ACCELERATED CYCLAMEN PRODUCTION I[1]

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The popularity of cyclamen (Cyclamen indicum) pot plants has been decreasing in recent years despite their attractive appearance. Several factors may account for the decline: reportedly poor keeping quality, lack of education sales promotion, and the cost of the plants, which is determined by a 15-month production period (1,4).

Plants of the cultivar Astoria Bright Salmon Red were placed in 30 homes this past winter to evaluate keeping quality. Cooperators were told to place the plants in a bright or sunny location and to check the plants regularly for water requirements so they would not wilt. Wilting usually results in the loss of leaves and flower buds. Some cooperators did not care for the plants as directed and reported only 7-14 days of bloom, while others reported that the plants were still blooming up to 90-100 days later. The average house life of plants in satisfactory condition was 38 days. Individual flowers lasted 3-4 weeks. These results indicated that the cyclamen provides satisfaction in the home if given reasonable care. Further, European plantsmen are developing new and reportedly more house-hardy cultivars.

Informal observations indicated that a relatively large percentage of persons contacted did not know the name of a cyclamen when they saw it. This leads to the impression that lack of education and sales promotion limits sales.

Cost of the plant is a significant factor. Currently, commercial producers take 15 months to produce large flowering specimens for Christmas. This long production period results in high production costs that are reflected in a relatively high sales price. European studies (3,6) indicate that production time can be shortened appreciably. Also, cooperators in the keeping quality study indicated that they found smaller, compact plants preferable to the large plants usually available in local floral outlets. The production of smaller, compact, sturdy plants in less time requires early flowering cultivars and modified cultural techniques.

A study was initiated to determine how Minnesota growers could produce attractive flowering specimens for Christmas sale in half of the currently used 15-month period.

Materials and Methods

An early flowering cultivar, Astoria Bright Salmon Red (also sold under the name No. 7 Bonfire Brilliant Salmon), was used in all trials. A night temperature of 68° F. was maintained throughout the study unless otherwise indicated. Preliminary trials compared germination in Jiffy-7's; sphagnum peat moss; a 1:1:1 mix of soil, peat, and perlite; and a 1:1:1 mix of soil, peat, and sand, with and without the application of intermittent mist. The peat used was a commercial baled source with a bulk density of 19.4 grams per 100 milliliters (2). Fertilizer and limestone additions to the peat (table 1) were a modification of those used in Europe (3,7). The use of

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[1] Paper No. 7689, Scientific Journal Series, Agricultural Experiment Station, University of Minnesota

mist delayed and decreased germination, probably because the temperature of the medium under mist usually was 60°-62° F. Massante (5) indicated that a germination temperature of 68° F. was optimum. Germination percentage was highest in peat moss and in the 1:1:1 mix of soil, peat, and perlite and was almost as good in Jiffy-7's. A steadier moisture level probably accounted for the higher percentage in the bulk media. Germination in Jiffy-7's was quicker, however, and little if any root disturbance occurred when the plants were shifted to larger containers. Therefore, Jiffy-7's were selected for the standard germination procedure. Expanded Jiffy-7 tapes (strips of 10 Jiffy-7's on their sides and held together by polyethylene strips) were placed side by side in disinfected flats. Seeds were inserted in the top of each Jiffy-7 and covered lightly with peat moss. Seed was sown on March 3, 17, and 31 and April 17, 1970. Use of the tapes facilitated handling and permitted a larger number of Jiffy-7's per square foot than if individual units resting on their bases were used. After watering, the flats were stacked one upon another with pieces of wood lath in between to permit air circulation. The stacks were then covered with a piece of black polyethylene film to provide darkness and a fairly high humidity. A constant temperature of 66°-68° F. was maintained. Once a third of the seed had germinated, the flats were placed in daylight to prevent excessive stretching of the seedlings.

Table 1. Basic additions to the peat moss

Material	Grams per bushel
Ground limestone	200.00
Magnesium sulfate	20.00
Calcium nitrate	6.25
Potassium chloride	4.00
Superphosphate	12.50
Osmocote (18-9-9)	12.50
Sodium borate	.40
Cupric sulfate	.15
Ferrous sulfate	.38
Manganous sulfate	.15
Zinc sulfate	.15
Sodium molybdate	.03
Chelated iron	.20

All plants (and Jiffy-7's) were plunged in fortified peat moss (table 1) at a 3 by 3 inch spacing on June 8. Actually, this planting could have been done several weeks earlier.

On August 8 the cyclamen were planted in 5 inch plastic pots. Plants were divided into three similar lots and planted in three different media: fortified peat moss (table 1); a 9:1 fortified peat moss: silt loam soil mix; and 1:1:1 silt loam: peat moss: sand mix. Superphosphate (0-20-0) was mixed in the third medium and to the silt loam in the second medium at the rate of a 4 inch potful per 3 bushels (2½ pounds per cubic yard) of soil. All media were steam sterilized. Mean leaf count per plant at the time was 15, 12, 9, and 7, respectively, for seed sown March 3, 17, 31, and April 17. Thus, each

delay of 1 week in sowing resulted in approximately one and a half fewer leaves per plant.

European growers plant the top of the corm flush with the soil line in the belief that it encourages greater leaf initiation and consequently more flowers and broader plants. American growers usually keep the corm half above the soil surface to lessen the chance of plant loss to Botrytis rot (Botrytis cinerea). In order to investigate the merits of each corm level, 60 plants from seed sown February 6 were grown half in fortified peat and half in the 1:1:1 soil:peat:sand mix. Equal numbers of plants in each medium were grown with the corm raised and with the top of the corm level with the medium after potting on August 17.

A 20-20-20 soluble fertilizer was applied at the rate of 100 p.p.m. nitrogen (7 ounces per 100 gallons water) with every watering except for the 2 weeks following potting. Supplemental applications of muriate of potash were made when soil analysis indicated the need. Plants were grown in two-thirds full light intensity in June, July, and August and in full sunlight at other times. Evaporative pad cooling was used in hot weather. Total radiation in the greenhouse was recorded daily and summarized in monthly totals. Plants were spaced at intervals throughout the study, but generally were more crowded than desired in late summer and fall. Overhead air circulation fans operated constantly during this period.

A night temperature of 68° F. was maintained until it was lowered to 65° F. on October 15 and to 62° F. on October 30. Day temperatures were generally 10-15 degrees higher.

Results and Discussion

Plants grew similarly in each of the three growth media. Data on plant size and date of the first flower are shown in table 2. Plant size and flowering date were similar for the three growth media. There was a tendency toward later flowering for plants grown in 9:1 peat moss: soil mix. There also was a trend toward later flowering and smaller plants with later seed sowing dates. Visual observations provided similar conclusions.

Plants grown with the top of their corms flush with the surface of the medium appeared larger than plants with raised corms. Measurements of plant height and diameter (table 3) did not confirm this visual impression. The plants were kept in the greenhouse for an extended period to determine whether the buried corm would encourage the development of Botrytis or any other difficulties. No chemicals were applied for the control of Botrytis during this period. Although no difficulties were encountered, the buried corm plants still appeared larger. Therefore, the leaves were counted on April 2. Plants with depressed corms had appreciably more leaves per plant. Also, plants grown in peat had more leaves per respective corm level than did plants grown in soil.

Plants in these studies were grown at temperatures appreciably higher than those ordinarily maintained by commercial growers. The higher temperatures did not affect the plants unfavorably, in as far as could be determined. Actually, the higher temperatures did result in faster growth

and probably, along with good air circulation, helped avoid serious infections of Botrytis despite overcrowding of the plants in the fall. Botrytis is frequently a problem in the cluster of leaf petioles and flower stems arising from the corm when plants are grown at night temperatures below 60° F. in the fall.

Table 2. Plant size and date of first open flower for plants grown as indicated, 10 plants per treatment.

Date sown	Medium	Mean plant height (inches)	Mean plant diameter (inches)	Mean date, first flower
March 3	Soil	6¼	12½	Dec. 25
	9:1	6¼	12½	Jan. 12
	Peat	6¼	12½	Jan. 8
	Average	6¼	12½	Jan. 5
March 17	Soil	5½	12	Dec. 16
	9:1	5½	10	Jan. 30
	Peat	6½	12½	Dec. 19
	Average	5 3/4	11½	Jan. 2
March 31	Soil	5	10¼	Feb. 5
	9:1	6 3/4	11 3/4	Jan. 22
	Peat	5 3/4	11½	Jan. 22
	Average	5 3/4	11¼	Jan. 17
April 17	Soil	5	12	Jan. 20
	9:1	5	12	Jan. 19
	Peat	5¼	11½	Jan. 7
	Average	5	11 3/4	Jan. 15

Table 3. Comparison of plants grown in two media with the corm half above the surface of the media and with the top of the corm level with the medium from August 17, plants from seed sown February 6 planted in 5 inch pots on August 17, 15 plants per treatment

Corm position	Growth medium	Mean plant height (inches)[1]	Mean plant spread (inches)[1]	Mean date first flower	Mean leaf number[2]
Raised	Soil	6	11½	Jan 2	62½
Raised	Peat	7	12½	Dec 28	84¼
Level	Soil	6½	12½	Dec 23	88
Level	Peat	6	12½	Jan 1	101

[1] Measured on January 5.

[2] Counted on April 2.

Actual radiant energy measured in the greenhouse is presented in table 4. The accelerated cyclamen production was obtained despite the fact that the months of October, November, and December were darker than usual. Further, inclusion of radiant energy data provides research workers with a common denominator for comparison of similar studies.

Table 4. Solar radient energy per month in calories per square centimeter per minute measured in the greenhouse by an Eppley pyrheliometer* located 15 feet below the glass and 3 feet above bench level

Month	Mean, 1966 through 1969	1970
January	1,939	2,242
February	3,299	3,536
March	5,034	5,364
April	5,816	6,376
May	7,737	6,475
June	7,440	8,653
July	8,405	9,080
August	7,597	7,966
September	5,543	5,804
October	3,477	3,311
November	1,798	1,521
December	1,695	1,282

* Recorded by a disc integrator.

Opening of the first flower on a cyclamen plant does not necessarily mean that the plant is salable. Frequently a month or so is required for the plant to come to the peak of bloom. Results of this study indicate that 8-month cyclamen are a possibility for Minnesota, but that additional studies are necessary to find means of further accelerating plant growth and flowering peak.

Economic benefits of accelerated plant production are clearly evident. Table 5 shows that production cost per plant conceivably could be in the vicinity of $1. Remember that such plants are smaller than most of those currently available on the Christmas market. Also, judging by the small scale test, the majority of potential customers prefer smaller, compact, tidy plants.

Current Suggestions:

1. Select early blooming cultivars.
2. Sow the seed after January 1 for Christmas plant production.
3. Maintain a 68° F. night temperature.
4. Minimize root disturbance in transplanting.
5. Use a well aerated, well drained growth medium.
6. Don't fertilize for 2 weeks after transplanting.
7. Fertilize regularly and have the growth medium analyzed periodically.
8. Maintain good air circulation in the greenhouse.

Table 5. Cost estimate of short term cyclamen production based on assumption of total operating cost of 1 cent per square foot of greenhouse bench per day

Operation	Date	Spacing	Number of days	Cost per plant
Seed sown	Mar 3	30 plants/sq.ft.	97	3.2¢
Seedlings plunged	June 8	15 plants/sq.ft.	61	4.1
Plants potted	Aug 8	5.3 plants/sq.ft.	34	6.4
Plants spaced	Sept 11	4.8 plants/sq.ft.	14	3.0
Plants spaced	Sept 25	2.4 plants/sq.ft.	67	30.0
Plants spaced	Dec 1	1.4 plants/sq.ft.	25	18.0
		Cost to Christmas		64.7¢
		Cost to January 25 (at which time all plants had flowered) +22.2¢		86.9¢

References

1. Ball, V. 1965. The Ball Red Book, 11th edition. Geo. J. Ball, Inc., West Chicago, Ill. p. 226.

2. Farnham, R. S., and D. N. Grubich. 1970. Peat Resources of Minnesota. Iron Range Resources and Rehabilitation Office and Minnesota Agricultural Experiment Station. p. 9.

3. Kurki, L. 1966. "Cyclamen Production in 8-9 Months." Puttahra 4. p. 196.

4. Laurie, A., D. C. Kiplinger, and K. S. Nelson. 1968. Commercial Flower Forcing. 7th edition. McGraw Hill, Inc. New York.

5. Massante, H. 1964. "Untersuchungen über den Einfluss der Temperatur und Lagerung und Keimung von Zierpflanzensamen." Gartenwelt Nr 14. pp.291-93.

6. Reeker, R. Cyclamen Kultur in TKS. Torfstreuverband GMBH. Oldenburg.

7. Woods, M. J. 1966. "Tomato Production in Peat Filled Troughs." Irish Journal of Agricultural Research 5:2, pp. 155-62.

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