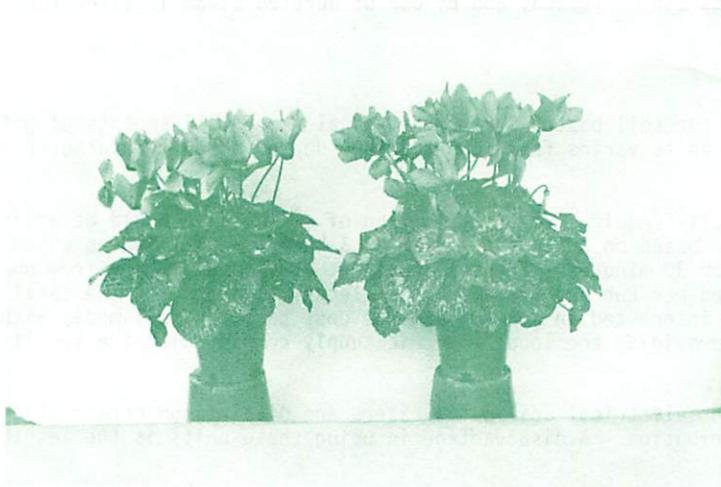


MINNESOTA FAST CROP CYCLAMEN -- 1979¹

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Cyclamen production and quality are on the upspring and for good reason. Quality plants properly cared for in the home or office will remain attractive at least twice as long as potted chrysanthemums. In the home, cyclamen should be kept in bright light, but not in direct sunlight, at moderate to cool temperatures (68°F/20°C or lower at night) and watered thoroughly before wilting. Individual flowers usually last close to 4 weeks. Fertilization is often required within a month after placement in the home, unless a slow release fertilizer is applied prior to plant purchase.

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Price is also a significant factor if cyclamen sales are to reach their potential. Competitive, yet profitable, prices are possible if plants are produced efficiently on a fast crop schedule. Slow grown, oversized, poor keeping plants, old fashioned preferences and prejudices of some retailers and memories of unhappy past experiences in customers' minds must be replaced. The grower must take the lead by producing only appropriate plants and by convincing reluctant retailers. Care tags should accompany every plant sold.

Modern Techniques

Cultivars:

Stocky, firm floriferous plants with good keeping quality grown in 4, 5 and 6 inch (10, 12.5, 15 cm) pots are desired. Early flowering cultivars with good growth characteristics are essential. Some of the better cultivars are as follows:

Large flower size

Dark Salmon Red TAS	Improved Bonfire
Pure White TAS	Cardinal
Rosa von Zehlendore TAS	Hallo
Albadonna	

Intermediate flower size

Gypsy*	Rosamunde*
Merry Widow*	Swan Lake*

Small flower size

Beautiful Helena	Puppet
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*hybrids -- usually more uniform

Germination

Use fresh seed. If seed must be stored, keep it at 60° to 68°F (16° to 20°C) at relatively low humidity. The older the seed, the lower the germination percentage. No known preplant seed treatment is reliably beneficial. Sow seed 1/8 to 1/4 inch (1/3 cm) deep in flats filled with nutrient-enriched moss peat. Avoid moss peat that is too fine and powdery. Additions are listed in Table 1.

Table 1. Nutrient additions to moss peat

Fertilizer	Grams* bushel	1 cu yd
ground limestone	200	9.7 lb
magnesium sulfate	20	1.0 lb
potassium nitrate	7	5.5 oz
superphosphate	12	10.0 Oz
Osmocote (14-14-14)	16	12.5 oz
Peters fritted trace element mix	1	.75 oz

*28.35 grams/ounce

Be sure to mix thoroughly. Compact the moss peat to 2/3 of its fluffed-up volume. Never use moss peat without the additives (especially the limestone), as the seeds germinate poorly and the roots won't develop. Space the seed on 3 x 3 inch (7 x 7 cm) centers.

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Cyclamen seed germinates best at 68°F (20°C) in the dark with a fairly high (70 percent) relative humidity. Temperatures of 72°F (22°C) and above are inhibitory. Such conditions are best obtained in the headhouse or a basement room with good air circulation (air conditioning is acceptable) rather than in the greenhouse where radiant energy from the sun increases the temperature of the propagating medium. Water the flats after seed sowing. Allow the flats to dry for several hours before placement in the germination room to discourage fungus growth on the medium. Keep the soil moist during germination and water when the surface lightens in color.

Move the flats to a humid, shaded, 68°F (20°C) night temperature greenhouse to keep the quickest germinating seedlings from stretching excessively. Seed germinating after 45 days usually produce smaller, less vigorous plants and should be discarded. Even though germination percentage may vary by seed lot, a plant stand of 85 percent is usually realistic. Excessive light or inadequate humidity levels will cause shriveling of the petiole below the cotyledon and loss of some of the affected plants. Blank areas can be filled with plants from extra flats.

Light:

Shade the plants from April to October to provide a maximum of 4000 ft-c. Provide full light for the remainder of the year when the maximum does not exceed 4000 ft-c.

Quality plants may be grown in glass, fiberglass reinforced plastic or polyethylene covered greenhouses, provided air circulation is adequate and humidity levels are not excessive as in tight plastic greenhouses.

Temperature:

Maintain the 68°F (20°C) night temperature until the plants average 6 unfolded leaves. A drop to 62° to 64°F (17° to 18°C) is then recommended to facilitate earlier flowering. Day temperatures should be 66° to 68°F (19° to 20°C) (cloudy) and 73° to 75°F (23° to 24°C) (sunny). Fan and pad cooling is essential in most areas for top quality, early flowering plants. Lack of cooling may delay flowering one to two months and adversely affect plant quality. Plants are finished at 60° to 62°F (16° to 17°C) night temperature in dark (winter weather) and slightly higher in good light conditions. A 68°F (20°C) night finishing temperature will cause bud abortion, small flower size and soft, weak plants, especially in dark weather.

Potting:

Approximately 17 weeks after seed sowing, the plants are transferred from the flats to their final pots. This is the only transplanting required if seeds were sown at a 3 x 3 inch (7 x 7 cm) spacing. Plants grown in moss peat can be transplanted easily without disturbing their root systems. Use either plastic or clay pots, but plastic facilitates better moisture retention, more even root growth and easier plant care in the home. The potting medium should be the same type of nutrient-enriched moss peat used for germination. Keep the top of the corm flush with the top of the growth medium. If desired, 1/2 inch (1 1/2 cm) pea rock can be placed in the bottom of the pot to provide ballast, especially when using plastic pots. Small flowered cultivars are suggested for pot sizes of 5 inches (12.5 cm) or less. The larger the pot size, the more time required for flowering.

Watering:

Moss peat should not be allowed to appear dry or get as dry as a loam soil. If the peat is so dry that one can't wring water out of it when squeezing the moss in one's hand, it is too dry. Always water thoroughly to insure complete wetting of the "root ball" and to prevent soluble salt buildup. With tuber watering, two tubes may be necessary with larger pots to insure uniform watering. Watering from below, such as with capillary mats, usually causes excessive plant stretch. Water in the morning, whenever possible, to minimize botrytis crown rot. If the cyclamen wilts, especially in hot weather, some of the leaves will yellow in 24 to 36 hours.

Fertilization:

Cyclamen are slow to develop conspicuous symptoms in response to low or high nutrient or salt levels in the growth medium. The first response is usually a decline in the growth rate and leaf size. Usually no supplemental fertilizer is needed for two months after seed sowing. Then, depending on soil analysis results, an application of a solution of 100 ppm nitrogen from a 20-20-20 soluble fertilizer every two to three weeks is generally recommended.

Starting one month after potting, regular applications of a fertilizer containing nitrogen, phosphorus and potassium are necessary. Phosphorus is not retained very long in moss peat and must be added regularly. Nitrogen and potassium must be fairly well balanced with slightly more potassium for optimum leaf and plant development. Inadequate nitrogen or potassium levels before the plants have developed about 40 leaves will delay flowering. After that stage, flowering time is unaltered.

The following is an approximate fertilization schedule (with a 20-20-20 soluble fertilizer) subject to modifications based on variations in environment and culture.

Month after potting	Applications per week	Concentration
second	2	100 ppm N
third	3	150 ppm N
fourth	4	200 ppm N

Occasional extra applications of potassium are usually necessary. Analyze the growth medium at regular intervals to insure maintenance of proper nutrient levels. Inadequate potassium increases plant susceptibility to yellowing of older leaves and botrytis. Excessive nitrogen levels will encourage tall, soft plant growth and extra large leaves. Pale green foliage on regularly fertilized plants could indicate a lack of microelements, especially iron. A pH of 6.0 to 6.7 is preferable but cyclamen grow well with a pH as low as 5.0. Elevated carbon dioxide levels (1000 ppm) accelerate plant growth.

Spacing:

Plants may be pot-to-pot until the foliage reaches the pot rim but should be spaced promptly thereafter. Rate of leaf initiation is about 1.3 per week on the initial growing point and plants develop additional leaves from additional growing points. Crowding results in petiole elongation, and favors development of diseases and weak, unattractive plants. The final spacing for well grown plants should be as follows:

Pot size	Space
4" (10 cm)	10 x 10" (25 x 25 cm)
5" (12.5 cm)	12 x 12" (30 x 30 cm)
6" (15 cm)	15 x 15" (37 x 37 cm)

Plants which become too large for their pots can be shifted to larger containers with no apparent setback.

Flowering and GA:

Flower buds initiate in the axil of the 6th leaf while the 10th to 13th leaves are initiating. Flowering is apparently not controlled by photoperiod, but is advanced as the total light supply increases, within appropriate limits.

Proper application of gibberellic acid (GA₃) to adequately sized plants 45 to 60 days prior to the desired bloom date will hasten flowering and increase the number of flowers open at one time. A spray application of 8 ml of GA₃ solution per plant with wetting agent is applied to the crown below the leaves. For further instructions see December 1978 issue of the Minnesota State Florists' Bulletin. A concentration of 25 ppm GA₃ is used on most cultivars and 10 ppm on F-1 hybrids. Follow directions precisely for best results. Growers using this procedure for the first time should do so on a limited scale in order to become familiar with the technique and results on cultivars they grow.

Schedules:

Plants may be scheduled to flower in any month of the year, but sales in most areas would be limited in May, June, July and sometimes August. Appropriate flower colors should be grown for individual seasons. Quickest production is from seed sown in February through April. Average fast crop plant developmental steps follow:

Time stage	Plant stage	Christmas crop in 5 inch (12.5 cm) pots
0 days	Sow seed, maintain 68 ⁰ F (20 ⁰ C)	April 15
30 days	move seedlings to light	May 15
60 days	first true leaf (cotyledon always present) starts to become clearly visible	
120 days	6 leaves unfolded, drop temperature to 62 ⁰ -64 ⁰ F (17 ⁰ -18 ⁰ C) after potting	August 15
180-190 days	apply GA, lower temperature to 60 ⁰ -62 ⁰ F (16 ⁰ -17 ⁰ C)	October 15 to November 1
250 days	in bloom	December 20

Add one month total time for 6 inch (15 cm) pot plants and subtract one month for 4 inch (10 cm) pot plants.

Diseases:

Disinfect everything from potting bench to growing bench to minimize difficulty. Don't use Captan on seed germination flats as it inhibits cyclamen seed germination.

Mold on seed flats -- use a Benlate drench at 1 tablespoon per 2 gal water (0.25 kg per 388 liters).

Crown rot (Botrytis cinerea) -- Benlate drench, 60° to 62°F (16° to 17°C) minimum temperature, good air circulation and spacing.

Bacterial soft rot (Erwinia carotovora) -- discard all infected plants.

Insects:

These chemicals should only be used if recommended and approved for cyclamen on the package label.

Cyclamen mites -- Kelthane

Spider mites -- Kelthane (may cause some leaf spotting in dark weather), Pentac

Fungus gnats -- Malathion or diazinon drench

Aphids -- Malathion (may cause some flower and foliage damage), Orthene, Pirimor (may cause some foliar spotting)

Thrips -- Resmethrin, Vapona, Methoxychlor

Summary of Key Suggestions for Successful Fast Crop Production:

1. Select proper early flowering cultivars.
2. Germinate seed in proper medium and environment.
3. Maintain appropriate growing temperatures.
4. Maintain appropriate humidity levels.
5. Transplant on schedule and only once.
6. Minimize root disturbance during transplanting.
7. Use a light, well-aerated growth medium with good water retention capacity.
8. Water thoroughly and appropriately, and maintain uniform, adequate moisture levels in the growth medium.
9. Fertilize regularly in proportion to plant size and soil analysis results.
10. Avoid excessive growth medium soluble salt levels.
11. Keep plants actively growing at all times.
12. Maintain appropriate solar radiation energy levels.
13. Use evaporative pad cooling in summer (in most areas).
14. Space plants properly and provide for good air circulation.
15. Apply GA₃ when appropriate.
16. Utilize good sanitation practices at all times.
17. Control insects and diseases promptly.