New Zealand Institute for Crop & Food Research Ltd
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CROP & FOOD RESEARCH

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Quality flowers are cool flowers

Not too hot, not too cold

Low temperature storage prolongs that "fresh picked" quality in cut flowers, but the optimum storage temperature may vary from one flower crop to the next. If the temperature is too high, senescence will result in deterioration and low quality stems. Conversely, too low a temperature may result in chilling damage. The extent of chilling injury is determined by temperature, duration of exposure and the chilling sensitivity of the crop.

Take a tip from asparagus tips

Our research has shown that the more heat units accumulated after harvest, the shorter the remaining shelf life of asparagus. This is also highly likely for cut flowers. But what is an accumulated heat unit? **One degree-hour is one hour at one degree above zero**. Researchers have used the strong relationship between the postharvest shelf life of asparagus and heat units accumulated after harvest to estimate export shelf life. Different postharvest handling options were seen to have different effects on the retail shelf life of asparagus in Japan.

Understanding the precise way that time and temperature interact will have a huge impact on the handling and value of cut flowers.

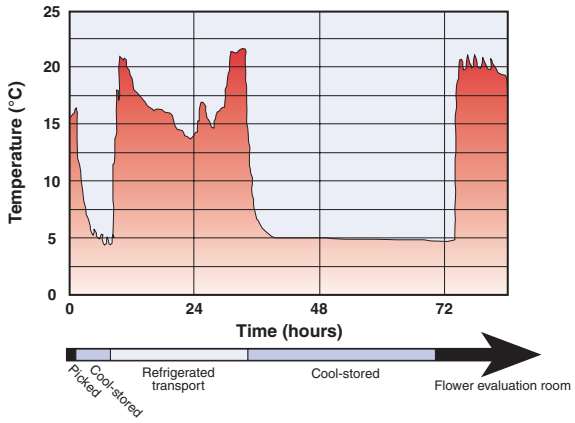
Benefits of chilling

- Flowers can be held in bud until they reach the market-place.
- Extend the subsequent vase life of transported flowers by lowering respiration and conserving metabolic reserves.
- Reduce water loss.
- Higher returns for premium quality flowers e.g. for export peonies

When flowers get hot

Make sure you know when your flowers are heating up. Use temperature loggers to determine where and when heat units are being accumulated in your crop. ***Figure 1*** *is an example of the temperatures experienced by a consignment of sandersonia flowers during transport from Whangarei to Levin. The transport of these flowers was supposed to be refrigerated.* ***Clearly that was not the case.***

Figure 1: *Temperatures experienced by sandersonia flowers during transport.*

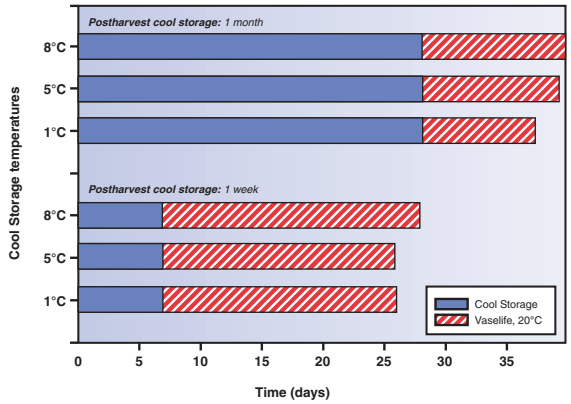


Cool storage to extend crop marketability

Long-term cool storage of flowers may be useful in extending the market options for some flower crops. Cool storage enables quality stems to be held for longer periods before sale and ensures that the flowers still have a good vase life when they reach the market-place. We have examined whether this would be a viable option for *Cymbidium* orchids.

Our researchers have shown that cool storage of *Cymbidium* orchids (San Francisco) at 5-8°C for 1 month resulted in an extension of the marketing window for these flowers by 2 weeks compared to flowers that were cool stored for 1 week (see **Figure 2**).

Figure 2: *Cool Storage of* Cymbidium *orchids.*



Cymbidiums can withstand temperatures down to 1°C, although after 1 month of cool storage, 2-4 days extra saleability is obtained if storage temperatures are between 5 and 8°C (see **Figure 2**).

The change in quality during storage either for 1 week or 1 month was very small, so the blooms were always in good condition when removed from the store. As always, only first-class blooms should be candidates for long-term cool storage as any minor blemishes become more obvious in storage.

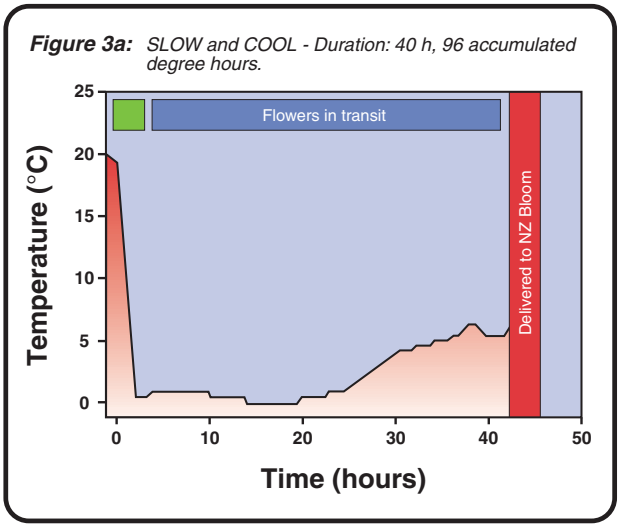


Figure 3a: *SLOW and COOL - Duration: 40 h, 96 accumulated degree hours.*

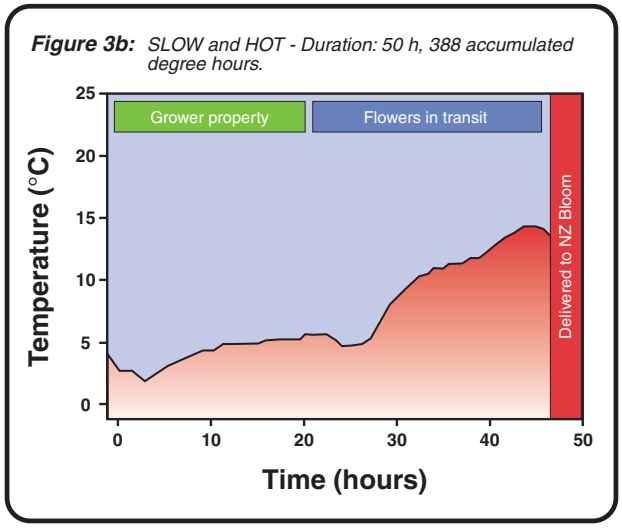


Figure 3b: *SLOW and HOT - Duration: 50 h, 388 accumulated degree hours.*

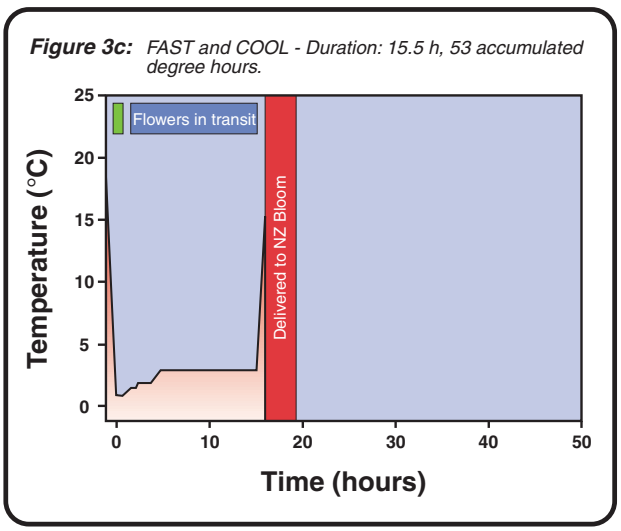


Figure 3c: *FAST and COOL - Duration: 15.5 h, 53 accumulated degree hours.*

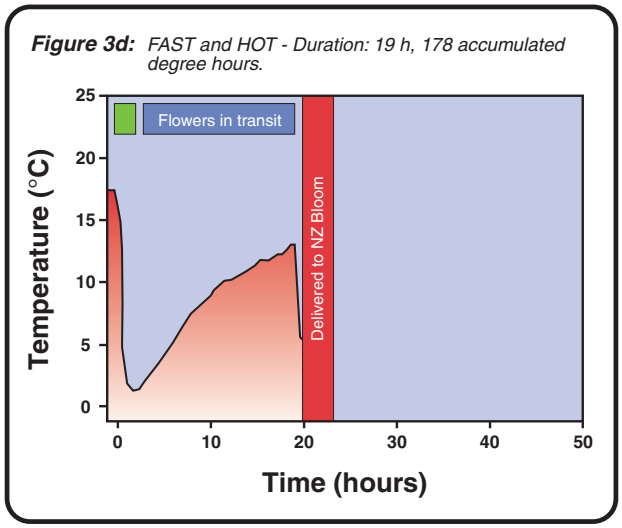


Figure 3d: *FAST and HOT - Duration: 19 h, 178 accumulated degree hours.*

Fast or slow: cool is best!

Measuring accumulated heat units for export peonies

In December 1998, Crop & Food Research monitored the temperature of export peony consignments from harvest at two South Island locations, through cooling, grading and transport until their arrival at the export agent's depot at Mangere (New Zealand Bloom).

Figures 3a, b, c and d show the temperatures experienced by the flowers during slow and fast transport, with and without cooling.

In general, the temperature of the consignments rose during transport to Auckland and the transportation contributed to as much as 80% of the accumulated heat units.

Researchers concluded that the peony growers had very effective methods for removing field heat from their crop, but that further improvements of the cool chain could be made by managing the transportation temperatures more effectively.

Acknowledgements

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How cool are your flowers?

The table overleaf lists the optimum storage temperatures for a range of cut flowers.

Optimum storage temperatures for selected cut flowers

Flower species	Common name	Storage temp. (°C)	Maximum period of storage	wet/dry
Allium	-	0 - 2	2 weeks	dry
Alstroemeria	-	4	2-3 weeks	-
Anthurium	-	3	4 weeks	-
Antirrhinum	Snapdragon	1	2 months	wet
Aster	-	0 - 4	1-3 weeks	-
Bellis perennis	English daisy	4	3 days	-
Centaurea cyanus	Cornflower	4	3 days	-
Chrysanthemum frutescens	Marguerite daisy	2	2 weeks	dry
Chrysanthemum	-	1	3 weeks	-
Clarkia elegans	Elegant fairyfan	4	3 days	-
Cosmos		4	3-4 days	-
Cyclamen	-	0 - 1	3 weeks	-
Cymbidium	Orchid	5 - 8	4 weeks	-
Dahlia hybrida	Dahlia	4	3-5 days	-
-	Daisy - Marguerite	2	1-2 weeks	-
-	Daisy - Shasta	4	7-8 days	-
Delphinium	-	4	1-2 days	-
Dianthus barbatus	Sweet William	7	3-4 days	-
Dianthus caryophyllus	Carnation - wet	4	4 weeks	-
Dianthus caryophyllus	Carnation - dry	0 - 1	4-6 months	-
Freesia	-	0 - 0.5	10-14 days	-
Gerbera	-	4	3-4 weeks	wet
Gladiolus	-	2 - 5	1-4 weeks	dry
Gloriosa	Flame lily	4-7	4-7 days	-
Godetia (Clarkia sp.)	Fairyfan	10	1 week	-
Gypsophila	Baby's breath	4	1-3 weeks	-
Heliconia	-	12	10 days	-
Helichrysum	Strawflower	2 - 4	3-4 weeks	-
Iris, bulbous	-	-0.5 - 0	1-2 weeks	-
Lathyrus odoratus	Sweet pea	-0.5 - 0	2 weeks	-
Lilium sp.	Lily	0 - 1	4-6 weeks	dry
Lilium sp.	Lily	1	4 weeks	wet
Limonium	Statice	2 - 4	3-4 weeks	-
Matthiola incana	Stock	2 - 4	3-5 days	-
Narcissus	Daffodil	0 - 0.5	1-3 weeks	-
Paeonia hybrida	Peony	0 - 7	4 weeks	dry
Phlox	-	4	1-3 days	-
Protea	-	4	7-10 days	-
Ranunculus	-	0 - 5	7-10 days	-
Rosa	Rose	0.5 - 3	2 weeks	dry
Sandersonia aurantiaca	-	< 4	-	-
Strelitzia reginae	Bird of paradise	8	4 weeks	-
Tulipa	Tulip	-0.5 - 0	2-3 weeks	dry
Zantedeschia	Calla	4	1 week	-
Zinnia	-	4	5-7 days	

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