

Cool Temperatures, Cool Crops

Consumers are now looking for quality product to extend spring peak both earlier and later. Find out what you should be growing to capitalize on this trend.

By Josh Schneider and Jack Williams



Top to Bottom: 'Soprano White' *osteospermum*, 'Sundaze Bronze' *bracteantha* (Photos courtesy of Proven Winners), 'Comet Pink' *agryranthemum*, 'Bridal Showers' *bacopa* (Photos courtesy of The Flower Fields).

Consumer's demand for premium-quality annuals has allowed growers and retailers to realize stronger sales volumes and margins. Unfortunately, one of the biggest current limitations to sales is the ability to add more units of product into an already busy spring market. In the words of most garden center operators, the reason for doing off-peak sales is simple: It comes down to "cash flow, cash flow, cash flow!"

Given this demand, is it possible for vegetative annuals to be grown cool and sold in early spring, taking advantage of space availability prior to peak sales periods such as Mother's Day? (This also opens up opportunity to refill that space with product for summer sales.) When produced cool, these crops are prepared for the less-than-optimum conditions they will be subjected to before spring weather has a chance to warm. This creates a win/win situation for everyone involved. Growers are able to spread out their production and shipping loads, maximizing efficiency and production capacity, and retailers are able to increase their sales and have interesting product to keep and satisfy their customer base.

With these benefits in mind, growers need to focus on some culture adjustments required for successful cool temperature production. Plant selection, production schedules and culture practices all require modification compared to traditional spring crop programs. The effect of temperatures on plant function is not the

only issue to consider. Temperatures also influence decisions on what media and fertilizers to use, what insects and diseases might be a problem, what light intensities are required and how growth regulator applications are impacted.

Although not a complete list, the following vegetative annuals either tolerate or require cold temperatures for vernalization. Plants that are grown cold and can be placed outside after the risk of killing frost has past are ideal for early spring sales.

- Antirrhinum (snapdragons)
- Agryranthemum
- Bacopa (sutura types)
- Bracteantha
- Brachyscome
- Calibrachoa (early-flowering varieties only)
- Diascia
- Helichrysum
- Lamium
- Nemesia
- Osteospermum (most types require four weeks at 45-55° F to vernalize for blooming)
- Petunia (early-flowering varieties only)
- Scaevola
- Verbena

CULTURAL CONSIDERATIONS

Adjustments to production schedules are required based on the slower plant growth that results at cold temperatures. Keep in mind that plants in larger pots, and therefore larger soil volume, have a higher moisture content that keeps the root zone cold for longer periods of time. This impacts the growth rate; comparable plants in smaller pots

will require adjusted production schedules to compensate. The differences may be as much as 2-3 weeks beyond the expected "additional" time required for developing larger-sized plants based on pot size alone. In areas where day temperatures can be kept cool and ample sunlight is available, delays may not be as severe. Also, crops in baskets or pots hanging in the greenhouse benefit from warmer temperatures and light levels found in this zone, which may improve plant growth rates and reduce the effects of cold temperature delays. Expect that production schedules need to be modified for factors beyond just the anticipated effects of temperature.

Transplant young cuttings and establish roots at temperatures between 55-65° F. Once root systems have expanded into the growing media, usually 3-4 weeks later, pinch plants if required and reduce temperatures to 45-55° F for the balance of the production.

Growing media should provide excellent drainage and aeration as cold temperatures result in slower drying of the media that can result in a higher incidence of diseases such as Pythium and Phytophthora. Irrigation practices must be monitored closely. Likewise, if the growing mix stays too wet on a regular basis, pests like fungus gnat larvae become a greater risk, as these conditions are very conducive to pest development.

Avoid fertilizer mixtures high in ammonia or urea forms of nitrogen due to problems that can occur at cold temperatures (risk of ammonium toxicity, etc.). Focus ▶

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on complete and balanced blends of calcium and potassium nitrate that include minor elements (such as Excel 15-5-15).

For best results, maintain media pH between 5.5 and 6.0. Many species, such as calibrachoa, petunias, bracteantha and brachyscome, exhibit minor element deficiencies when the pH rises above 6.0. Provide adequate iron and manganese levels throughout production to avoid yellowing of the foliage.

One of the benefits of cold temperatures is that the conditions are not conducive to insect development, making pest control somewhat easier. Monitor all crops closely and treat as needed with the appropriate chemicals. At cool temperatures, there is more risk from pathogens such as Pythium and Botrytis. Use of periodic broad-spectrum fungicides or bio-rational materials such as "bio-guard" starting at time of transplant are helpful in preventing problems.

Light intensities should be kept as high as possible when producing cool-temperature crops. During the winter months, light levels are limited in many regions of North America, so

Figure 1

Season	Late Winter (50° F)	Early Spring (55° F)	Spring (60° F)	Summer (65° + F)
Media	Sterile, well drained for best results.			
Target fertilizer program	150-200 ppm (CLF), media pH range of 5.5-6.0 and EC of <2.0 (SME). Supplement crops such as Petunia Calibrachoa using a constant release feed (Osmocote, etc.) due to higher fertilizer needs.		150-200 ppm (CLF), media pH range of 5.5-6.0 and EC of <2.0 (SME). Supplement crops such as Petunia Calibrachoa using a constant release feed (Osmocote, etc.) due to higher fertilizer needs.	
Feed	Balanced, dark weather mix, Excel 5-5-15, etc.		Balanced, general purpose mix, 20-10-20, etc. alternated with a calcium feed	
Temperatures	Establish cuttings 60° F, finish at day temp. 55-60° F, night temperature 45-50° F	Establish cuttings 60° F, finish at day temp. 55-65° F, night temperature 50-55° F	Establish cuttings 60-65° F, finish at day temp. 55-65° F, night temp. 50-55° F	Establish cuttings 65° F, finish at day temp. 65-80° F, night temperature 65-75° F
PGR	May not be required due to cold temperatures	Spray treat-ments with B-Nine or Cycocel as required	Spray treat-ments with B-Nine or Cycocel or soil drench with Bonzi as required.	
Insects	Watch for fungus gnat larvae in growing media.	Watch for fungus gnat larvae in growing media. Also aphids, thrips and whitefly later in the crop due to higher day temperatures.	Watch for fungus gnat larvae in growing media. Also aphids, mite, thrips and whitefly later in the crop due to higher day temperatures.	
Disease	Watch for root rots resulting from soil being kept too wet. Also foliar blights when leaves/flowers get moisture on them from irrigation and condensation		Watch for foliar blights that result from water on leaves/flowers. Also, mildews can be a problem as humidity and temperatures increase.	

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avoid putting too many baskets or other plants above crops, which can block light. If it is not possible to avoid hanging baskets in the upper greenhouse, it is important to space adequately as you move to larger basket sizes (up to 12 or 14 inches),

be sure to adjust the spacing accordingly. Otherwise, the amount of light blocked will further slow flowering of the crops and can contribute to internode stretch and of course, disease.

Since high light and cool tempera-

tures minimize stretch, monitor crops for potential PGR needs. If internode elongation occurs, treatments of B-Nine and other PGRs may be used. Check product support from distributors to confirm which chemicals are effective on each crop



Calibrachoa 'Colorburst Melon' (Photo courtesy of Flower Fields)

grown. It is very important to anticipate growth patterns of the crops and use appropriate PGRs early or late enough in production such that flower timing, size and bud counts are not affected. Unfortunately, most of the stretch with these crops takes place in later stages as day temperatures begin to rise in response to longer daylength and better conditions.

Just as individual crops can be grown effectively at cool temperatures, there are many nice combinations that can be produced as well. Picking from the list of crops that tolerate cold production, there is any number of beautiful mixtures that can be created in pots or baskets for early spring sales. Larger containers with significant soil volume may be best assembled using established plants in small pots. When planting rooted cuttings, growers must use care to keep the growing mix moist around young cuttings and avoid saturating the media that will result in slow development from cold soil.

The benefits of producing crops under cool temperatures become obvious, as growers get familiar with this strategy. Not only are there savings in energy- and production-related costs, but successful culture generally yields larger bloom size, more intense flower color and strong, compact plants that are very durable in the garden. GPN

Jack Williams is New Product Manager at The Flower Fields, Carlsbad, Calif., and Josh Schneider is spokesperson for Proven Winners, DeKalb, Ill. Jack can be reached by phone at (800) 468-3253 or E-mail at jwilliams@eckeranch.com. Josh can be reached by phone at (888) 323-0730 or E-mail at josh@euroamprop.com.

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