

# Capsicum

*Capsicum annuum*



## Best practice

Capsicums (and chillies) are unique vegetables with special qualities that set them apart. Botanically a fruit, they may be harvested green and immature or when fully coloured. While full red fruit are usually the highest price, leaving the crop to mature can increase losses and so reduce yield.

Market preferences are for capsicums that are either fully green or fully red (or yellow, orange, purple, depending on variety). Capsicums are 'non-climacteric', meaning they cannot be ripened after harvest. Treating capsicums with ethylene will have little effect on colour change, but does increase softening and disease development. Partially coloured fruit will continue to change if held at 12°C–20°C, but may not reach the same colour intensity as fruit picked at a later stage.

Capsicums should not be harvested while wet, and preferably not very early in the morning. Under these conditions fruit is fully turgid so more easily scuffed or damaged. Capsicums harvested during hot weather should be immediately placed in the shade to avoid dehydration and sunburn. The best harvest conditions are when weather is cool to warm and dry.

Their waxy skin and lack of natural openings means that capsicums are fairly resistant to water loss. The fruit are usually packed immediately after harvest, then cooled to around 7°C within 24 hours using forced air or room cooling systems. Longer delays will increase softening and rots. The stem and calyx are particularly susceptible to rots under moist conditions, as occur inside cartons while fruit remains warm.

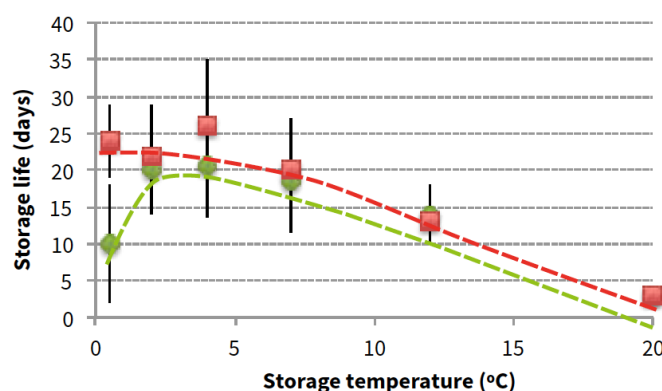
Capsicums must never be immersed in water. However, they can benefit greatly from washing with a sanitiser under a pressure spray or (preferably) using soft brushes. This not only improves appearance but also removes fungal spores that would otherwise cause disease. Heating the water can further increase the effectiveness of cleaning. Hot water shower / brushing treatments reduce chilling sensitivity as well as postharvest disease development, and are used commercially for capsicums exported from Israel to Europe.

Washing is less important for capsicums grown under protected cropping systems. Fruit grown hydroponically in a glasshouse does not need washing to clean it. However, if long storage periods are planned, fruit may still benefit from a hot water treatment.

## Storage life

Capsicum storage life is highly dependent on maturity, variety and growing conditions. Storage life is also extremely variable, as it is usually ended by rots. These can affect one or two fruit within a carton while leaving the others untouched.

Although considered chilling-sensitive, capsicums response to low temperature varies according to growing conditions, variety and maturity. In general, red capsicums are less chilling-sensitive than green fruit. Trials with greenhouse grown capsicums found that storage life was maximised at 0°C for red capsicums and 2°C for green capsicums. Even though chilling injury did occur on green fruit held at 2°C, storage life ended sooner at warmer temperatures due to early onset of rots.



Storage life of capsicums at different temperatures. Bars indicate the likely range around each mean value.

## Key messages

- ▶ Capsicums are fruit. Although they cannot be artificially ripened, mature fruit continue to develop colour during storage at 8–20°C.
- ▶ Capsicums should not be harvested while wet. If conditions are hot, harvested fruit must be shaded or prevent dehydration and sunburn.
- ▶ The waxy skin of capsicums has no natural openings (lenticels, stomata), making them resistant to water loss.
- ▶ Field-grown fruit usually need to be washed with soft brushes and water jets; capsicums should never be immersed in water.
- ▶ Greenhouse-grown fruit usually does not need washing.
- ▶ Capsicums are chilling sensitive. Sensitivity depends on growing conditions, cultivar and maturity eg red capsicums are less chilling sensitive than green ones.
- ▶ Storage life is variable, but maximised at 1–5°C.
- ▶ Internal rots can occur due to infection during flowering. These are undetectable at harvest.

# Capsicum

## Weight loss

- ▶ Capsicums can lose up to 3% weight and still remain marketable
- ▶ Capsicums that have lost 5% weight or more will be soft and/or shrivelled

*Average percent weight loss per day for unprotected capsicums at different temperatures and humidities,  $\pm$  values represent 95% of the predicted range.*

Relative Humidity	Temperature				
	0°C	2°C	5°C	10°C	20°C
40%	0.7 $\pm$ 0.5	0.8 $\pm$ 0.6	1.0 $\pm$ 0.8	1.3 $\pm$ 0.6	2.5 $\pm$ 1.8
60%	0.5 $\pm$ 0.4	0.5 $\pm$ 0.5	0.7 $\pm$ 0.5	0.9 $\pm$ 0.5	0.5 $\pm$ 1.2
80%	0.3 $\pm$ 0.3	0.3 $\pm$ 0.3	0.4 $\pm$ 0.3	0.5 $\pm$ 0.3	0.3 $\pm$ 0.7
90%	0.2 $\pm$ 0.2	0.2 $\pm$ 0.2	0.2 $\pm$ 0.2	0.3 $\pm$ 0.2	0.2 $\pm$ 0.4
100%	0	0	0	0.1	0.2

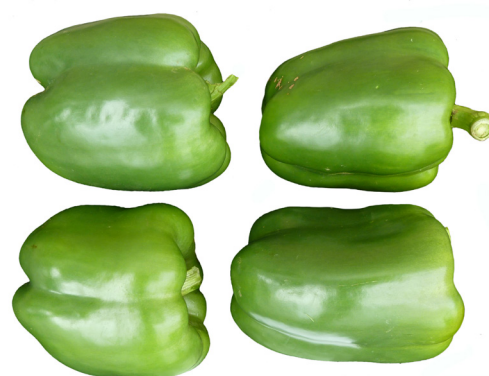
## Summary

Storage conditions	Optimum temperature	Green; 2–5°C Red; 1–4°C
	Optimum RH	90–95%
	Storage life (best)	Green; 2–3 weeks Red; 3–4 weeks
	Storage life at 5°C	2–3 weeks
Cooling	Cooling method	Forced air, room cooling can also be suitable
	Freezing point	-0.7°C
	Susceptibility to freezing	Moderate
	Chilling sensitive?	Green; moderately Red; low
Physiology	Respiration rate	Low
	Ethylene production	Low
	Ethylene sensitivity	Low
Packing	Cleaning	Greenhouse grown; rinse only if necessary Field grown; rinse and brush clean with water containing sanitiser Washed fruit should be dried eg with a fan, before packing
	Rate of water loss	Low
	Display	Do not display on ice

## Grading

Capsicums are generally sorted into three colour types – full green, coloured (or chocolate) and red. Fruit graded as red must be >50% red at packing, with the remainder “chocolate”; this area will turn red during storage and transport.

Green



Coloured / chocolate



Red



# Capsicum

## Diseases

### Alternaria – *Alternaria* spp.

Alternaria often appears where fruit have been damaged by factors such as blossom end rot, chilling injury, or physical damage. Sunken lesions develop, with a centre full of fine black spores. These multiply during storage.



### Anthraxnose – *Colletotrichum* spp.

Although infection by anthracnose usually occurs during production, symptoms often appear after harvest. Characteristic round lesions form with black or brown spores, sometimes forming a target pattern.



Photo: G Holmes, Bugwood.org

### Bacterial soft rot – *Erwinia* spp., *Xanthomonas campestris*

Soft rots are a common cause of the end of storage life for capsicums. Unlike fungal diseases, bacterial infections often initially grow through the flesh without breaking the waxy skin. The flesh turns brown and liquefies, often with an unpleasant smell.



### Grey mould – *Botrytis cinerea*

Grey mould forms a water-soaked rot, which is soon followed by the development of fluffy grey mould. Grey mould is very difficult to control as it continues to grow at low temperatures.



### Internal rots – *Alternaria alternata*, *Fusarium* spp., *Botrytis cinerea*, *Colletotrichum* spp., *Pectobacterium atrosepticum*

Internal rot can occur on the seeds or internal parts of the fruit. It is most common in red fruit. The external appearance of the capsicum can be completely normal, with symptoms only seen once the fruit is cut open. Initial infection usually occurs during flowering. However the disease only progresses once the fruit ripens.



## Disorders

### Chilling injury

Chilling injury can be induced by extended periods below 5°C. However, appearance is highly variable, with red fruit being particularly resistant to chilling damage. Initial damage can appear as dimpled areas in the skin, similar to orange peel. More significant chilling results in sunken pits, which are highly susceptible to decay. Severe chilling can cause large brown lesions, where the skin separates from the water-soaked underlying flesh.



Dimpling



Sunken pits

### Insect damage

Feeding by insects early in the crop's growth can deform fruit, even though the insects responsible are long departed. Feeding by thrips causes characteristic brown skin scarring. As this area cannot expand, fruit develop a highly deformed appearance. Feeding by thrips at fruit maturity causes a silvery scarring of the surface. These injuries have little impact on eating quality, but reduce fruit appearance.

Heliothis caterpillars and other pests may also feed on fruit early in development. Although this injury may heal, fruit is usually unmarketable.



Early thrips damage



Recent thrips damage



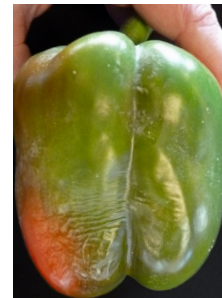
Healed heliothis feeding damage

### Sunburn

Sun exposure causes bleaching, local dehydration and wrinkling. The underlying flesh is likely to soften and can become more susceptible to disease.



Bleaching



Wrinkling



Disease