

Grower Facts	Class	Series/Variety	Exposure	Seeds per oz.(g)	Seed form	Recommended plug size**	Cover seed	Germination temperature	Days to germinate	Plug crop weeks	Planting density	Growing on temperature day	Growing on temperature night	Weeks from plug to finish	Key tips	Stem length	Other recommendations
	AGERATUM <i>A. houstonianum</i>	Everest Blue	☀	14,175-17,000 S/oz. (500-600 S/g)	PEL	406-cell or larger	No	68-72°F (20-21°C)	3-4	4-5	3 plants/ft. ² (32 plants/m ²) in Summer & 2 plants/ft. ² (24 plants/m ²) in Autumn for Pinched crop. For Non-Pinched crop can use 6 plants/ft. ² (64 plants/m ²)	65-75°F (18-24°C)	55-60°F (13-16°C)	12-15	Greenhouse cut flower. Low temperatures (46-54°F/ 8-12°C) promote optimum stem length.	26 in. (65 cm)	After harvest, the cut stems should remain in water for at least 1 night in water before transport or sale. The flowers will open better if handled this way.
Online*	ANEMONE <i>A. coronaria</i>	Mona Lisa® Series	☀	52,500 S/oz. (1,850 S/g)	SED	406-cell or larger	Yes	60-65°F (16-18°C)	10-14	8	2-4 plants/ft. ² (22 to 44 plants/m ²)	60-65°F (16-18°C)	55°F (13°C)	12	Greenhouse cut flower. Low temperatures (46-54°F/ 8-12°C) promote optimum stem length.	18 in. (45 cm)	Ideally suited for young plant production from a March to June sowing in Northern Hemisphere for October through April season; a September to December sowing in Southern Hemisphere for April through October season.
	ASTER <i>Callistephus chinensis</i>	Meteor Series	☀	12,000 S/oz. (420 S/g)	SED	200-cell	Yes	70°F (21°C)	4-8	4-5	7 plants/ft. ² (78 plants/m ²)	60-75°F (16-24°C)	50-60°F (10-16°C)	13-16	Greenhouse, shade house or field. Soils must be free of pathogens. Provide 1 layer of netting. Fertilize with alternate applications of calcium nitrate and potassium nitrate to supply 125 to 150 ppm N. Decrease nitrogen and increase potassium-containing fertilizers when flower buds appear.	30-40 in. (80-100 cm)	Crop timing is affected by the ratio of long days (LD) to short days (SD). Under SD conditions, increasing LD treatments will increase stem length and shorten time to harvest. LD consists of 16 hours of light. Cyclic lighting of 7.5 min. per half-hour.
Pg 95	CAMPANULA <i>C. medium</i>	Campana Series	☀	102,000-136,000 S/oz. (3,600-4,800 S/g) Raw; 105,000-122,000 S/oz. (3,700-4,300 S/g) PEL	SED, PEL	288-cell or larger	No	68-72°F (20-22°C)	4-5	7-8	6-8 plants/ft. ² (64-80 plants/m ²)	60-70°F (16-21°C)	54-59°F (12-15°C)	10-14	This greenhouse cut-flower campanula is a qualitative long day plant. To ensure sufficient vegetative growth and stem length, it is recommended to provide 6 weeks of short day conditions (11 hours) from approximately 2 weeks after sowing. When producing for Winter flowering, providing long days at 6 weeks after transplanting is required. "Mum lighting" from 10 PM to 2 AM can be used.	30-34 in. (75-85 cm)	Maintain a medium moisture level. In order to reach sufficient stem length, Campanula medium needs adequate moisture and fertilization. Dry growing conditions will cause early flowering and reduced stem length. However, do not over water as this will cause weaker stems and weaker root systems which will lead to plants falling over.
Pg 88	CELOSIA <i>C. cristata</i>	Bombay Series	☀	21,300-28,350 S/oz. (750-1,000 S/g) Raw; 5,670-7,080 S/oz. (200-250 S/g) PEL; 20,000-27,000 S/oz. (700-950 S/g) FCS	SED, PEL, FCS	288-cell or larger	Cover lightly	68-72°F (20-22°C)	3-4	2-3	6-8 plants/ft. ² (64-80 plants/m ²)	Before flower development: 65-75°F (18-24°C) After flower development: 60-61°F (16°C)	Before flower development: 63-65°F (17-18°C) After flower development: 59°F (15°C)	10-14	This greenhouse cut-flower celosia is a quantitative short day plant. Flowers will initiate under short days. The optimum daylength for Bombay to reach the appropriate stem length lies between 12 to 13 hours.	28-40 in. (70-100 cm)	Celosia makes a taproot and is sensitive for root damage, which will result in early bud formation, deformed flowers and less uniformity. Therefore, planting should be done before the plugs get rootbound. It is important to maintain a constantly moist media, especially for the first 2 weeks after transplanting to prevent premature flowering.
	CELOSIA <i>C. cristata</i> A Kieft Seed product	Celway Series	☀	2,547-3,538 S/oz. (90-125 S/g) PEL; 24,055-35,375 S/oz. (850-1,250 S/g) FCS	PEL, FCS	288-cell or larger	Cover lightly	68-72°F (20-22°C)	3-4	2-3	6-8 plants/ft. ² (64-80 plants/m ²)	Before flower development: 65-75°F (18-24°C) After flower development: 60-61°F (16°C)	Before flower development: 63-65°F (17-18°C) After flower development: 59°F (15°C)	10-14	This greenhouse cut-flower celosia is a quantitative short day plant. Flowers will initiate under short days. The optimum daylength for Celway to reach the appropriate stem length lies between 12 to 13 hours.	40-48 in. (100-120 cm)	Celosia makes a taproot and is sensitive for root damage, which will result in early bud formation, deformed flowers and less uniformity. Therefore, planting should be done before the plugs get rootbound. It is important to maintain a constantly moist media, especially for the first 2 weeks after transplanting to prevent premature flowering.
Pg 90	CELOSIA <i>C. plumosa</i>	Sunday Series	☀	42,525-68,040 S/oz. (1,500-2,400 S/g) Raw; 44,000-60,000 S/oz. (1,550-2,100 S/g) FCS	SED, FCS	288-cell or larger	Cover lightly	68-72°F (20-22°C)	3-4	2-3	6-8 plants/ft. ² (64-80 plants/m ²)	Before flower development: 65-75°F (18-24°C) After flower development: 60-61°F (16°C)	Before flower development: 63-65°F (17-18°C) After flower development: 59°F (15°C)	12-16	This greenhouse cut-flower celosia is a quantitative short day plant. Flowers will initiate under short days. The optimum daylength for Sunday to reach the appropriate stem length lies between 12 to 13 hours.	28-40 in. (70-100 cm)	Celosia makes a taproot and is sensitive for root damage, which will result in early bud formation, deformed flowers and less uniformity. Therefore, planting should be done before the plugs get rootbound. It is important to maintain a constantly moist media, especially for the first 2 weeks after transplanting to prevent premature flowering.
Online*	DELPHINIUM <i>D. elatum</i> A Kieft Seed product	Guardian F1 Series	☀	9,285 S/oz. (325 S/g)	SED	200-cell	Yes	65-70°F (18-21°C)	5-6	5-6	2-4 plants/ft. ² (22-44 plants/m ²)	60-70°F (16-21°C)	50-60°F (10-16°C)	11-16 (see Key tips)	Autumn: greenhouse 13 weeks, field 16 weeks. Spring: greenhouse 11 weeks, field 13 weeks. Treat cut stems with an ethylene-inhibiting agent.	30-39 in. (75-100 cm)	In temperate areas, such as coastal California, plugs are generally transplanted into the field August through October, and February to early May. Autumn transplants will flower the following Spring (February onward); Spring transplants flower late Spring.
Online*	DIANTHUS <i>D. barbatus interspecific</i>	Amazon F1 Series	☀	12,760-14,175 S/oz. (450-500 S/g)	PEL	406-cell	Yes	64-68°F (18-20°C)	3-5	4-5	3-4 plants/ft. ² (30-40 plants/m ²); 1.5 plants/ft. ² (15 plants/m ²) if pinched	60-72°F (16-22°C)	50-60°F (10-16°C)	11-23 (see Key tips)	Late Spring/Summer greenhouse/field: 11-14 weeks. Late Summer/Winter greenhouse: 12-18 weeks. Field: 18-23 weeks	18-36 in. (45-90 cm)	A small percentage of early off-types can be observed at 4-5 weeks from sowing. They should be removed. Can tolerate night temperatures as low as 45°F (7°C). Plants are frost-tolerant although frost will damage the flowers.
Online*	DIANTHUS <i>D. barbatus interspecific</i>	Bouquet F1 Series	☀	8,575 S/oz. (300 S/g)	PEL	406-cell	Yes	64-68°F (18-20°C)	3-5	4-5	3-4 plants/ft. ² (30-40 plants/m ²)	60-72°F (16-22°C)	50-60°F (10-16°C)	11-23 (see Key tips)	Late Spring/Summer greenhouse/field: 11-14 weeks. Late Summer/Winter greenhouse: 12-18 weeks. Field: 18-23 weeks	18-24 in. (45-60 cm)	Hardy perennial.

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Online*	DIANTHUS <i>D. barbatus</i>	Sweet F1 Series	☀️	7,300-9,600 pellets/oz. (260-340 pellets/g)	PEL	406-cell	Yes	64-68°F (18-20°C)	3-5	4-5	4-6 plants/ft. ² (42-64 plants/m ²)	60-72°F (16-22°C)	50-60°F (10-16°C)	10 (Summer/Autumn), 11-15 (Winter/Spring)	Late Spring/Summer greenhouse/field: 8-9 weeks. Later Summer/Winter greenhouse: 9-13 weeks. Field: 15-18 weeks. Greenhouse or full sun. No vernalization required for flower induction.	18-36 in. (45-90 cm)	Taller growth achievable from early Autumn-transplanted, greenhouse-grown plants.
Pg 101	GOMPHRENA <i>G. sp.</i>	Fireworks	☀️	14,175 S/oz. (500 S/g)	COT	406-cell or larger	Yes	68-75°F (20-24°C)	2-3	5-6	.75 plants/ft. ² (8 plants/m ²)	65-75°F (18-24°C)	63-66°F (18-25°C)	8-9		18 in. (45 cm)	
	GOMPHRENA <i>G. haageana</i>	QIS Series	☀️	5,700-8,500 S/oz. (200-300 S/g)	SED	406-cell or larger	Yes	68-75°F (20-24°C)	2-3	5-6	1.5 plants/ft. ² (16 plants/m ²)	65-75°F (18-24°C)	63-66°F (18-25°C)	10-12		24-26 in. (60-70 cm)	To increase productivity, the first blooms of the plants should be removed.
	A Kieft Seed product																
	HELIANTHUS <i>H. annuus</i> (Sunflower)	Jua Series	☀️	483-567 S/oz. (17-20 S/g)	SED	Direct sow recommended; 200-cell	Yes	68-75°F (20-24°C)	2-3 days if sown in plugs and 3-5 days when direct sown in field	2-2.5	6-9 days after seedlings emerge, thin to 4-5 plants/ft. ² (42-52 plants/m ²)	65-85°F (18-29°C)	50-65°F (10-18°C)	8.5-10.5 depending on culture conditions	Suitable for short and long day conditions, bred for best quality flowers under long day conditions.	36-60 in. (90-150 cm) depending on culture conditions	
	HELIANTHUS <i>H. annuus</i> (Sunflower)	Prado Series	☀️	1,135 S/oz. (40 S/g)	SED	Direct sow recommended; 200-cell	Yes	68-75°F (20-24°C)	3-5	2-3	.75 plants/ft. ² (8 plants/m ²)	65-85°F (18-29°C)	50-65°F (10-18°C)	10-12 (from sowing)	At high elevations (5,000 ft+/1,500 m+) and high light levels, Prado Red may produce almost-black ray petals. Very low humidity or very high light levels can reduce stem length.	48-66 in. (1.2-1.7 m)	Approximately 7-10 flower stems per plant may be harvested when the main stem is pinched at the fifth set of true leaves. Harvest approximately 10-12 weeks from sow.
	LIMONIUM (STATICE), ANNUAL <i>Limonium sinuatum</i>	QIS Series	☀️	9,900-14,175 S/oz. (350-500 S/g)	SED	200-cell or larger	Yes	70°F (21°C)	3-8	4-5	1-2 plants/ft. ² (10-20 plants/m ²)	55-60°F (13-16°C)	50-55°F (10-13°C)	18-22 (12-13 with vernalization)	Plants flower more rapidly and uniformly if subjected to a cold treatment of 50-55°F (10-13°C) for 3-5 weeks following germination.	30-35 in. (75-90 cm)	Popular series for both fresh and preserved cut flower production. Stiff stems do not require netting.
	A Kieft Seed product																
Online* Flare, pg 107	LISIANTHUS, CUT FLOWER <i>Eustoma grandiflorum</i>	Flare F1 Series (Spray Type Double Flowering), ABC F1 Series (Double Flowering), Laguna F1 Series (Single Flowering)	☀️	28,000 S/oz. (1,000 S/g)	SED	392, 406 or similar cell size plug	No	68-72°F (20-22°C)	8-12	8-10	Summer: 8 plants/ft. ² (84 plants/m ²) Winter: 6 plants/ft. ² (64 plants/m ²)	68-75°F (20-24°C)	60-65°F (16-18°C)	14-18 Winter, 12-14 Spring/ Autumn, 10-12 Summer	Full-sun plantings of cut flower Lisianthus produce shorter stems than greenhouse-grown Lisianthus.	29-45 in. (75-115 cm)	Flare is a series of F1 spray-type double flowering Lisianthus. They have a top-flowering habit producing more flowers on top of each stem within a short flowering window giving a bouquet effect. Flare series is Speed Group 2 (Mid/medium speed) for flowering speed.
Online*	MATRICARIA <i>Tanacetum parthenium</i>	Vegmo Series	☀️	18,650 S/oz. (650 S/g)	PEL	200-cell	No	70-72°F (21-22°C)	4-6	4-5	Summer: 8 plants/ft. ² (80 plants/m ²) Winter: 7 plants/ft. ² (70 plants/m ²)	Winter: 55-58°F (13-14°C) Summer: 72-74°F (22-24°C)	Winter: 55-58°F (13-14°C) Summer: 60-65°F (16-18°C)	14-16 Winter, 10-14 Spring/ Autumn, 7-10 Summer	16 hours of lighting is required for flowering; supplemental lighting may be solid or cyclic. Matricaria are not sensitive to ethylene.	28-36 in. (70-90 cm)	
Online*	MATTHIOLA (STOCK), EXTRA EARLY FLOWERING <i>M. incana</i>	Katz Series	☀️	15,300-18,100 S/oz. (540-640 S/g)	SED	406-cell	Yes	68-72°F (20-22°C)	3-4	4	12 plants/ft. ² (126 plants/m ²)	60-75°F (16-24°C)	45-55°F (7-13°C)	8-13	Crop time is dependent on daylength and light intensity. As a general guide with daylength of 13 hours or more, the crop time will be 8 weeks from planting. Shorter days will slow the crop time, depending on the temperature, up to 13 weeks from planting.	32 in. (80 cm)	Best performance when grown in tunnels.
	MATTHIOLA (STOCK), FIELD CUT <i>M. incana</i>	Column Stocks	☀️	15,600-20,000 S/oz. (550-700 S/g)	SED	Direct sow to field	Yes	65-70°F (18-21°C)	14-21	N/A	2.2 lbs./acre (1kg/4,000m ²)	55-65°F (13-18°C)	55-60°F (13-16°C)	20-22 (from sowing)	Column stocks are non-selectable for doubleness. Supply one layer of support netting. Direct sow seed.	24-30 in. (60-75 cm)	Optimum stem length will be achieved during cool growing periods. High heat can stunt plants or prevent flower spikes from developing.
	MATTHIOLA (STOCK), GREENHOUSE-GROWN SELECTABLE <i>M. incana</i>	Aida, Carmen, Figaro, Opera (Vegmo) Series	☀️	15,600-20,000 S/oz. (550-700 S/g)	SED	200-cell	Yes	59°F (15°C)	5	5-6	6 plants/ft. ² (64 plants/m ²)	50-62°F (10-16°C)	50-62°F (10-16°C)	11-12 Winter, 8-9 Spring, 3-5 Summer, 4-7 Autumn	Double-flowering Matthiola may be selected from single-flowering types by exposing seedlings with fully expanded cotyledons to 41°F (5°C) for approximately 3-5 days. At this point, seedlings of double-flowering plants will appear a pale green, while singles remain dark green.	32 in. (80 cm)	After removal from cold treatment, double-flowering seedlings will appear yellow and chlorotic within 1-2 days, while single-flowering seedlings remain robust and green. This cold treatment may only be done once to selectable Matthiola plugs.
	SNAPDRAGON, FORCING F1 <i>Antirrhinum majus</i>	Apollo Series	☀️	180,000 S/oz. (6,350 S/g)	SED	512-cell or larger	Cover lightly	65-68°F (18-20°C)	4-5	4-5	6-10 plants/ft. ² (64-106 plants/m ²); high-density planting under high-light or field situation.	60-75°F (16-24°C)	52-57°F (11-14°C)	8-18		39-60 in. (1-1.5 m)	Group 2,3: Open-faced series ideal for Autumn and Spring harvests. Refer to the Snapdragon Culture Guide for detailed information.
	SNAPDRAGON, FORCING F1 <i>Antirrhinum majus</i>	Cool Series	☀️	180,000 S/oz. (6,350 S/g)	SED	512-cell or larger	Cover lightly	65-68°F (18-20°C)	4-5	4-5	6-10 plants/ft. ² (64-106 plants/m ²); high-density planting under high-light or field situation.	55-70°F (13-21°C)	45-55°F (7-13°C)	8-18		39-60 in. (1-1.5 m)	Group 1 to early Group 2: Highly uniform series for germination, plug growth, spike architecture and flowering date.

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SNAPDRAGON, FORCING F1 <i>Antirrhinum majus</i>		Maryland Series		180,000 S/oz. (6,350 S/g)	SED	512-cell or larger	Cover lightly	65-68°F (18-20°C)	4-5	4-5	6-10 plants/ft. ² (64-106 plants/m ²); high-density planting under high-light or field situation.	55-70°F (13-21°C)	45-55°F (7-13°C)	8-18	Dark Orange germinates best with light.	39-60 in. (1-1.5 m)	Group 1,2
SNAPDRAGON, FORCING F1 <i>Antirrhinum majus</i>		Monaco Series, Paxia Series		180,000 S/oz. (6,350 S/g)	SED	512-cell or larger	Cover lightly	65-68°F (18-20°C)	4-5	4-5	6-10 plants/ft. ² (64-106 plants/m ²); high-density planting under high-light or field situation.	60-75°F (16-24°C)	52-57°F (11-14°C)	8-18		39-60 in. (1-1.5 m)	Group 2,3: Well suited to difficult transition periods, such as Group 3,4 (Summer) to Group 1,2 (Autumn/Winter). Tolerates warm Autumn conditions, perfect for Winter production in warmer climates, performs well all year in moderate temperatures.
SNAPDRAGON, FORCING F1 <i>Antirrhinum majus</i>		Early Potomac, Potomac Series, Axiom Series		180,000 S/oz. (6,350 S/g)	SED	512-cell or larger	Cover lightly	65-68°F (18-20°C)	4-5	4-5	6-10 plants/ft. ² (64-106 plants/m ²); high-density planting under high-light or field situation.	70-85°F (21-30°C)	Potomac: 60°F (16°C), Early Potomac: 55-60°F (13-16°C)	8-18	Appleblossom and Dark Orange germinate best with light.	39-60 in. (1-1.5 m)	Group 3,4: Ideal for production during periods of high light, long days and warm temperatures. Can be grown year-round with supplemental high-intensity lighting.
SNAPDRAGON, FORCING F1 <i>Antirrhinum majus</i>		Purple Twist		180,000 S/oz. (6,350 S/g)	SED	512-cell or larger	Cover lightly	65-68°F (18-20°C)	4-5	4-5	6-10 plants/ft. ² (64-106 plants/m ²); high-density planting under high-light or field situation.	55-70°F (13-21°C)	50-55°F (10-13°C)	8-18	The flowers have a unique purple and white striped color pattern. The striped pattern varies depending on the growing environment - when grown in warmer greenhouse conditions, the white stripes are more dense and prominent, but when grown under cool outside/tunnel conditions, the purple is more dense and prominent.	39-60 in. (1-1.5 m)	This is a unique novelty stand-alone Group 2 variety. Purple Twist can be produced under short days, moderate light conditions with night temperatures of 50 to 55°F (10 to 13°C) during production. It can be scheduled and grown along with the Maryland series.
SNAPDRAGON, FORCING F1 <i>Antirrhinum majus</i>		Red Delilah		180,000 S/oz. (6,350 S/g)	SED	512-cell or larger	Cover lightly	65-68°F (18-20°C)	4-5	4-5	6-10 plants/ft. ² (64-106 plants/m ²); high-density planting under high-light or field situation.	55-70°F (13-21°C)	50-55°F (10-13°C)	8-18	Red Delilah has a unique flower spike with red and white tube flowers.	39-60 in. (1-1.5 m)	This is a unique novelty stand-alone Group 2 variety. Red Delilah can be produced under short days, moderate light conditions with night temperatures of 50-55°F (10-13°C) during production. It can be scheduled and grown along with the Maryland series.
SNAPDRAGON, FORCING F1 <i>Antirrhinum majus</i>		Trumpet Tangerine & Trumpet Pink		180,000 S/oz. (6,350 S/g)	SED	512-cell or larger	Cover lightly	65-68°F (18-20°C)	4-6	4-5	6-10 plants/ft. ² (64-106 plants/m ²); high-density planting under high-light or field situation.	60-75°F (16-24°C)	45-55°F (7-13°C)	8-18		39-60 in. (1-1.5 m)	
SNAPDRAGON, GARDEN F1 <i>Antirrhinum majus</i>		Rocket Series		180,000 S/oz. (6,350 S/g)	SED	406-cell	Cover lightly	65-68°F (18-20°C)	4-8	5-6	3-4 plants/ft. ² (30-40 plants/m ²)	65-80°F (18-26°C)	55-60°F (13-16°C)	13-16	Bronze, Golden, Pink, Red and Rose Shades will germinate best with light.	30-36 in. (75-90 cm)	Versatile snapdragon can be used as both landscape series and as field-grown cut flower. Rocket makes an excellent quality Group 3,4 Spring and Summer-flowering landscape snapdragon.
TRACHELIUM, CUT FLOWER TYPE <i>T. caeruleum</i>		Lake Forest, Lake Michigan, Lake Louise Series		21,500 S/oz. (750 S/g)	PEL	200-cell	No	72°F (21°C)	7-10	7-9	6-8 plants/ft. ² (64-84 plants/m ²)	62-68°F (16-20°C)	60°F (16°C)	10-18	Trachelium needs 16-hour daylengths for faster flowering.	30-42 in. (75-105 cm)	Should be transplanted Autumn to early Winter for flowering in mid-Winter to early Spring.