

ORNAMENTAL PLANTS PLUG GROWING CHART

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Crop	STAGE 1*					STAGE 2**					STAGE 3***					STAGE 4****					Total Plug Crop Time (weeks) ⁵	Cultural Comments
	Cover ¹	Soil Temp.	Moisture	Light ²	Days	Soil Temp.	Moisture	Supp. Light ³	Fertilizer (ppm) ⁴	Soil EC ⁵	Days	Soil Temp.	Supp. Light ³	Fertilizer (ppm) ⁴	Soil EC ⁵	Days	Soil Temp.	Fertilizer (ppm)	Soil EC ⁵	Days		
Abutilon	Yes	72-75°F (22-24°C)	Wet		3	65-72°F (18-22°C)	Medium		50-75 1/wk < 0.75	5-7	65-70°F (18-21°C)		75-100 1/wk <0.75	14-21	62-65°F (17-18°C)	100-150 1/wk <0.75	7				4-5	Keep the media wet until radicle emergence, then reduce the moisture level. Do not let the seedling wilt.
Ageratum	No	75-78°F (24-25°C)	Medium		2-3	72-75°F (22-24°C)	Medium		50-75 1/wk < 0.75	5-7	65-68°F (18-20°C)		100-150 1/wk < 1.0	21	60-62°F (15-17°C)	100-150 1/wk <0.75	7				5-6	Sensitive to high sodium levels and high salts. Control growth with DIF, B-Nine, A-Rest, Bonzi or Sumagic.
Alternanthera <i>(Alternanthera dentata)</i>	Yes Lightly	72-76°F (22-24°C)	Wet	Beneficial	5	65-72°F (18-22°C)	Medium	Yes	50-75 1/wk < 0.75	5-7	65-70°F (18-21°C)		75-100 1/wk < 1.0	20-20	62-65°F (17-18°C)	100-150 1/wk <0.75	1.0				4-5	Cyocel may cause phytotoxicity. A light covering with coarse vermiculite is helpful for moisture control, but light is beneficial for uniform germination.
Alyssum <i>(Lobularia maritima)</i>	No	70-72°F (21-22°C)	Medium		2-3	65-75°F (18-24°C)	Medium		50-75 1/wk < 0.75	5-7	65-75°F (18-24°C)		100-150 1/wk < 1.0	21	60-62°F (15-17°C)	100-150 1/wk < 0.75	7				5-6	Susceptible to damping-off. Control with less seeds per cell, moisture and fungicides. Control growth with DIF or B-Nine. High light (>2,500 f.c.) and low feed will cause yellowing of lower leaves and downy mildew. If using multi-seed pellets, do not cover and mist/water thoroughly after sowing to assure the pellet dissolves.
Angelonia	No	72-76°F (22-25°C)	Medium	Yes	4-5	68-72°F (20-22°C)	Dry	Yes	50-75 1/wk < 0.75	7-10	65-70°F (18-21°C)		100-150 1/wk < 1.0	14-21	64-68°F (18-20°C)	100-150 1/wk < 1.0	7				5-6	Do not let the seedlings wilt or they may not recover. If necessary, B-Nine can be used to control stretch.
Asparagus <i>(Asparagus densiflorus Sprengeri group)</i>	Yes	72-78°F (22-25°C)	Wet		14-21	72-78°F (22-25°C)	Wet		50-75 1-2/wk < 0.75	21	70-74°F (21-23°C)		100-150 1-2/wk < 1.0	21-28	65-70°F (18-21°C)	100-150 1-2/wk < 1.0	7				10-12	Keep temperature warm and media moist throughout Stages 1 and 2 for best germination. Can pinch plants after Stage 2, but add 2 weeks to crop time. Feed with more 15-0-15 or other calcium fertilizers. Control growth with high light, cool temperature, feed and moisture.
Aster <i>(Callistephus chinensis)</i>	Yes	68-70°F (20-21°C)	Dry		4-5	68-70°F (20-21°C)	Dry		50-75 1/wk < 0.75	7	65-68°F (18-20°C)		100-150 1/wk < 1.0	14	60-62°F (15-17°C)	100-150 1/wk < 0.75	5-7				4-5	To prevent premature flowering, minimize stress due to high light, and low moisture and fertilizer. Do not hold plugs. Keep plants vegetative with night interruption (from incandescent lights) of 50 f.c. for 4 hours in the middle of the night.
Bacopa	No	68-74°F (20-23°C)	Wet	Yes	4-6	65-75°F (18-24°C)	Medium		50-75 1/wk < 0.75	5-7	60-65°F (15-18°C)		100-175 1/wk < 1.0	10-14	55-60°F (13-15°C)	100-175 1/wk < 1.0	7				3-4	If using multi-seed pellets, do not cover and mist/water thoroughly after sowing to assure the pellet dissolves. B-Nine can be used to tone the plugs.
Begonia, Fibrous	No	75-78°F (24-25°C)	Wet	Yes	6-7	72-78°F (22-25°C)	Wet	Yes	50-75 2/wk < 0.75	7-14	68-72°F (20-22°C)		100-150 2/wk < 1.5	21-28	62-68°F (17-20°C)	100-150 1/wk < 1.0	7				7-8	Uniform moisture is critical for good germination and early growth. Stage 2 seedlings will stall if fertility too low or too high, ammonium >10 ppm, or soil too dry. Watch for burn or stunting due to high light (> 2,500 f.c.).
Begonia, Tuberous	No	72-75°F (22-24°C)	Wet	Yes	7-10	70-72°F (21-22°C)	Wet	Yes	50-75 2/wk < 0.75	7-14	68°F (20°C)		100-150 2/wk < 1.5	28-35	60-62°F (15-17°C)	100-150 1/wk < 1.0	7				8-9	Culture same as fibrous begonias, except keep Stages 1 and 2 soil temperatures lower. Use night interruption of 50 f.c. for 4 hours in the middle of the night to prevent tuber formation until daylength equals 12 hours (approximately mid-March to April 1).
Browallia	No	75-78°F (24-25°C)	Medium		4-5	72-75°F (22-24°C)	Medium		50-75 1/wk < 0.75	14	68-72°F (20-22°C)		100-150 2/wk < 1.0	21	62-68°F (17-20°C)	100-150 1/wk < 0.75	7				6-7	Needs warm temperature to grow. Avoid wilting or burning seedlings by keeping moderate moisture, low light (<2,500 f.c.) and rinsing fertilizer off leaves.
Cabbage/Kale, Flowering <i>(Brassica oleracea)</i>	Yes	65-70°F (18-21°C)	Medium		3-4	62-65°F (17-18°C)	Dry		50-75 1/wk < 0.75	4-7	62-65°F (17-18°C)		100-150 1/wk < 0.75	10-14	60-62°F (15-17°C)	100-150 1/wk < 0.75	7				4-5	Control early stretch with lower starter charge, moisture, fertilizer low in P and ammonia form of nitrogen, and DIF. Use B-Nine or Bonzi if needed. Avoid lower yellow leaves and mildew by keeping seedlings fed.
Calceolaria	No	70-75°F (21-24°C)	Medium	Yes	5-7	70-75°F (21-24°C)	Medium		50-75 1/wk < 0.75	5-7	65-70°F (18-21°C)		100-150 1/wk < 1.0	14	60-62°F (15-17°C)	100-150 1/wk < 0.75	7				5-6	Keep soil temperature above 70°F (21°C) and maintain uniform moisture for best germination. Avoid overwatering during Stages 3 and 4 to promote root growth and avoid disease. Watch for burn on leaves due to high light levels. Control growth with DIF, moisture and Cyocel.
Campanula <i>(Campanula carpatica)</i>	No	68-72°F (20-22°C)	Medium	Yes	7-10	68-72°F (20-22°C)	Medium	Yes	50-75 1/wk < 0.75	7-10	65-68°F (18-20°C)		100-150 1/wk < 1.0	28-35	60-62°F (15-17°C)	100-150 1/wk < 0.75	7				8-9	Keep daylength <14 hours to avoid premature flowering. Control growth with low temperature, moisture, fertilizer low in P and ammonia form of nitrogen, DIF or Cyocel.
Carnation <i>(Dianthus caryophyllus)</i>	Yes	65-70°F (18-21°C)	Medium		5-7	65-70°F (18-21°C)	Medium		50-75 1/wk < 0.75	7-10	62-65°F (17-18°C)		100-150 1-2/wk < 1.0	14-21	60-62°F (15-17°C)	100-150 1/wk < 0.75	7				5-6	Best growth with cool temperature, low feed (<0.75 EC), low ammonium (<10 ppm) and high light (up to 3,000 f.c.). Control growth with moisture, and fertilizer low in P and ammonia form of nitrogen.
Celosia	No	75-78°F (24-25°C)	Medium		4-5	72-75°F (22-24°C)	Medium		50-75 1/wk < 0.75	7	65-68°F (18-20°C)		100-150 1-2/wk < 1.0	14-21	60-62°F (15-17°C)	100-150 1/wk < 0.75	7				5-6	To prevent premature flowering, minimize stress due to high light, and low moisture and fertilizer. Control height with DIF, Bonzi or Sumagic. Do not hold plugs. Reduce crop time if needed to keep vegetative. Control damping-off with no cover, moisture and a preventative fungicide.
Gineraria, Florist <i>(Gineraria X hybrida)</i>	No	70-75°F (21-24°C)	Medium	Yes	5-7	68-70°F (20-21°C)	Medium		50-75 1/wk < 0.75	5-7	65-70°F (18-21°C)		100-150 1/wk < 1.0	14	60-62°F (15-17°C)	100-150 1/wk < 0.75	7				5-6	Avoid overwatering during Stages 3 and 4 to promote root growth and avoid disease. Watch for burn on leaves due to high light levels. Control growth with DIF, moisture, fertilizer low in P and ammonia form of nitrogen, and B-Nine. Long days of 18 hours with HID lights will speed up flowering time.
Clarkia <i>(Clarkia amena, Godetia amena)</i>	Optional	68-72°F (20-22°C)	Medium		8-10	65-68°F (18-20°C)	Dry	Yes	None < 0.75	5-7	62-65°F (17-18°C)		100-150 1/wk < 0.75	10-14	60-62°F (15-17°C)	100-150 1/wk < 0.5	3-5				4-5	Control early stretch with DIF, cool temperature, low moisture, fertilizer low in P and ammonia form of nitrogen, low starter charge, high light or B-Nine. Do not hold plugs. Best growth if grown cool with low feeding and transplanted on time.
Coleus	No	72-75°F (22-24°C)	Medium		4-5	72-75°F (22-24°C)	Medium	Yes	50-75 1/wk < 0.75	10	65-68°F (18-20°C)		100-150 1-2/wk < 1.0	14-21	60-62°F (15-17°C)	100-150 1/wk < 0.75	7				5-6	Slow-growing varieties may need more frequent 20-10-20 feeding. Control growth with DIF, low moisture, high light, A-Rest or Bonzi. Sensitive to high salts (> 0.75 EC) in irrigation water.
Cosmos	Yes	65-70°F (18-21°C)	Dry		3-4	62-65°F (17-18°C)	Dry		50-75 1/wk < 0.75	4-7	62-65°F (17-18°C)		100-150 1/wk < 1.0	10-14	60-62°F (15-17°C)	100-150 1/wk < 0.75	7				4-5	Control early stretch with lower temperature, moisture, fertilizer low in P and ammonia form of nitrogen, and low starter charge.
Cyclamen	Yes	65-68°F (18-20°C)	Wet	No	21-28	70°F (21°C)	Medium		50-75 1/wk < 0.75	7-14	68-72°F (20-22°C)		100-150 1/wk < 1.0	21-28	65-68°F (18-20°C)	100-150 1/wk < 0.75	7				9-10	Best germination if cool, wet and dark. Keep media pH 6.0 to 6.2. Control diseases with moisture and fungicides. Keep light levels <3,000 f.c. during warm weather. Feed with low ammonium fertilizers. Control moisture during Stages 3 and 4 for best roots.
Dahlia	Yes	68-70°F (20-21°C)	Dry		3-4	68-70°F (20-21°C)	Dry		50-75 1/wk < 0.75	5-7	65-68°F (18-20°C)		100-150 1/wk < 1.0	12-14	60-62°F (15-17°C)	100-150 1/wk < 0.75	7				4-5	Best germination if cool and dry with covering. Control growth with DIF, B-Nine, A-Rest or Bonzi.
Dianthus <i>(Dianthus chinensis, D. hybrida, D. barbatus)</i>	Optional	70-75°F (21-24°C)	Medium		3-5	70-75°F (21-24°C)	Medium	Yes	50-75 1/wk < 0.75	7	65-70°F (18-21°C)		100-150 1/wk < 1.0	14-21	60-62°F (15-17°C)	100-150 1/wk < 0.75	7				5-6	Very sensitive to high salts during Stages 1 and 2. To promote early flowering, increase total light energy to the crop. Control growth with DIF, A-Rest, Bonzi, Cyocel or Sumagic.
Diastasia	Yes	65-70°F (18-21°C)	Wet		4-6	65-72°F (18-22°C)	Medium		50-75 1/wk < 0.75	5-7	65-70°F (18-21°C)		100-150 1/wk < 1.0	10-14	62-65°F (17-18°C)	100-175 1/wk < 0.75	7				4-5	Plug tray sizes 406 to 288 are recommended. B-Nine at 2,500 ppm can be used at Stage 3 if needed.
Dichondra <i>(Dichondra argentea)</i>	Yes	72-76°F (22-25°C)	Medium		4-6	65-72°F (18-22°C)	Low	Yes	50-75 1/wk < 0.75	7-10	65-70°F (18-21°C)		100-150 1/wk < 0.75	14-21	62-65°F (17-18°C)	100-175 1/wk < 0.75	7				5-6	Plug development is faster with drier culture, but do not let seedlings wilt. B-Nine at 2,500 ppm a week before transplant promotes branching.
Dracaena Spikes <i>(Cordyline indivisa)</i>	Yes	72-78°F (22-26°C)	Wet		28	72-78°F (22-26°C)	Wet		50-75 1/wk < 0.75	28	70-74°F (21-23°C)		100-150 1-2/wk < 1.0	35-49	65-70°F (18-21°C)	100-150 1-2/wk < 0.75	7				14-16	Keep temperature warm and media moist throughout Stages 1 and 2 for best germination. Crop time will be longer if transplanting into larger-cell plug tray. Avoid excessive drying as leaf tips will burn. Can use A-Rest to control height and fatten leaf blades.
Dusty Miller <i>(Senecio cineraria)</i>	No	72-75°F (22-24°C)	Medium		3-6	70-75°F (21-24°C)	Medium		50-75 1/wk < 0.75	7-14	65-70°F (18-21°C)		100-150 1/wk < 1.0	14-21	60-62°F (15-17°C)	100-150 1/wk < 0.75	7				6-7	Keep foliage dry and avoid watering late in day to reduce disease. Use Zyban, Daconil or Chipco 26019 to control Alternaria. Control growth with DIF, B-Nine or Bonzi. Increase dusty leaves with nitrate feed, low moisture and high light.
Eustoma <i>(Lisianthus)</i>	No	72-75°F (22-24°C)	Medium	Yes	10-12	68-72°F (20-21°C)	Medium	Yes	50-75 1/wk < 0.75	14-21	65-68°F (18-20°C)		100-150 2/wk < 1.2	29-35	62-65°F (17-18°C)	100-150 2/wk < 1.0	7				9-11	Keep temperature below 78°F (25°C), but above 60°F (15°C) to avoid rosetting. Provide long days to improve flowering. Keep soil pH >6.0. Reduce moisture after cotyledon expansion to control algae. Do not hold plugs until rootbound. Germinate on bench to provide 200 f.c. of light for best germination.
Gazania	Yes	68-70°F (20-21°C)	Dry		5-7	68-70°F (20-22°C)	Dry		50-75 1/wk < 0.75	7	65-68°F (18-20°C)		100-150 1/wk < 1.0	17-21	60-62°F (15-17°C)	100-150 1/wk < 0.75	7				5-6	Best germination if cool and dry with covering. Avoid overwatering in Stages 3 and 4. Control growth with DIF, moisture, fertilizer and high light.
Geranium <i>(Pelargonium X hortorum, P. peltatum)</i>	Yes	70-75°F (21-24°C)	Medium		3-5	70-75°F (21-24°C)	Medium	Yes	50-75 1/wk < 0.75	5-10	65-70°F (18-21°C)		100-150 2/wk < 1.2	14-21	62-65°F (17-18°C)	100-150 2/wk < 1.0	7				5-6	Keep germination temperature under 75°F (24°C). Soil pH needs to be above 6.0 to avoid micronutrient toxicities. Control growth with DIF, Cyocel, Bonzi or A-Rest, but keep feed and light levels high. Control Pythium with Subdue, and Botrytis with moisture, air movement and Daconil.
Gerbera	Optional	70-75°F (21-24°C)	Medium	Yes	7	70-75°F (21-24°C)	Medium	Yes	50-75 1-2/wk < 0.75	7-10	65-70°F (18-21°C)		100-150 2/wk < 1.2	14-21	62-65°F (17-18°C)	100-150 1-2/wk < 1.0	7				5-6	Best germination with constant temperature and medium to dry moisture, with coarse vermiculite covering. Keep plants fed. HID lights needed for best growth and flowering. Watch for whiteflies on older plugs.
Gomphrena	Yes	72-75°F (22-24°C)	Medium		5-7	68-72°F (20-22°C)	Dry		None < 0.75	5-7	65-68°F (18-20°C)		100-150 1/wk < 0.75	14-21	62-65°F (17-18°C)	100-150 1/wk < 0.50	7				5-6	Avoid overwatering for best germination, root growth and control of disease. Control growth with DIF, moisture, fertilizer low in P and ammonia form of nitrogen, low starter charge and high light. Low temperature may slow growth too much. Very sensitive to most pesticides – use caution when spraying.
Helenium <i>(Helenium amarum)</i>	Yes	65-75°F (18-22°C)	Wet		3-5	68-72°F (20-22°C)	Medium		50-75 1/wk < 0.75	7-10	68-72°F (20-22°C)		100-150 1/wk < 1.0	10-14	62-65°F (17-18°C)	100-175 1/wk 1.0-1.5	7				3-4	Plug tray sizes 288 to 128 are recommended.
Hibiscus <i>(Hibiscus moscheutos)</i>	Yes	68-75°F (20-25°C)	Medium		3-5	68-70°F (20-21°C)	Medium		50-75 1/wk < 0.75	7-10	68-70°F (20-21°C)		100-150 1/wk < 1.0	10-14	68-70°F (20-21°C)	100-175 1/wk < 1.0	7				5-7	Plug tray sizes of at least 200 are recommended. Cyocel spray at 300 ppm 10 days after sowing if needed. Supplemental lighting will reduce crop time.
Hypoestes	Yes Lightly	70-75°F (21-24°C)	Medium		3-4	70-75°F (21-24°C)	Medium	Yes	50-75 1/wk < 0.75	7	65-68°F (18-20°C)		100-150 1/wk < 1.0	14-21	62-65°F (17-18°C)	100-150 1/wk < 0.75	7				5-6	Provide long days with HID lights for best growth. New varieties are genetically more compact. Use Cyocel or DIF to control growth. Under low light, use low ammonium fertilizer for best color.
Impatiens <i>(Impatiens walleriana)</i>	No	72-77°F (22-25°C)	Wet	Yes	3-5	70-72°F (21-22°C)	Medium	Yes	50-75 1/wk < 0.75	10	68-72°F (20-22°C)		100-150 1/wk < 1.0	14-21	62-65°F (17-18°C)	100-150 1/wk < 0.75	7				5-6	Keep temperature below 77°F (25°C) for best germination. Soil pH needs to be 6.0 to 6.2 to avoid micronutrient toxicities. Control growth with DIF, high light, low moisture and nitrate fertilizer. Use Bonzi or Sumagic if needed.
Impatiens, New Guinea <i>(Impatiens hawkeri)</i>	Yes Lightly	77-80°F (25-26°C)	Wet																			