

Module 23

Drying Tunnel

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information

Reference

For more information on the drying of fruit and requirements for drying tunnels, please consult the CRI Production Guidelines, volume IV.

Introduction

Fruit goes through drying tunnels after the hot water fungicide bath and after being waxed. In the first drying process, it is very important that the fruit is dried well; if not the wax application will not be effective. After the wax is applied, the fruit goes through another drying tunnel to set the wax properly.

A drying tunnel can damage fruit if it is not operated correctly. Citrus is produced in various areas in South Africa in diverse climatic conditions. The relative humidity and temperature have an effect on how fast moisture is evaporated from the fruit in the drying tunnel. It is therefore difficult to set guidelines concerning temperatures and time spent in the drying tunnel that can be followed by all packhouses. Each packhouse has to perform their own tests to establish the optimal drying condition for their climate.



Drying Practices

Brushes and Rollers

Some packhouses, directly out of the fungicide bath, have a lot of brushes and doughnut rollers and that tends to remove some of the fungicide residue off the fruit, which you have just applied in the fungicide bath.

The whole idea is to remove any superfluous water off the fruit, to make the drying of the fruit easier in the tunnels but over brushing can cause a loss of residue.



Fans

Some packhouses have a set of fans before the drying tunnel, to get rid of the superfluous water as well. After the fans the fruit moves through the drying tunnel on rollers. Packhouses can use either cold air or hot air drying tunnels.



Hot Air Tunnels

The hot air drying tunnels must be set at certain temperatures. The recommended temperatures for soft citrus is 40 to 48°C maximum, because they are very susceptible to any injury through heat. Other drying tunnels for the hard citrus, that is your oranges and your grapefruits and your lemons, can be set up anything from 56 to 58°C maximum.



Time in Tunnel

The time that the fruit spends in the drying tunnel and the length of the drying tunnel determines how effectively your fruit will be dried. That can be tested, at the end of the drying tunnel, to see how dry your fruit comes out.

You can always check on the speed of your belt moving through the drying tunnel and reset it if your fruit comes out on the other side with the fruit still wet to ensure efficient drying through the tunnel. You could also adjust your temperatures slightly and you could slow down the conveyor in the drying tunnel for the fruit to spend more time in the tunnel for more efficient drying.



Drying Processes

Drying of Fungicide Residue

It is important to dry your residue on your fruit and also important to get dry fruit coming out of the tunnel because you cannot apply wax to wet fruit. Applying wax to wet fruit will cause very erratic and smudgy waxing on the fruit. The wax application will not be effective at all. Waxing is a vitally important aspect of citrus production.



Drying of Wax

After the waxing of the fruit, the wax has to be dried on the fruit as well, because you cannot allow the fruit to air dry with the wax.

The fruit passes through a drying tunnel again. Some packhouses have cold air drying tunnels here whilst others use hot air drying tunnels.



Conclusion

It is important to adhere to the recommended drying temperatures and not to exceed them.

For fruit with a thinner rind, like soft citrus the temperature should be between 40 and 48°C. For fruit with a thicker rind such as oranges, lemons and grapefruits the temperature should be between 56 and 58°C.

Check the fruit coming out of the tunnels to judge whether they are drying properly.



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summary

Drying Tunnel Dos and Don'ts

- **Test drying tunnel** to determine correct time and temperature for climatic conditions.
- Do not have too many **brushes** and **rollers** coming out of the fungicide bath.
- **Temperature** for hot air drying tunnel:
 - Soft citrus – 40-48°C
 - Hard citrus – 56-58°C
- Check that fruit are properly dry, and adjust speed of belt and / or temperature.
- Make sure that wax is not applied to wet fruit.

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 23.1 – Practical

Perform tests by speeding up the conveyor belt that carries fruit through the drying tunnel in your packhouse to its fastest speed. Assess the effectiveness of the drying process. Now bit by bit, slow the belt down to its slowest speed, noting the effect on the dryness of fruit coming out the other side.

Note your findings. Make a recommendation for the speed setting for the belt to achieve optimum dryness, adding an explanation on why you make this recommendation.

Activity 23.2 – Worksheet

In your own words, explain why there is a difference in the temperature setting for the drying tunnel for different fruit.



