

RE-PACKERS AND FRUIT RIPENERS

05 A GUIDE TO
BEST PRACTICES



RE-PACKERS AND FRUIT RIPENERS

Re-packing (such as in netting bags) or other retailer designated packaging may or may not be done in the same facility or to the same fruit, as ripening. They will therefore be discussed as two separate issues.

On arrival of fruit, check the truck temperature logs and any discrepancies with required temperature protocols should be noted.

If fruit arrives at the facility directly from the packing house, as imported fruit directly from the port of arrival, or in the case of Mexican fruit, from the trans-shipping stores at the border, check for presence of temperature loggers. Remove them and download the data.

UNRIPENED RE-PACKED FRUIT

Where fruit are to be packed such that they will reach the retailer in a hard and unripe state with approximately 7 to 10 days shelf life at ambient temperature, the fruit should be treated as unripe fruit and should be subject to cold chain breaks for as short a duration as possible.

On arrival all fruit should be placed in cold stores at the temperature of shipping, or as close to that as possible. The variation from shipping temperature should not exceed 2°F higher than shipping temperature or 4°F lower in a static cooling holding store. Do not store together with other produce if possible, and definitely not with any products which produce ethylene, such as apples, peaches, nectarines, bananas, melons and kiwifruit.

Fruit should be removed from the cold store for pre-packing as close in time to the pre- packing operation as possible.

It is desirable that the re-packing area be temperature controlled, at a temperature of 53°F or less.

After re-packing, fruit should be returned to the cold store and remain there until transport to the retail store or distribution center.

All cold rooms should be checked regularly for buildup of gasses, especially ethylene. This is especially important in facilities which may also ripen fruit, as ethylene build-up within the facility is more likely to occur. Ethylene should be non-detectable. Regular venting of fresh air should also be undertaken to prevent a buildup of gasses, especially ethylene. Venting with fresh air should be done for 15 to 20 minutes with fans running. This may be needed at intervals between 2 and 6 days. Approximately 3 to 4 air volume changes may be needed to ensure gas build-up is eliminated.



RIPENED FRUIT

Ripening needs to be initiated in green, hard fruit where it is intended to eventually offer ripe ready to eat fruit at final point of sale, but the fruit should not be ripened completely, as shelf life will be compromised to the extent that poor quality and diminished sales will result. The extent of ripening undertaken before further distribution depends on the intended market, and the number of days shelf life or to full ripeness is required. Unless the ripening is taking place at a food service facility or processing factory where full ripeness is required before further processing, fruit must be distributed to final sales destination before full ripeness, otherwise excessive bruising will result. Fruit bruising has been determined in a number of studies, as the most prominent cause of quality reduction at retail level. The problems will start at re-packers or ripeners if suitable precautions are not taken.

Ripening can be triggered by addition of ethylene in ripening rooms, or by allowing the fruit to ripen naturally at non storage (non cold) temperature.



For ripening, all fruit can be moved out of the cold store at the time that initiation of ripening is needed (dictated by retail or food service orders) and placed in warm ripening rooms. Because fruit from different origins, maturities, shipping temperatures and age after harvest will react differently, only uniform groups of fruit should be treated together. It is important to note that fruit that has been shipped to the USA using controlled atmosphere in the shipping containers, will react to the ripening process differently to fruit that has not been subjected to controlled atmospheres. The purpose of controlled atmosphere storage is to slow down the ripening process, and this effect will remain to some extent for a time after removal from the containers. It is particularly important to ripen the fruit slowly, and this means ensuring that ripening temperatures are not too high. Attempting to ripen the fruit too fast may result in

physiological disorders and poor ripening. The temperature of the rooms should be 65 to 68°F. Higher temperatures increase the ripening rate, but at the same time increase the risk of pathogen development, such as stem end rots, which also increases risk of vascular browning, body rots due to anthracnose and especially in the case of low maturity fruit, uneven ripening. Lower temperatures than the above decrease these risks, but tend to result in poor color development. This has the disadvantage that consumers are often unable to adequately judge ripeness, and tend to leave fruit until over-ripe with the potential that quality deterioration will have resulted. Adequate ventilation to prevent excess buildup of gases, especially CO₂, is needed. High levels of CO₂ will inhibit ripening and increase the potential for internal disorders such as grey pulp, as well as development of pathological disorders such as anthracnose rots. The speed of ripening and therefore the number of days at which the fruit should be left to ripen, is very dependent on the maturity of the fruit, notably indicated by the dry matter content.

Ripening can also be achieved using ethylene application. Automatic ethylene control systems are best for controlling the concentration in the ripening rooms. Apply ethylene as a trickle system to maintain 10ppm ethylene. If intermittent application of ethylene is done, apply a shot to obtain a concentration of approximately 100ppm. The concentration is then allowed to slowly decrease over 6 to 8 hours. During the ripening of the fruit, high concentrations of CO₂ will be evolved. It is essential that the CO₂ is not permitted to rise above 2%, and preferably not above 1% otherwise ripening will be retarded and internal defects such as grey pulp will occur. Ripening rooms must be vented every 8 hours for at least 20 minutes, with fans running to ensure air change.

The relative humidity of the ripening room should be maintained at 90-95%. The treatment time varies dependent on maturity of the fruit, with approximate times of:

- Dry matter <23% use 2 to 3 days
- Dry matter 23-26% use 1 to 2 days
- Dry matter >26% use 1 day

The treatment is designed to initiate fruit ripening, and the process should therefore be stopped before ripeness is actually reached. The fruit should be checked regularly for indications of ripening by a change in softness. Fruit will not be left until soft, but to the point of breaking (sprung stage, where fruit neck is slightly soft). Thereafter, fruit can be re-packed into consumer packs or left in their boxes. Fruit must be transferred to a cold room set at 41°F to 44°F for holding before shipment to final destination and to control ripening progression to fully ripe and ensure sufficient shelf life for sale.

Fruit can be packed for final retail sale in different ways, but needs to be protected against bruising during storage, shipment and at the point of sale. The most robust packaging is in clam shells. Fruit can be packed in singles or multiples, and can be sorted, using the variability in ripening speed likely to be encountered, into groups with different numbers of potential days to ripe, which is useful for retailers and consumers. Fruit sorting can be done using in-line softness touch testing or acoustic equipment. In addition, a color changing ethylene determining sticker can be included in the pack to indicate to the consumer the stage of ripeness without physical squeezing.

Once packed, all packaging must be labeled appropriately to indicate to the retail trade that the fruit has been ethylene conditioned. Ready to eat dates should if possible be applied.

Where fruit has been shipped long distances, such as from Peru and Chile, some physiological ripening processes may have already started by the time fruit arrives at the fruit ripener. It may therefore be important to adjust the above protocols to take this into account. Ethylene treatment time may require slight reduction. Exporter specific requirements should be noted.

5 STAGES OF RIPENESS

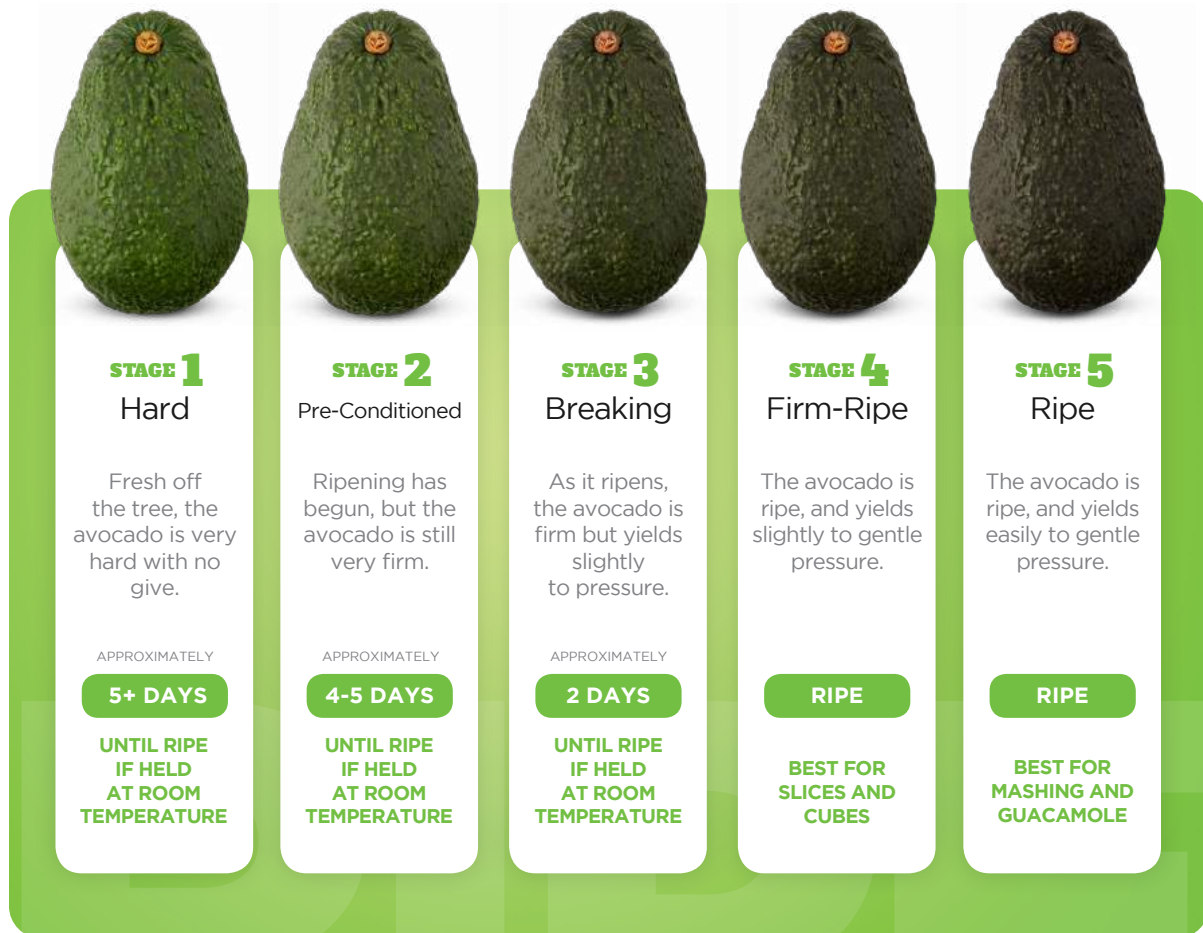


Chart courtesy of Mission Produce, Inc.

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- Check truck and fruit temperature on arrival
- Remove any data loggers present and download data
- Place fruit in holding store at shipping temperature with variation not exceeding 2°F higher than shipping temperature or 4°F lower
- Do not store with any products producing ethylene
- Re-pack and cool again as fast as possible if to be sold as hard fruit
- If fruit is to be ripened use either warm temperatures (68 to 72°F) or place in ethylene ripening rooms
- Add ethylene at rate of 10 ppm for trickle application or 100ppm shot application, renewing after 8 hours.
- Vent rooms for 30 minutes with fans running to remove CO₂ every 8 hours. Do not let CO₂ exceed 25 and preferably not more than 1%
- Apply ethylene for 1 day (fruit dry matter >26%), 1 to 2 days for fruit dry matter 23-26% and 2 to 3 days for fruit dry matter <23%
- At sprung stage re-pack fruit if required and store at 41°F to 44°F until dispatch. Label as ethylene treated