



By Erik Runkle



Cold-Tolerant Bedding Plants


In the December 2013 issue of *GPN*, I discussed cold-sensitive bedding plants, which are crops that have a relatively high base temperature (46° F or higher). At low growing temperatures, cold-sensitive crops develop very slowly and therefore, they should generally be grown warm (70 to 75° F) to avoid lengthy production times. During the winter and early spring, we have predicted that the amount of energy consumed for heating on a per-crop basis is often higher when cold-sensitive crops are grown cool because production time of these crops at low temperatures is so long.

In contrast, there are a number of bedding plant crops that have a relatively low base temperature (39° F or lower)

and therefore, continue to develop at cool temperatures. These species can be labeled as “cold-tolerant” crops. The base temperature estimates are based on controlled-environment research performed at Michigan State University primarily by former graduate students Matt Blanchard and Tasneem Vaid. By quantifying times to flower at different average daily temperatures, we can extrapolate from flowering timing to predict the temperature at which plants stop developing, which is the base temperature.

A list of cold-tolerant bedding plant crops is provided in Table 1. As with all crops, flowering time decreases as temperature increases. However, the flowering delay when cold-tolerant crops are grown at cool temperatures is relatively small compared with the delay for cold-sensitive crops. For example, flowering of cold-tolerant crops takes typically 15 to 25 percent longer when grown at 63° F than at 68° F. Another common feature of many cold-tolerant crops is their quality is often greatest when crops are grown cool (less than 65° F), especially when the daily light integral is low (less than 10 mol·m⁻²·d⁻¹).

Therefore, cold-tolerant plants should generally be grown at cool to moderate temperatures (60 to 65° F) to balance crop timing and crop quality. If “cold growing” is desired, then these are the crops to include since they will continue to develop — albeit slowly — at temperatures above 40° F. In contrast, cold-sensitive crops would not develop at such low temperatures and could even suffer from chilling injury.

In an ideal situation, cold-tolerant crops would be grown together in one greenhouse section and cold-sensitive crops would be grown in a separate, warmer section. Cold-intermediate crops (to be discussed in the next issue of *GPN*) could be grown in either greenhouse or, even better, in a third section with moderate temperatures. This type of growing strategy, while difficult to implement, can help balance crop timing, crop quality and energy consumption for heating, and it is a starting point for optimizing the growing environments for different bedding plant crops. 

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Crop	Estimated base temperature (°F)	Days to first flower from transplant		
		57° F	63° F	68° F
Dianthus (Super Parfait)	39	72	57	47
Diascia (Diamonte)	25	51	45	40
Heliotrope (Blue Wonder)	35	56	45	37
Marigold – American (Inca II)	32	60	50	42
Marigold – French (Janie)	34	32	27	23
Nemesia (Poetry)	37	46	36	30
New Guinea impatiens (Divine)	36	62	51	43
Osteospermum (Asti)	31	64	49	40
Petunia (Bravo)	39	45	35	28
Petunia (Dreams)	37	35	28	24
Petunia (Easy Wave)	39	62	51	42
Snapdragon (Liberty Classic)	39	60	46	37
Snapdragon (Montego)	36	41	34	28
Stock (Hot Cakes)	37	42	33	27
Viola (Sorbet)	39	34	27	22