

#### 4.5.1A

### 13. Handling of Pears

Pears are classified as Summer pears and Winter pears. Summer pears ripen quickly and therefore cooling and maintaining the cold chain is of utmost importance.

Summer pears are extremely sensitive to high temperatures and special effort should be made to cool the fruit as fast as possible (within 48 hours), and thereafter maintain the cold chain. It is better to transport the fruit in refrigerated trucks than on conventional flat bed trucks. Pulp temperatures may not exceed +0,5°C during loading.

Freezing might occur when fruit core temperatures are below –1,5°C. Fruit will be damaged if kept for prolonged periods at these temperatures. Total Soluble Solid (% TSS) content of the fruit influences the freezing point of the pears. A summary of various handling protocols is listed in Table 1.

#### Specific Protocols for Summer Pears

**Summer pears include the following varieties:**

Early Bon Chretien	Beurre Hardy
Bon Chretien	Doyenne du Comice
Bon Rouge	Sempré
Rosemarie	Victoria Blush
Flamingo	Harrow Delight

- 📖 Maturity: Fruit must be picked strictly according to maturity parameters as set out in Table 2.
- 📖 Fruit delivery: Within 12 hours of harvest, but preferably same day.
- 📖 Pre cooling: Within 48 hours, shorter times preferably.
- 📖 Packing period (Bon Chretien): Fruit with firmness > 8,4 kg packed within 14 days. Fruit with firmness < 8,4 kg packed within 7 days.
- 📖 Recooling: to –0,5°C within 96 hours
- 📖 Transporting: Preferably in refrigerated trucks. Only fruit that adheres to Picking Code 1 standards (fruit picked early in the picking window) should be transported by Tautliner trucks. Fruit trucked from within the Helderberg area can be transported by Tautliner to the harbour (+/- 50 km), as this is a short distance. Lee and waiting times at the harbour should be taken into account when taking such decisions.
- 📖 Temperatures: Refer to: [http://www.ppecb.com/NR/rdonlyres/27377F02-0A0E-4B6B-9FC9-4CCAC23AD5D7/763/HP28Protocol\\_PomefrtRev06.doc](http://www.ppecb.com/NR/rdonlyres/27377F02-0A0E-4B6B-9FC9-4CCAC23AD5D7/763/HP28Protocol_PomefrtRev06.doc)

**DP1: Minus 1,0°C (summer pears in bags only)**

Carry at minus 1°C for the full duration of the voyage

Maximum of plus 0,5°C

**D05: Minus 0,5°C (summer pears without bags)**

Carry at minus 0,5°C for the full duration of the voyage

Maximum of plus 1,5°C

**Table 2. Various handling protocols and storage parameters for Summer and Winter pears.**

<b>Summer Pears</b>						
	<b>Packaging</b>	<b>Max Storage period RA</b>	<b>CA storage gas mixture*</b>	<b>Potential shelf life</b>	<b>National Inspection STD's</b>	<b>Optimum storage temperature</b>
EBC	Poly bag	3 months	1,0% O <sub>2</sub> + 0,0% CO <sub>2</sub>	5 days	10,0 kg - 7,3 kg	-0,5°C
BC	Poly Bag	3 months	1,0% O <sub>2</sub> + 0,0% CO <sub>2</sub>	5 days	10,0 kg - 7,3 kg	-0,5°C
Bon Rouge	Poly Bag	3 months	1,0% O <sub>2</sub> + 0,0% CO <sub>2</sub>	5 days	10,0 kg - 7,3 kg	-0,5°C
Rosemarie	Poly Bag	3 months	1,5% O <sub>2</sub> + 1,0% CO <sub>2</sub>	7 days	8,2 kg - 5,4 kg	-0,5°C
Flamingo	Poly Bag	3 months	Not recommended	7 days	8,2 kg - 6,3 kg	-0,5°C
Beurre Hardy	Perforated Poly Bag	3 months	1,5% O <sub>2</sub> + 0,0% CO <sub>2</sub>	7 days	6,3 kg - 4,1 kg	-0,5°C
Doyenne du Comice	Poly Bag	3 months	1,0% O <sub>2</sub> + 1,0% CO <sub>2</sub>	7 days	6,8 kg - 3,6 kg	-0,5°C
<b>Winter Pears</b>						
Forelle	Poly Bag	Min 12 weeks required	1,5% O <sub>2</sub> + 1,0% CO <sub>2</sub>	10 days	6,8 kg - 4,5 kg	-0,5°C
Beurre Bosc	Poly Bag	3 Months	1,5% O <sub>2</sub> + 1,5% CO <sub>2</sub>	7 days	8,2 kg - 4,5 kg	-0,5°C
Packham's Triumph	Poly Bag	6 Months	1,5% O <sub>2</sub> + 2,5% CO <sub>2</sub>	7 days	7,9 kg - 5,0 kg	-0,5°C

\*Extract. Refer to Annexure 3 for detailed CA gas mixtures. With permission from ARC Infruitec-Nietvoorbij.

#### **14. Handling of apples**

Apples are not as sensitive to the development of defects due to poor cooling as summer pears. This however, is not a reason to slacken the protocols as stringent cooling practices can add months of storage potential to your produce.

The most sensitive cultivars are the Gala types, Golden Delicious, Braeburn and Red Delicious types. Apples also require forced air-cooling.

 Do not over-utilise the daily cooling capacity of the room.

- 📖 Stack the bins directly in the path of the air, to force the air through the wall of fruit.
- 📖 Do not stagger or block pack the bins. This will result in the air taking the route of least resistance and cooling will be inefficient and moisture loss will be high.
- 📖 Keep doors closed or install plastic curtains or automatic air curtains.
- 📖 Make sure that for initial cooling, fan speed is high. After the room is filled and closed, airspeed is reduced to minimise moisture loss.
- 📖 Ethylene sensitive cultivars such as Royal Gala should not be loaded in the same container with high ethylene producing cultivars such as certain Summer pears. The ethylene might have a detrimental effect on fruit quality.
- 📖 Take special care of reloading times after packing, especially in cases where fruit is sorted and packed as Class 1 and where Class 2 fruit is rerouted to the cold store.

**Table 3. Handling protocols and storage parameters for apples.**

Cultivar	Poly bag Packaging	Max Storage period RA	CA storage gas mixture*	Potential shelf life	Inspection STD's	Optimum storage temperature
Gala types	n/a	3 months	1,5% O <sub>2</sub> + 1,5% CO <sub>2</sub>	7 days	Min 5,9 kg	-0,5°C
Golden Delicious	Poly Bag	6 months	1,5% O <sub>2</sub> + 2,5% CO <sub>2</sub>	7 days	Min 6,8 kg	-0,5°C
Red Delicious	n/a	6 months	1,5% O <sub>2</sub> + 2,5% CO <sub>2</sub>	7 days	Min 6,4 kg	-0,5°C
Braeburn	n/a	6 months	1,5% O <sub>2</sub> + 1,5% CO <sub>2</sub>	7 days	Min 6,4 kg	-0,5°C
Fuji types	n/a	6 months	1,5% O <sub>2</sub> + 1,5% CO <sub>2</sub>	7 days	Min 5,4 kg	-0,5°C
Granny Smith	n/a	6 months	1,5% O <sub>2</sub> + 1,0% CO <sub>2</sub>	7 days	Min 5,9 kg	0,0 - 1,0°C
Cripps Pink	n/a	6 months	1,5% O <sub>2</sub> + 1,0% CO <sub>2</sub>	7 days	Min 6,3 kg >10 % Red Colour	-0,5°C
Cripps Red	n/a	6 months	1,5% O <sub>2</sub> + 2,5% CO <sub>2</sub>	7 days	Min 6,3 kg	-0,5°C
Pink Lady®	n/a	4 months	1,5% O <sub>2</sub> + 1,0% CO <sub>2</sub>	7 days	Min 7.0 kg >40 % Red Colour Min TSS 13%	-0,5°C-
Sundowner®	n/a	6 months	1,5% O <sub>2</sub> + 2,5% CO <sub>2</sub>	7 days	Min 30 % starch breakdown	-0,5°C

\*Extract. Refer to Annexure 3 for detailed CA gas mixtures. With permission from ARC Infruitec-Nietvoorbij.

## 15. Defects of Apples and Pears after poor cooling.

- 📖 Over-ripe fruit (low firmness)
- 📖 Wilted fruit, especially pears
- 📖 Yellowing of fruit, especially Bon Chretien, Royal Gala and Golden Delicious
- 📖 Bitter pit development, especially Golden Delicious and Braeburn.  
This however is linked to the bitter pit potential of the fruit.
- 📖 Reduced storage potential and shelf-life.
- 📖 Mealiness in Red Delicious types.
- 📖 Greasiness in Granny Smith and Cripps' Pink (Pink Lady®) - linked to over maturity

## 16. Preventing bruising of Apples and Pears (Refer to [www.....](#))

Fruit bruise due to a number of reasons i.e.

- 📖 Rough handling
- 📖 High turgidity
- 📖 Bruise potential (in some cultivars higher than in others e.g. Golden Delicious).

### Types of bruises:

**Pressure bruise:** This is as a result of prolonged pressure on the fruit, exceeding the damage threshold. Pressure bruises are typically formed when fruit is packed tightly together e.g. in thrift bags, jumble or layered cartons. The handler (picker/sorter/packer) can cause pressure bruising by gripping the fruit too firmly.

**Velocity or impact bruise:** The apples are moved against each other or against the bins or packing machinery, causing elongated bruises or chafe marks during packing and transport (result of impacts of short duration but high momentum). Pears are particularly prone to velocity bruises, especially Doyenne du Comice, where the skin colours black after bruising. This is more a problem with immature fruit than with more mature fruit.

Producers, pack houses and handlers of apples and pears should be trained as to how each party can play a role in minimising the risk of bruising. A wide range of controls and preventative measures can and must be put in place to prevent and control bruising:

- 📖 Train pickers and orchard sorters
- 📖 Prepare farm roads before harvest – especially roads which are corrugated or eroded after rain.
- 📖 Prepare bin trailers – correct tyre pressure etc. Tyre pressure should be soft, as for driving in sandy conditions i.e. 1.5 to 1.8 kPa
- 📖 Don't drive too fast
- 📖 Use bin liners where applicable
- 📖 Do not pick during rain or directly after rain.

- 📖 Fruit pickers should have short nails and not wear jewellery on their fingers.
- 📖 Pickers can empty their picking bags or baskets onto a thick (10 mm) sponge blanket or mat in order to minimise bruising in the bin.
- 📖 Check pack line regularly with for instance an “electronic apple” to determine where bruise risk is high