

Beans

Phaseolus vulgaris



Best practice

Beans are an immature seedpod. They are growing and developing rapidly at harvest maturity, have relatively little protection against moisture loss and hardly any storage reserves. Moreover, they are sensitive to chilling, so cannot be stored below 5°C for more than a few days.

To maintain quality, beans should be harvested when conditions are cool (overnight or early morning) and cooled as quickly as possible to around 6–8°C. Hydrocooling or hydro-vacuum cooling are suitable methods.

Keeping humidity high (approx. 95%) can reduce water loss. In this environment beans can last up to 12 days in fresh condition.

Beans can be packed while still slightly wet so long as there is air circulation around the packed product. They should not be packed wet into lined and sealed cartons.

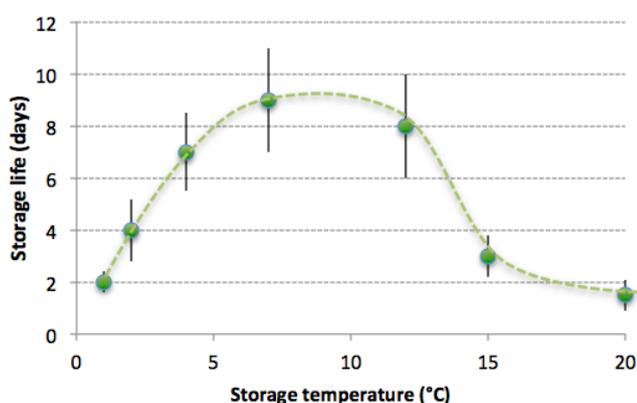
Good quality beans should be smooth skinned, sweet and crisp, breaking easily if bent.

Storage life

The storage life of beans is generally maximised between 6 and 9°C, depending on growing conditions and the chilling sensitivity of the variety.

The time until chilling injury occurs is temperature dependent: at 5°C symptoms can take a week to appear, whereas at 1°C damage may be obvious after only two days.

Beans are also very sensitive to high temperatures. Storage at over 12°C results in rapid weight loss, shrivelling and softening.



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

Weight loss

- ▶ Beans can lose up to 5% of their initial weight and still remain marketable.
- ▶ Beans that have lost 5–7% of their weight will be soft and unacceptable.

Weight loss during storage, transport and retail may be estimated using the data shown in the table below. Note that weight loss will be significantly slower for packed product and will vary according to carton and packaging type as well as ventilation rate.

Average percent weight loss per day for unprotected beans at different temperatures and humidities, ± values represent 95% of the predicted range.

Relative Humidity	Temperature			
	2°C	5°C	10°C	20°C
40%	3.1 ±1.2	3.9 ±1.3	5.1 ±1.5	9.6 ±2.1
60%	2.2 ±1.1	2.7 ±1.2	3.5 ±1.3	6.5 ±1.7
80%	1.3 ±1.0	1.5 ±1.0	1.9 ±1.1	3.4 ±1.3
90%	0.8 ±0.9	0.9 ±1.0	1.1 ±1.0	1.9 ±1.1
100%	0.1	0.2	0.3	0.6

Key points

- ▶ Beans are growing and developing rapidly at harvest. They have a fast respiration rate and are very perishable.
- ▶ Harvesting when beans are cool, then reducing temperature to 7–10°C as soon as possible, will help maintain quality after harvest.
- ▶ Beans are very chilling-sensitive, so cannot be stored below 5°C for extended periods.
- ▶ Temperatures above 10°C increase yellowing, moisture loss and rots.
- ▶ Small losses of moisture (~5%) make beans unmarketable. Packaging can protect beans from moisture loss, extending storage life.

Beans

Summary -

Storage conditions	Optimum temperature	7–10°C
	Optimum RH	90–95%
	Storage life (best)	7–12 days
	Storage life at 5°C	6–8 days
Cooling	Cooling method	Hydrocooling, hydro-vacuum cooling and forced are recommended. Room cooling may be suitable in some circumstances.
	Freezing point	-0.5°C
	Susceptibility to freezing	High
	Chilling sensitive?	High
Physiology	Respiration rate	High
	Ethylene production	Low
	Ethylene sensitivity	Moderate; some damage may occur with prolonged exposure
Packing	Cleaning	No washing required if field packed clean, if soil is present wash with sanitiser and dry
	Rate of water loss	High, benefits from POS packaging
	Display	Do not display on ice

Disorders

Chilling injury

Chilling injury in beans often starts off as a diagonal brownish red russetting along the pods.

In later stages large water-soaked lesions develop, spreading through the internal flesh and becoming slimy. Severely chill-damaged beans will disintegrate.



Dehydration

Beans are very susceptible to moisture loss. Shrivelling is first obvious around the tips. Dehydrated beans are soft and limp.



Diseases

Anthracnose – *Colletotrichum lindemuthianum*

Distinct, small reddish brown to black circular lesions appear on the pods. Mature lesions have a grey centre with blackened margin and, under moist conditions, can produce masses of pink spores. Mainly a pre-harvest disease, but symptoms can worsen significantly after harvest.



Cottony leak – *Pythium aphanidermatum*

This watery soft rot can develop on pods during transport and storage. The initial lesion develops into white, cottony growth. This mats pods together, forming a soft, leaking mass.



Early symptoms

Advanced symptoms

Grey mould – *Botrytis cinerea*

Infection with grey mould often occurs during flowering. However, symptoms often only appear after harvest. The spores are also present in the environment and on a wide range of hosts. Infection can spread rapidly after harvest, even during low-temperature storage.



Photo: QDAF

White mould – *Sclerotinia* spp.

White mould first appears as a soft, brown, water-soaked lesion, which is soon followed by fluffy, white fungal threads. These can infect neighbouring beans, forming a 'nest'. As the fungus matures, hard black resting structures (sclerotes) may form.



Photo: Ohio State University