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## CALCEOLARIA AND DIANTHUS FOR MINI POT PROGRAMS

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### Calceolaria Evaluation

The word calceolaria is derived from the latin *Calceolus*, a slipper, as represented by the shape of the flower. Thus the common name "lady's slipper" has been mixed with others such as "grandmothers or mothers purse" and the "pocket book or purse plant." One can also find it listed as the slipper flower or slipperwort. No matter the name, it has been an intriguing plant for many years. The pouched flowers come in colors ranging from yellow, orange and red, plus those with spots.<sup>1,2</sup> Adults and children alike marvel at the delicacy of the flowers and the array of colors.

Research on mini pot calceolaria was initiated in 1973 using the STPS system of production described in the Colorado Flower Growers Bulletin 346.<sup>2</sup> Thirteen calceolaria varieties have been evaluated throughout a six year period. Data were extrapolated from each years sowings and used to develop Table 1. The majority of varieties (Table 2) could be used for mini pots, but should be evaluated further by each grower.

The calceolaria is a plant that has a market place from March through the bedding plant season. However, the grower must stay on top of the cultural aspects.

**Flowering:** The calceolaria requires cool temperatures 10°C (50°F nights) in order to initiate flowers.<sup>3,4</sup> White and Bell<sup>4</sup> found that calceolaria could be flowered any time of the year by using lights, 15°C (60°F) temperature and forgetting the 10°C flower induction period. Production in the cell packs,

at 15°C (60°F) until the foliage is crowded, tends to cause flower initiation too. There is no doubt that the combination of the STPS system using cell packs plus lighting the 4" pots to insure flower initiation will provide an excellent plant. However, not all varieties respond the same and each grower will have to experiment.

**Temperature:** It would be nice to say the calceolaria is definitely a cool temperature crop, but it appears most varieties grow best at 15°C. Data taken in the 1975-76 season definitely showed that the warmer temperature was most desirable for the varieties super mix (Fig. 1), glorious mix, and golden bunch, even with lights. More work needs to be done on temperature and lighting with the STPS system.

**Timing:** The time from seeding to flowering will be affected by several factors: variety, season, temperature, greenhouse cover, lighting, and grower effectiveness. The Sakata varieties tend to flower faster (Fig. 2). While most varieties can be flowered in 18 to 22 weeks from seeding, (Table 1), the Sakata "yellow with spots" was salable in 17 to 20 weeks, without lights. The majority of the evaluations were conducted under glass covered greenhouses. Fiberglass or poly covers will probably hasten the crops.

**Watering:** Like most floricultural crops, "the water person controls the crop". Calceolaria can be overwatered easily in the cell pack stage. If kept too wet, they become yellow and it is almost impossible to maintain a timetable.



Figure 1. *Calceolaria* cultivar "Super Mix" grown in two temperature regimes using the STPS system for mini pot production. The cool grown plants were delayed approximately 15 days.

each other. Four inch calceolaria are easily water stressed and the mat system may be the answer to labor intensive hand watering, but watch overwatering!

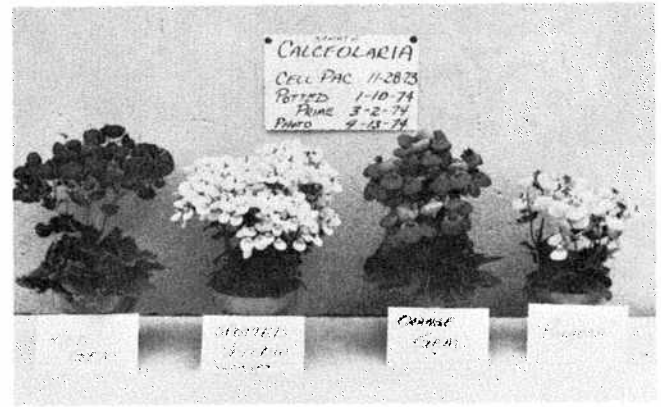


Figure 2. Growth habits of calceolaria cultivars: Orange and Red Gem, Yellow with spots and Rugosa Golden Bunch. They were seeded on October 11, 1973 and ready to market 20 weeks later in 4 inch azalea pots.

The watering mat is probably the answer for growing mini pot plants at a 4 per sp.ft. spacing. Both 4 and 5 inch pots of calceolaria were grown on mats in the 1979 evaluations. The plants were grown in a FRP covered greenhouse (approximately 60% light transmission) during the spring. Plants in both sized pots came into bloom within days of

**Iron chlorosis:** Chlorosis of calceolaria may be related to overwatering, pH and iron deficiency. In most instances chlorosis has been overcome with applications of iron sequestrene. However, recommended rates have proven fatal and/or caused severe foliage burn. Drenches of less than 1/4th strength may still damage some varieties.

Table 1. Suggested schedule for the production of 4 inch, mini pot, *Calceolaria* using the STPS system of production.

Seed	Transplant	Pot	Salable	Wks from Potting to Sale	Weeks from seed
9/15	11/4	12/19	2/1	6.2	19.9
10/15	12/5	1/24	3/21	7.9	22.0
11/15	1/5	2/16	4/7	7.0	20.0
12/15	1/25	3/3	4/15	6.1	18.0

### Dianthus Evaluation

The introduction of dianthus chinensis, China Doll in 1970 evidently opened a few doors for what Bailey<sup>1</sup> described as a type of "garden pink" with a clove scent.

Ten cultivars of *Dianthus* have been evaluated for mini pot production at CSU during the past six years (Table 3). The

Table 2. Evaluation of calceolaria cultivars as mini pot plants from 1973-1979.

Cultivar	Source	Comments
Yellow w/spots (multiflora)	Sakata	earliest fall varieties, best 4" pot, most flowers
Golden bunch (Rugosa) F-1	Sakata	small flower, easily becomes chlorotic
Orange gem (multiflora) F-1	Sakata	one week longer than yellow with spots, quality is good, but better than red gem.
Red Gem Improved (multiflora) F-1	Sakata	small plants with elongated stalk and few flowers, no side breaks
Formula mix (med grandiflora) F-1	Gloekner	not for 4" pots
Glorious mix (med multiflora) F-1	Gloekner	larger flowers and foliage, good form, slower, not best 4".
Super mix	Gloekner	a little large for 4" pots.
Nana compacta mix no. 3 (multiflora) F-1		very slow, quality is fair
Holland Wonders (grandiflora) F-1		not for 4" pots
Prize mixed no. 3 (multiflora) F-1		possible, but slower
Dwarf Fascination mix, F-1		a little large
Fascination formula mix F-1		slow; four weeks later than yellow w/spots.
Confetti formula mix, F-1		slow, but good quality, larger flowers, large dark green foliage, not for 4" pots.

magic charm series appears to be the most adapted, but not all cultivars. Other cultivars are less uniform in habit (Fig. 3).

Table 3. Cultivars of Dianthus evaluated for 4 inch mini pots.

Magic Charm Series	
white	excellent for 4" pots, good combination with crimson
scarlet	doesn't break well, and slightly tall, watch watering
coral	tends to get tall when pot to pot, space, watch watering
crimson	the most compact and uniform for 4" pots
pink	gets tall, with fewer breaks, pot before other cultivars.
Orchid Lace, F-1	single spike develops first, needs to be pinched once.
Snowflake	very uniform, chlorosis and malformed, not recommended
Merry-go-around (Chinensis)	slower than charm series by 2 weeks and not quite as compact and full. has potential.
Color-pride (Sinensis)	Highly variable in habit, slower than charm series, not recommended



Figure 3. (L-R) Cultivars of Dianthus Merry-go-round, Color Pride and Magic Charm used in the 4 inch mini pot evaluation. Note variations.

**Temperatures:** Plants were grown using the STPS system in both 11°C (52°F) and 15°C (60°F) night temperatures. Production can be effectively achieved in both temperature regimes, Fig. 4. However, when the lower temperature is used, watering and spacing is of utmost importance. The plants should be kept on the "dry side", but not enough to create a stress delay. Plants should also be grown in unshaded greenhouses and spaced no less than 4 per ft<sup>2</sup> in the pot stage.

**Cell Pack Stage:** Like all plants used in the STPS system, Dianthus growth in the cell pack stage is critical. The purpose of this stage is to allow the plants to grow toward maturity in a minimum amount of space. Flower buds should be uniformly developed on non-stretched plants before they are shifted from the packs to the 4 inch pots. Each cultivar must be grown and treated independently. Watch the stretching.

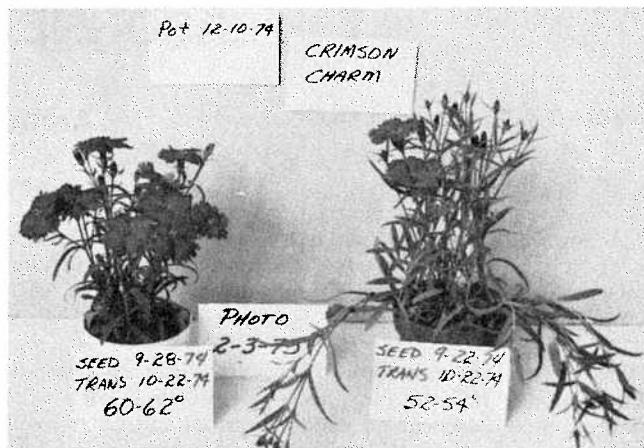


Figure 4. Dianthus cultivar "Crimson Charm" grown at two night temperature levels. Plants grown in the 11°C (52°F) temperature regimes were kept too wet, resulting in stretching and weakened stems.

**Timing Dianthus:** The best market for Dianthus is probably Valentines through Mother's Day. The general schedule, Table 4, was developed in a glass greenhouse, using the cultural procedures discussed in CFGA Bul. 346.<sup>2</sup> It appears that the 11°C (52°F) temperature is adequate and possibly best for pot stage; the warmer temperature might prove valuable for the cell pack phase. If the cooler temperature is used throughout the production cycle, add 10 to 14 days to the flowering time.

Table 4. General schedule for the production of 4 inch mini pot dianthus using the S(sow), T(transplant), P(pot), S(sale) system.

S	T	P	S	Weeks from seed
10/1	10/24	12/12	2/8	18
11/1	11/26	1/28	3/25	19
12/1	12/24	2/10	4/5	18
1/1	1/25	3/8	4/20	16

Dianthus can be pruned rather severely if they become too tall. During the 1976 evaluations, the Magic Charm series were given a "hair cut" on March 9. They were flowering again 21 days later and ready to be marketed.

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