sure that you know exactly what you are looking for and what standards are being used. If you are unsure about whether or not to remove a fruit, it is best to allow the fruit through at pre-sorting and leave the decision to the final graders.

If you are at the export grading station, be very careful to apply the standards consistently – remove the fruit and carefully compare it with the colour charts if you are in any doubt about which class it belongs to.

At first you will find that sorting and grading can be slow, but as you gain experience you will be able to sort fruit a lot faster and more accurately.

First Pre-Sorting

If you are in the first group of pre-sorters, look at the condition of the fruit in front of you and check it for injuries and damage.

Take out all the fruit that is decayed, stung, badly injured or squashed and place it in the tray in the middle. The belt on this tray will take the fruit to where it will be loaded for processing. If you are not sure, pick the fruit up and inspect it more closely.

Second Pre-Sorting

If you are part of the second group of pre-sorters, look at the colour and blemishes of the fruit going past you. Keep the colour and blemish charts at hand so that you can check fruit against it if you are unsure.

If the fruit is below export quality according to the instructions that were given to you by your supervisor, remove it and place it in the tray in the middle. From here it will be taken to the processing bins or to where they pack the fruit into pockets for the local market.

Final Grading

If you are at the grading station for export fruit, your job is more challenging, because you need to distinguish between the fruit that belongs to the different export classes. You must keep your colour charts on hand, and refresh your memory regularly.

If you are just separating the fruit into two different classes, you will in most packhouses move either the one grade or the other onto a different line, moving for instance the class 2 fruit onto another line and leaving the class 1 fruit on the line in front of you, or vice versa.

The packline system for grading more than one class is unique to each packhouse and you must make sure that you understand this system and where what fruit should go.

Recommended Grading Hours

The efficiency and accuracy of grading and sorting depend on various factors, of which fatigue is the most important. Best practice is for sorters and graders not to work for longer than 2 hours at a time, with 15 minute break in between each session.

Quality Control

The quality control people will take samples of fruit after pre-sorting to check that the right quality of fruit is allowed into packhouse.

If they find any problems they will report it to the supervisor, who will tell you.

Sorting Line Hygiene

It is important that we keep the grading tables clean and hygienic. The fruit passing over the table can be infected and can leave spores behind, which can infect other fruit.

Best practice is for the grading table to be cleaned every two hours. An effective method is to use a knapsack to spray disinfectant on the rollers while they are turning. After spraying the rollers, use a cloth to wipe all the surfaces.

Make sure that the line is clean before you start sorting or grading again.

Conclusion

In the packhouse we receive fruit from one source – the orchard – and send it out to a great many different destinations. Separating the large volume of fruit that is received at the packhouse into lots of the same quality is essentially the work of sorters and graders.

This is the principle of their job, even though the manner in which it is done may be unique to every packhouse.



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 – Group Practical

Ask your supervisor to prepare a sample batch of 50 fruit of different classes. Take turns in your group to grade fruit while timing each other. Discuss the results and allow people to defend their choices. Make keynotes in your workbook.

Activity 2 – Worksheet

In your workbook explain what the following means. The minimum requirements for the fruit are:

- ✓ Colour – 3 of set 37
- ✓ Shape – 3 of 38
- ✓ Skin texture – 7 of 37

Activity 3 – Workplace Logbook

You have to complete practical grading and sorting tasks as part of your practical learning. Please ask your workplace supervisor or team leader to observe you while completing these tasks and to sign your logbook.

Activity 2 – Worksheet

Explain what the following means.

The minimum requirements for the fruit are::

✓ Colour – 3 of set 37

✓ Shape – 3 of 38

✓ Skin texture – 7 of 37

