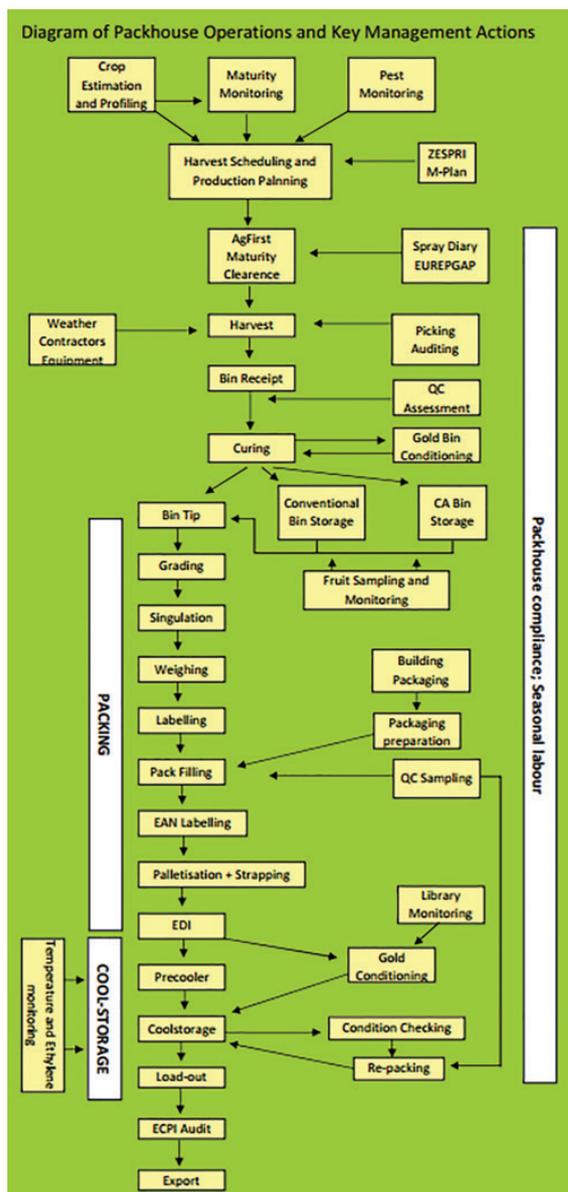




CHAPTER SIX HARVEST AND POSTHARVEST PRACTICES



The diagram to the left outlines the key processes and management actions that take place in preparation for and after harvest.

This chapter will now go into each of the actions outlined in the flow chart to the left. This chapter will be split into two broad sections including:

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6.1 HARVEST

Before fruit is harvested, it must be mature enough to ripen when it is off the kiwifruit vine. The fruit needs to meet the minimum dry matter threshold, be the right colour (Gold3 and Green14 only), reach the minimum Soluble Solid Concentration (SSC) or brix

(sugar content of an aqueous solution), and have sufficient black seeds (Hayward and Green14 only). When it is time to harvest, an independent laboratory will test the fruit maturity, and if it meets the standard will give a clearance to pick.

Right:
Sampler collecting a maturity sample



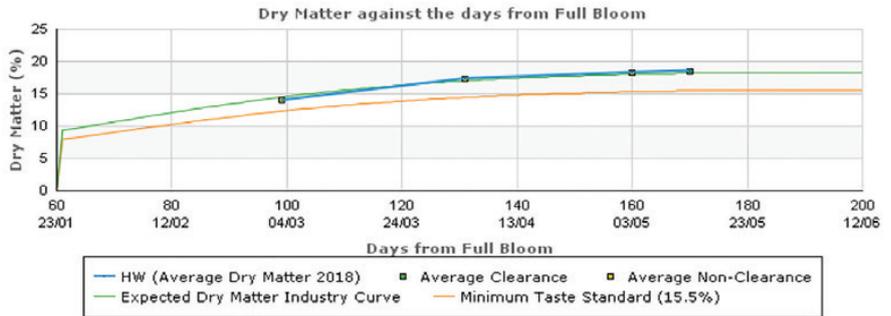
Dry matter is the most important aspect of fruit maturity for a grower, as a large proportion of their fruit payment is based on the dry matter percentage. Dry matter is largely made up of starch; this starch is converted into fruit sugars during the ripening process. The higher the dry matter, the greater the potential for high soluble solids when the fruit is ready to eat; high levels of soluble solids generally means tasty fruit.

Right:
Fruit slices after being dried in a dehydrator



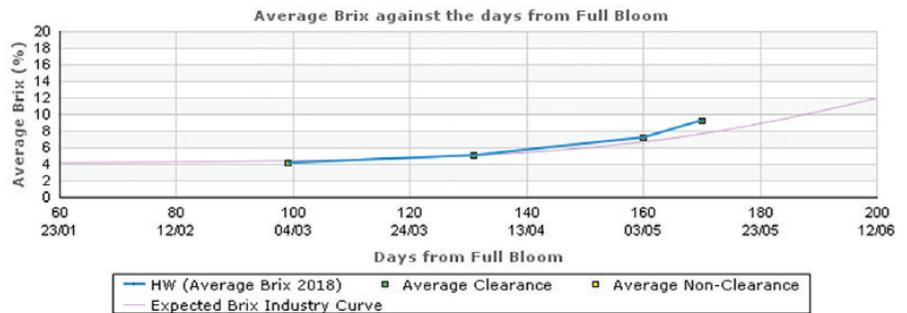
Dry matter is measured by cutting a 2-3mm slice from the middle of the fruit and drying it in a dehydrator – the proportional difference between the wet weight of the slice and the dry weight of the slice is the dry matter percentage. The dry matter percentages from every fruit in the sample is used to calculate the Taste Zespri Grade (TZG) of the sample. The TZG is then used to determine how much of the maximum taste payment a grower will receive; e.g. if the maximum taste payment for a tray of fruit was \$5.00, a TZG of 0.8 would mean that the grower would receive 80% of the maximum taste payment, or \$4.00 per tray.

Right:
Dry matter accumulation
graph from a maturity report



Soluble solids concentration (SSC) or brix is measured by a refractometer which uses light refraction to measure different sugar concentrations. Degrees of brix are the units of measure a refractometer uses. SSC and brix are effectively interchangeable terms. Generally, the greater the maturity at harvest the greater the taste and storage potential of the fruit. Brix can also be used when the fruit is eating ripe as a measure of how 'sweet' the fruit is. Fruit is increasingly being tested by retailers at the point of sale as an assessment of fruit quality. The higher the dry matter of fruit at harvest the higher the brix will be when sold at eating firmness at point of sale.

Right:
Brix accumulation
graph from a maturity
report



Generally, kiwifruit harvest begins in March. 'Mainpack' for Hayward is in May which is when the majority of fruit is harvested. Gold varieties 'Mainpack' is generally a little earlier. Harvest is generally over by the middle of June. There are two types of additional payments growers receive based on when their fruit is shipped. These are called the KiwiStart Premium and Time Payments. This section will describe the harvest timings for two different cultivars, the timing of harvest between regions, and the KiwiStart Premium and Time Payments.

6.1.1 Timing

The Hayward (Green) harvest starts in late March and peaks in May and is usually complete by early June. There are some regional variations with Poverty Bay and coastal Bay of Plenty having the earliest harvest most years. Harvest in the more elevated regions in the Bay of Plenty follow in May and June. Nelson has a relatively short harvest window due to their naturally later maturity and early onset of winter cold. This means harvest is usually limited to the first three weeks of May. Gold kiwifruit harvest starts in mid to late March and is normally complete by early May. Poverty Bay, Hawke's Bay and coastal Bay of Plenty are usually harvested ahead of other regions.

6.1.2 Kiwistart Premium

The fruit picked at the start of the season is termed 'Kiwistart'. This fruit has reached a level of maturity where it will ripen off the vine and be acceptable to consumers but has not reached its optimum size or taste on the vine. Zespri incentivise growers to pick early by compensating them for lost fruit size and taste payments. Zespri want fruit to hit the markets shelves before competitor fruit from Chile. Further, Zespri want to sell as much fruit as possible before mainpack in May. A more balanced supply over time also reduces storage costs and fruit loss.

6.1.3 Time Payments

Kiwistart compensates growers for their fruit being sold early; Time Payments compensate growers for their fruit being sold late. Time Payments cover the additional costs of storing and supplying kiwifruit overtime. As kiwifruit is stored longer, it requires additional coolstorage and because the fruit is deteriorating overtime, condition checking, repacking, fruit loss, and taste compensation levels all increase. There are a variety of variables that lead to kiwifruit being able to be stored for months. Maximising storage potential requires optimisation of inventory management practice, fruit maturity and high-quality fruit handling.

Kiwistart and Time Premiums extend the New Zealand kiwifruit selling season. Markets require consistent supply so that New Zealand kiwifruit is available to their customers for as long as possible.

Right:

Emptying fruit into bins for transport to the packhouse



6.2 POSTHARVEST

A packhouse operator receives fruit from the kiwifruit orchard in bins and places the fruit into packs before putting them into storage in preparation for shipping. Packing and cool storage are not regulated by statute and there is active competition between postharvest operators that helps to minimise growers postharvest costs.

There are approximately 53 packing facilities and 85+ coolstores used in the kiwifruit industry. These facilities are located in Northland, Auckland, Bay of Plenty, Gisborne, Nelson and the Manawatu. The smallest facilities pack from 200,000 trays (3.55kg/tray) per season whilst the largest pack up to 15 million trays per season.

Right:
Kiwifruit passing over grading tables in the packhouse.

Far right:
Kiwifruit on the sizer where they are weighted and sent to the packing lane where that size is being packed



6.2.1 Packing

Packing is the key control point where the fruit is segregated into market acceptable product. Fruit is graded for defects, sized, labelled and placed into packs suitable for the market. Product traceability moves from the orchard bin down to the individual pack level. It is at this point that maturity, dry matter, Global Good Agricultural Practice (GAP) requirements and market restrictions and regulations are all consolidated and identified electronically at the pack and pallet level. For more information on GAP, see Chapter 8.3.

6.2.2 Packaging

Packaging is a key market messaging tool with branding and graphics carefully controlled. In some cases, customers require specific packaging requirements. In-market packing is also used to meet customer requirements where fruit transferred from loose filled bulk packs and packed into smaller retail packs or bags.

All packaging must protect the fruit through the whole supply chain and be able to be disposed of at the end of its use in market. There are a variety of pack types that customers can order.

Right:
Examples of Zespri kiwifruit repackaged in to retail packs for specific markets.



6.2.3 Labelling

Markets have wide ranging pack and label requirements. Individual fruit labelling of the Zespri brand is a requirement in all markets in preparation for retail sale. All fruit labels either contain a Price Look-Up (PLU) code for that cultivar and size of kiwifruit or a bar code for price point differentiation by size at the point of sale. Some markets have additional market specific labelling requirements at the individual pack level. For example, South Korea, Brazil, India, Malaysia, Vietnam and Russia, all require country specific language showing the local contact details of the importer. These labels must exactly meet the importing countries statutory requirements to allow entry.

Right:
Individual fruit label
with bar code.



6.2.4 Coolstorage

Coolstores utilising refrigerated air are used to reduce the temperature of kiwifruit so that it stores for longer. Controlled atmosphere (CA) storage is also used where oxygen, and carbon dioxide concentrations as well as temperature and humidity are regulated to enable kiwifruit to store longer.

“ Markets have wide ranging pack and label requirements. Individual fruit labelling of the Zespri brand is a requirement in all markets in preparation for retail sale. ”

6.2.5 Shipping

Zespri uses two modes of shipping to deliver kiwifruit from New Zealand to offshore global markets, chartered refrigerated ships (or reefer ships) and containerised liner services.

Reefer Ships

Zespri “hires” or charters a whole ship, controls where and when the ship will travel and only carries the one cargo type, kiwifruit. These ships carry between 4,000-6,000 pallets.

Reefer ships load kiwifruit at various regional ports in New Zealand, close to where fruit is harvested (Nelson, Gisborne and Marsden Point) however most of the volume is loaded out from the port at Tauranga. Once fully loaded, the charter vessels travel direct to the key markets of Europe, Japan, China and Korea. Reefer ships offer the advantages of quick direct transit times, ability to condition (ready to eat) fruit whilst transiting to a destination and allow large volumes of fruit to be delivered to markets.

Right:
A typical reefer ship



Right:
Pallets being lowered
and stowed into the
hold of a reefer ship





Containerised Liner Services

Container ships are capable of carrying a variety of cargo types belonging to different cargo owners. Cargo is loaded and stowed on the vessel in units called TEU (twenty foot equivalent unit) or FEU (forty foot equivalent unit) that can be either dry or refrigerated units. Zespri uses refrigerated FEU units that carry 20 pallets of kiwifruit per FEU. These ships travel a fixed route every week, which may involve stops at many ports prior to reaching its final destination, similar to the experience of taking a ride on a public bus. Zespri uses such services to many destinations including Taiwan, USA, Australia, South East Asia, Middle East, South America and South Africa.

Containerised services offer the benefits of a cost-effective freight solution as only the required space is booked and there is the ability to send cargo to many destinations.

In 2019, it is estimated Zespri will ship globally from New Zealand over 18,000 FEU (360,000 pallets) on containerised liner services and charter some 44 reefer ships carrying over 184,000 pallets.

Right:
A typical container ship

