



By Erik Runkle



# Cold-Intermediate Bedding Plants

**B**edding plants that stop developing at moderately low temperatures can be labeled as cold-intermediate plants. This categorization of plants is based on estimates of crops' base temperatures derived from research data primarily generated at Michigan State University. We have designated the category of cold-intermediate (or cold-temperate) plants as those with a base temperature of 40 to 45° F. Plants with a base temperature of 39° F or lower can be labeled as cold-tolerant plants (see the January 2014 issue of *GPN*), while those with a base temperature of 46° F or higher can be called cold-sensitive plants (see the December 2013 issue of *GPN*). At or below the base temperature, a crop does not develop.

Many growing recommendations for bedding plants are based on a limited amount of data, and in many instances, only recommended night temperatures are provided. However, plants develop in response to the average 24-hour temperature and therefore, both the day and night temperature influence cropping time. Days to flower from transplant, as presented in Table 1, should be used as a guide, since production time depends on other factors, especially the maturity

**Table 1.** Cold-intermediate crops (with series tested in parentheses), their estimated base temperatures, and times from transplant to first flowering at three average daily temperatures with a long-day photoperiod. Data was primarily generated by former Michigan State University graduate students Matthew Blanchard and Tasneem Vaid.


Crop	Estimated base temperature (°F)	Days to first flower from transplant		
		63° F	68° F	73° F
Calendula (Bon Bon)	44	38	32	28
Cosmos (Cosmic)	45	48	37	31
Cupflower (Robe)	43	51	40	33
Dahlia (Figaro)	42	51	46	45
Gazania (Daybreak)	41	69	57	48
Geranium (Floever)	41	59	50	42
Geranium (Pinto)	42	82	65	53
Geranium (Ringo 2000)	42	75	59	49
Flowering tobacco (Perfume)	43	45	36	29
Impatiens (Blitz 3000)	45	26	24	25
Lobelia (Riviera)	41	30	24	20
Petunia (Shock Wave)	41	48	38	29
Petunia (Wave Purple Classic)	42	63	49	35
Rudbeckia (Becky)	40	51	46	45
Verbena (Obsession)	44	38	30	25
Verbena (Quartz)	41	60	48	41
Wax begonia (Sprint)	43	44	35	29

of the transplant, the daily light integral and varietal differences. Additional scheduling resources are available online at [www.flor.hrt.msu.edu/production-info](http://www.flor.hrt.msu.edu/production-info).

**Why have we categorized plants based on their base temperatures?** In an ideal world, floriculture crops would be grown under the most favorable environmental conditions to maximize plant quality and minimize production time. The major environmental factors that influence flowering time and quality are temperature, photoperiod and daily light integral. Generally, temperature controls development rate, daily light integral (and carbon dioxide) regulates plant quality, and photoperiod influences flowering of day-length-sensitive crops. Assuming plants are grown under a favorable photoperiod, temperature is the primary factor that influences crop time. A simple way to describe how plants tolerate low temperatures — from a developmental standpoint — is by estimating their base temperatures.

**How is the base temperature of a crop relevant in commercial production?** Plants with the lowest base temperatures continue to develop at low production temperatures, such as in the 50s. In contrast, cold-sensitive crops either do not develop or develop very slowly at such low temperatures. Therefore, by identifying a crop's tolerance to low temperature, one can select which crops to grow (and which to avoid) when cold-growing is desired. Generally speaking, crops with a low base temperature should be grown at moderate to cool temperatures, while those with a high base temperature should be grown fairly warm.

It's not uncommon for a bedding crop to be ready for sale but for some reason, it has to be held for a week or two. The base temperature of a crop can guide a grower about how temperature can slow down development. Suggested "hold" temperatures are around 5 to 10° F above a crop's base temperature, which would slow down but not stop development. Suggested holding temperatures are 45 to 50° F for cold-tolerant crops and 55 to 60° F for cold-sensitive crops.

The development of these categories is subjective and growers may wish to create their own groupings of crops based on this data, other sources of information and their own experiences. Ideally, crops with similar base temperatures would be grown together while those with higher or lower base temperatures would be grown in separate areas at warmer or cooler temperatures, respectively. In practice, this can be difficult, but nevertheless it should be a consideration when scheduling crops and production space. 

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