

### **Is the length of the broccoli stalk important for postharvest shelf life?**

A recent (2018) paper tested shelf life of broccoli heads trimmed with stalks 1cm, 3cm, 6cm or 9cm long. The florets yellowed earlier with both the very short and very long stems. Broccoli heads with 6cm stems retained slightly more chlorophyll than those with 3cm stems. The authors suggest that 6cm is the optimal length for broccoli stalks, as this length allows nitrogen to be remobilised from the stem to the florets.

### **Is there any effect of salting ice used for broccoli?**

Water containing salt freezes at a lower temperature compared to pure water. Salty ice will also resist melting for longer. This is good, in that it could reduce the likelihood of broccoli sitting in melted ice, making broccoli soup! It also, from what I understand, absorbs more heat energy from the environment as it melts. So, more energy goes into making salty ice, and it extracts more energy from (cools) the broccoli as it melts.

However, I would be concerned about the low temperature of salted ice causing freezing damage to the florets. I suppose if there was a lot of salt in the ice it might also have some antimicrobial effects – but not sure whether the levels you would normally use in salt ice would achieve this.

### **Does high RH in the storage environment help?**

Yes, so long as temperature fluctuations inside the cold room do not result in condensation. The RH should ideally be approx.. 90% at the lowest temperature encountered during normal operations.

### **What makes the base of the stems go yellow?**

I had a look at the pictures, and it appears to be a fungal disease in the vascular system. I have passed on to our pathologist (Dr Len Tesoriero) to see what he thinks.

### **If postharvest temperature fluctuates between 1 to 5°C during transport from warehouse to stores will this affect storage life?**

It is important to determine whether this fluctuation is simply the air temperature or actually in the product itself – there is a fair bit of buffering by packaging, even if it is only a crate with a liner.

Temperature fluctuations can lead to condensation, which can certainly be bad. However, the effects are a matter of time as well as temperature – if the poor temperature management only lasts a few hours it is unlikely to greatly affect quality. However, if it was going on for several days that would certainly reduce shelf life.

### **Is there any danger to human health from yellowed broccoli?**

No, but it will definitely have less nutritional value. And also taste terrible.

### **If there is dead or dying leaf material in the field will that produce enough ethylene to affect head quality?**

Very unlikely. Ethylene will disperse so quickly into the wider environment, this is unlikely to have any effects. Also, I would expect there will be some protective effects from the plant while the heads are attached and growing.

### **What should growers do who don't have any cooling system?**

Unless they are harvesting midwinter in Werribee, I think the grower needs to either set up a cold room (preferably with a forced air system, which can be as simple as a fan and a tarpaulin), or transport harvested broccoli to a packhouse that does have a cooling system as soon as possible. The effects of delayed cooling aren't obvious immediately, but develop after a period of storage.

### **Is it good to use liners?**

Yes, definitely, as they will keep RH high inside the cartons or crates. However, they need to either have enough holes to allow efficient cooling, or only be used once the broccoli is already cold.

Should grower change harvest time from early morning to late afternoon, when nutrients are high but air temperature is also high?

No, because temperature is ALWAYS the most important factor affecting quality! It is possible that broccoli harvested in the evening would be both cooler and have better storage reserves, but I'm not sure whether the benefits would be worth the fairly large hassle factor in picking in the dark.

### **What veggies should not be stored with broccoli in order to avoid ethylene in the storage environment?**

Most vegetables are pretty low ethylene producers, and if the temperature is below 5°C there is unlikely to be any problem. There is more likely to be an issue with ethylene if broccoli is stored alongside ripening fruit (bananas, passionfruit, avocados) at the higher temperatures that are suitable for them. This can occur at back of store and definitely in peoples home fridges!

However, this is a matter of time as well as temperature / exposure. If broccoli is only stored for a day or two with low levels of ethylene, the effects may not be significant. If stored for a week, then that is another matter.

### **Is it ideal to pack broccoli in the cold room rather than the open shed?**

Yes, absolutely, as this will prevent temperature fluctuations and re-warming. But the workers may not like this much!