

# Cold Storage of Plums



**for the South African Market**



Plums are grown in South Africa mainly for the export market. Consequently, most plums are harvested with extended cold storage periods in mind. Plums are therefore harvested mature, but not ripe and are normally ripened en route to the overseas markets. Sugar levels in these fruit are normally adequate for the plums to develop a sweet taste. However, high acid levels can mask the potential sweet taste. The full potential of taste can therefore only be realised by reducing the acid levels after harvest. The key to this is : COLD STORAGE TEMPERATURE. It is vital that growers, marketers and retailers work together to ensure that plums with a good eating quality are on sale on the local market. Consumer acceptance for plums must be developed, and this can only be done if there is a consistent supply of sweet juicy fruit.

This brochure provides information to help fruit handlers supply a good quality plum to the local market. General information regarding factors influencing plum quality, and suggested cold storage conditions are discussed.

**Factors influencing post-storage quality**

**Pre-harvest factors**

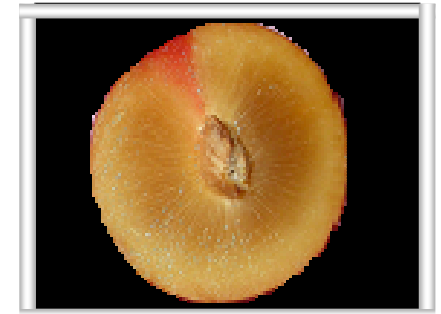
Post-storage quality is largely dependent on pre-harvest factors such as mineral nutrition, irrigation and exposure of the fruit to sunlight. Yet, however good a plum may be, it can be spoilt by incorrect storage.

**Harvest maturity**

Plums which are harvested over-mature are susceptible to bruising, decay, overripeness and bladderiness. Most cultivars harvested over-mature also have a high potential to develop gel breakdown.



Gel breakdown : Yellow plum

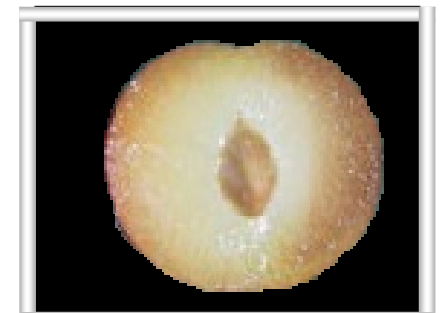


Gel breakdown : Red plum

If plums are harvested immature they ripen abnormally, becoming rubbery with an acid taste and poor aroma. Cold storage of immature plums promotes development of a chilling injury known as internal browning.



Internal browning : Yellow plum



Internal browning : Red plum

The effect of immaturity and over-maturity on quality of plums for the local market, which also influences unsightly development of shrivel, can be reduced by application of appropriate handling and cold storage procedures. This is possible since both the - cold storage period and the temperatures can be manipulated more readily than with export fruit.



Overripe



Shrivel

#### Cold storage

To maintain the quality of local market plums over a period of cold storage, it is essential that the fruit be placed under cold storage as soon as possible after harvest.

Chilling injury in plums is promoted by storage at temperatures between 1 °C and 5 °C . If stored at temperatures higher than 5 °C for long periods, rapid ripening may occur. This will result in soft, overripe fruit. By contrast, if plums are subjected to prolonged low temperature storage (-0.5 °C ), chilling injuries such as internal browning may develop, depending on the cultivar.

**To ripen normally, most plum cultivars, especially when harvested at export maturities, need to be subjected to a temperature of -0.5 °C and then be transferred to a higher temperature.** Research has indicated that the period over which plums can be subjected to low temperature varies dependent on the cultivar, and also the maturity of the fruit at harvest.

**Generally, it would appear that 10 to 14 days at -0.5 °C is the limit before internal disorder problems develop in all cultivars except those known to store well at single temperature (see Table).**

Since high temperatures lead to overripe and/or shrivelled fruit, and low temperatures for prolonged periods lead to internal chilling injury problems, temperature manipulation is required to optimise quality after storage.

The relative humidity in the cold store also influences fruit quality. To prevent shrivelling, humidities should be maintained at between 90 and 95%. The longer the storage period, the more pronounced the influence of relative humidity on fruit quality.

## Cultivars and storage potential

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Mature fruit, with a flesh firmness between 5.0 and 7.5 kg as determined with a penetrometer using the 11-mm plunger, can be safely stored for the maximum periods shown below :

Red Beaut	2 weeks			
Eldorado		3 weeks		
Gaviota		3 weeks		
President		3 weeks		
Pioneer		3 weeks		
Harry Pickstone			4 weeks	
Kelsey			4 weeks	
Laroda			4 weeks	
Mostert			4 weeks	
Methley			4 weeks	
Ruby Red			4 weeks	
Santa Rosa			4 weeks	
Sapphire			4 weeks	
Simka			4 weeks	
Songold			4 weeks	
Larry Ann*			4 weeks	
Souvenir			4 weeks	
African Pride™			4 weeks	
Casselman				5 weeks
Golden King				5 weeks
Laetitia				5 weeks
Ruby Nel				5 weeks
Angeleno*				7 weeks

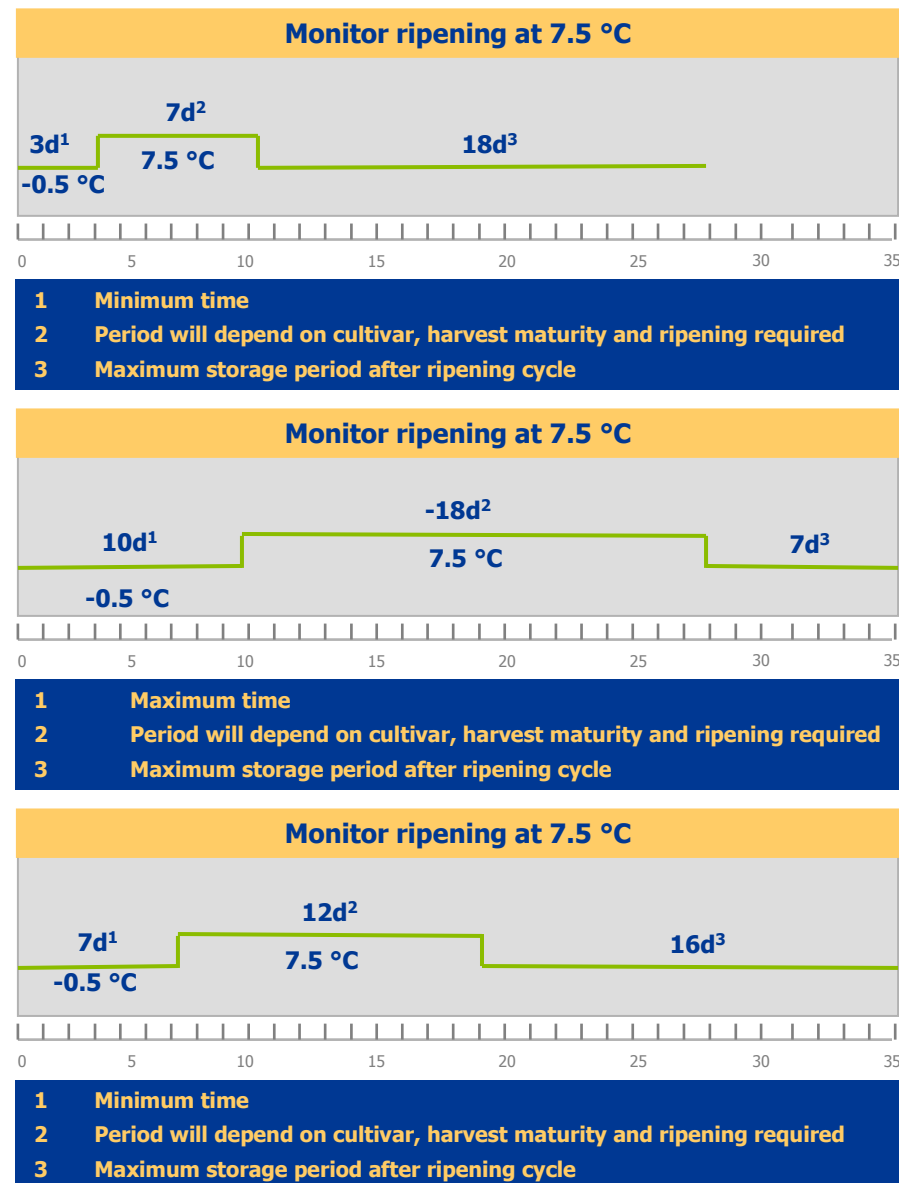
\*Single temperature (ST) at -0.5 °C can be used

## Cold Storage Regimes

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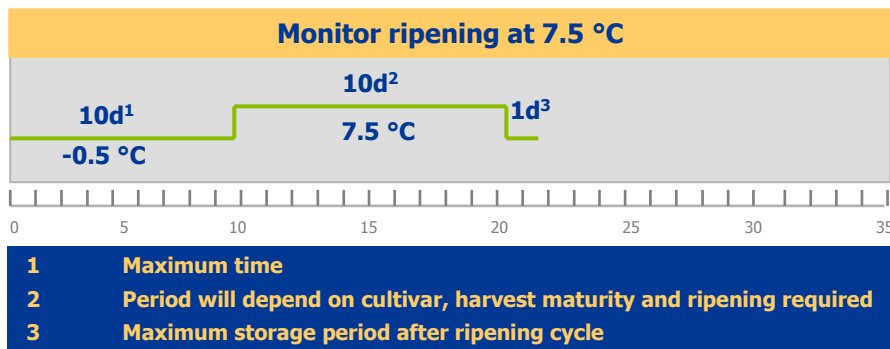
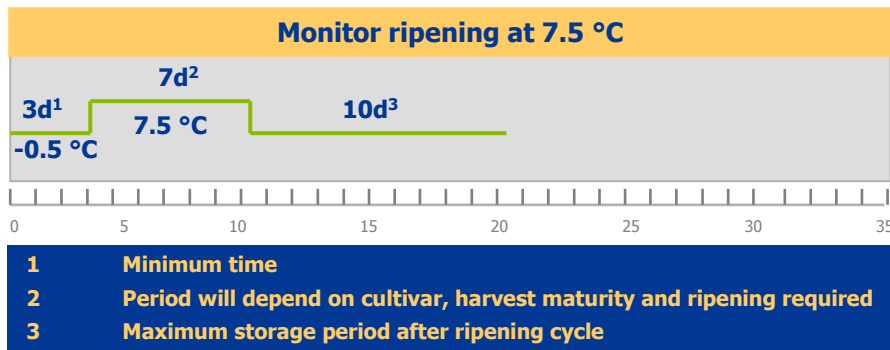
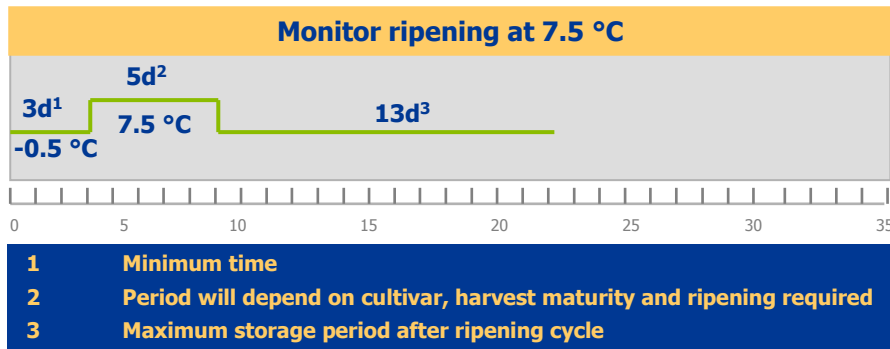
Storage of mature plums (5.0 – 7.5 kg) using two cold stores

For satisfactory ripening of plums, cold stores running at -0.5 °C and 7.5 °C are a pre-requisite (If faster ripening is required 10 °C can be used)



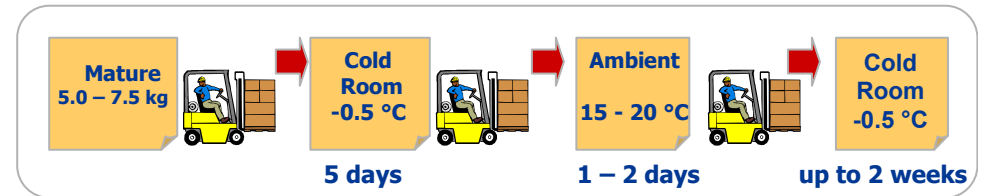
### Storage of ripe plums (3.0 – 5.0 kg) using two cold stores

Cold stores set at  $-0.5\text{ }^{\circ}\text{C}$  and  $7.5\text{ }^{\circ}\text{C}$  are recommended. If faster ripening is required  $10\text{ }^{\circ}\text{C}$  can be used. Plums harvested at a flesh firmness between 3.0 kg and 5 kg can be handled as shown below. The maximum recommended time in cold storage is a total of 21 days compiled in any combination as shown below

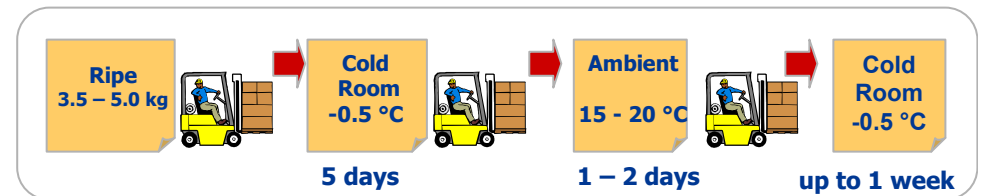


### Storage of plums (3.0 – 7.5 kg) using one cold store

If only one cold store is available, plums can be cold stored at  $-0.5\text{ }^{\circ}\text{C}$  and ripened at ambient between  $15\text{ }^{\circ}\text{C}$  and  $20\text{ }^{\circ}\text{C}$ . Plums harvested at a flesh firmness between 5.0 - 7.5 kg (mature), 3.5 – 5.0 kg (ripe) and 3.0 – 4.0 kg (soft), can be handled as shown below. The maximum recommended time in cold storage is a total of 14 days compiled in any combination as shown below.



OR



OR



*The information presented in this document serves as a guide only. To successfully store plums, ongoing quality monitoring during storage is necessary to enable good decision making. It is advisable to develop a good record keeping system to enable formulation of a good management strategy*

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