

PRELIMINARY EVALUATION OF THE DWARF WHITE CALLA LILY AS A POTTED PLANT

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The introduction of new floricultural crops has been the lifeblood of floricultural industries throughout the world. As an exporting country New Zealand is gaining a reputation for new crops such as, improved selections of endemic plants, unusual bulbous crops, and new fruit cultivars. New crops are attractive to marketers and may yield a higher profit margin than existing crops. However, the lack of production experience and absence of background research, mean that risks are greater with new crops.

New crops are currently under investigation at the New Zealand Nursery Research Centre at Massey University, Palmerston North. Crops selected for evaluation fall into three main categories: i) new cultivars from existing crops, ii) new uses for common species, and iii) plants taken from obscurity.

A systems approach to potplant evaluations in the new crops programme has been adopted to test various aspects of plant performance (1). The system acts to eliminate selections with obvious shortcomings in any of the evaluation phases. Promising plants are subjected to three phases of research. In Phase I plants are examined for ease of initial production and their postproduction keeping qualities. In Phase II production strategies and scheduling are examined in detail to develop optimal procedures for commercial production. In Phase III marketing opportunities are investigated.

Research is presently being conducted on a dwarf form of the common white calla lily, *Zantedeschia aethiopica* (L.) K. Spreng. cv. Childsiana (2) (Figure 1) 'Childsiana' is dwarf, floriferous, evergreen in habit, and produces rhizomes which are readily divided.

This cultivar was introduced into New Zealand from the USA by an enthusiastic amateur horticulturalist in Auckland. It was identified as having considerable potential by a commercial propagator and is currently being grown and exported as a cutflower.

The initial selection of this cultivar for use as a potted plant was based on the following criteria.

1. *Easy multiplication.* *Zantedeschia aethiopica*, including the various cultivars within this species, grows from a rhizome which freely produces offsets. For this reason the species has naturalised in many countries with mild climates. A 2 cm rhizome of



Figure 1. Various cultivars of *Zantedeschia aethiopica*: 'Green Goddess' (above left), 'Giant Calla' or wild type (above right), and 'Childsiana' (three blooms in foreground).



Figure 2. The yield of offsets of various sizes from a 2 cm rhizome of *Zantedeschia aethiopica* 'Childsiana' grown in New Zealand in a 125 mm pot for 5 to 6 months.

'Childsiana' yields 25 to 30 offsets of various sizes when grown in a 125 mm pot for 5 to 6 months in New Zealand (Figure 2). Multiplication rates of 35 to 55 offsets from mother stock planted in 200 mm pots have been reported by research in Florida (5). While the species has been successfully propagated by tissue culture (3) the high rate of division by offsets makes the expense of tissue culture unnecessary.

2. *Floriferousness.* The cultivar *Childsiana* is naturally more free flowering than the wild type. The natural flowering period extends from autumn until late spring. Commercial cut flower growers in New Zealand have reported yields up to 24 flowers per season from a two year old clump.

3. *Disease tolerance.* The summer-flowering, coloured calla hybrids of *Zantedeschia* can suffer from bacterial diseases (*Erwinia* spp.). *Z. aethiopica* and cultivars are seldom affected.

4. *Tolerance to low light.* Being a winter flowering plant, natural flowering occurs during times of low light intensity. Wild type *Z. aethiopica* also grow and flower under the shade of trees or buildings. 'Childsiana' shares these characteristics. Post-production keeping quality has been assessed and 'Childsiana' flowers have a shelf life of 26 days on the plant and flowers open under low light from the macrobud stage (4).

5. *Form.* 'Childsiana' is naturally dwarf when compared with other *Z. aethiopica* cultivars and the wild type (Figure 1). Established 2-year-old plants at the Massey University Bedding Plant Trial Garden have an average flower height of 80 cm and foliage height of 70 cm. This compares to a flower height of 150 cm and foliage height of 110 cm for the wild type.

6. *Fashion.* The calla lily is currently enjoying the attention of designers as it once did earlier this century. The stylised flowers often appear in popular magazines as backgrounds for home design and fashion. The resurgence of Art Nouveau is a contributing factor to the calla lily's current status in the fashion world. No longer are they seen as a funeral flower.

With these features 'Childsiana' possesses great potential for pot culture.

Observations from the natural growing cycle indicated the potential for winter production as a cool temperature crop (10°C min. nights). The main aims of the experiments were to determine the influence of: i) rhizome size, ii) lifting and drying rhizomes, and iii) the presence of offsets on flowers and foliage.

MATERIALS AND METHODS

Dry rhizomes. Plants grown in 150 mm pots had irrigation withheld on 15th December, 1987. They were removed from the potting medium on 24th January, 1988 with divisions being graded according to rhizome diameter. Rhizomes were then allowed to cure at 18°C until remaining leaves and roots had withered. Rhizomes were replanted on 4th March, 1988.

Green rhizomes. Plants grown in 70 mm pots were lifted and divided into grades on 4th March, 1988. Leaves were trimmed to 70 mm from the top of the rhizome and roots were also trimmed (Figure 2) before replanting on the same day.

Planting. Graded rhizomes (1, 2, and 3 cm in diameter), with and without offsets, were planted into pots (70, 100, and 150 mm, respectively) using a 70% sphagnum peat, 30% sand medium. Fertiliser was incorporated into the mix using 5 kg m⁻³ dolomite, 600 g m⁻³ Micromax[®], 1 kg m⁻³ 3–4 month Osmocote[®] and 1 kg m⁻³ 8–9 month Osmocote[®]. Ten replicates of each treatment were used and pots were spaced and randomised. Potted plants were placed outside on coarse metal with overhead irrigation for 7 weeks during the cool autumn months (March–April). On 21st April, 1988 plants were shifted into a greenhouse for forcing into flower. Temperatures were maintained at 10°C minimum nights and 30°C maximum days under natural light.

Assessment. Flower and foliage parameters were measured when the spathe of the first flower was open but before was pollen shed. The mean time to this stage of flowering was 102 days from planting. Flower size was measured by diameter across the top of

the spathe. Peduncle length from the medium surface to the base of the spathe was used to measure flower height, hence the spathe was born above this height. Foliage height was determined measuring the length of the tallest petiole from the medium surface to the leaf lamina. Leaves were erect during elongation and expansion, when they added little to foliage appearance, but the lamina became horizontal following expansion. Leaves were cut off at the medium level; those arising from the main rhizome were separated from those derived from offsets. Both groups were counted, the laminas were then removed and the surface areas measured.

RESULTS

Rhizome size influenced growth of flowers and foliage. Small rhizomes (1 cm) produced smaller flowers, which were shorter than those produced by larger (2 cm and 3 cm) rhizomes (Table 1). Foliage height also increased with rhizome size. This was accompanied by an increase in both the number of leaves per plant and leaf surface area produced (Table 1).

Plants grown from dried rhizomes produced more leaves than plants grown from freshly lifted, green rhizomes (Table 2). This pattern was consistent regardless of whether offsets were intact or removed (Table 2). Neither planting rhizomes before or after drying

Table 1. The influence of rhizome size on flowers and foliage in plants grown from dry rhizomes without offsets of *Zantedeschia aethiopica* 'Childsiana'. (Mean \pm standard error)

Rhizome size (cm)	Flower width (cm)	Flower height (cm)	Foliage height (cm)	Leaf area (cm ²)	Leaf number
1	3 \pm 1	8 \pm 3	7 \pm 1	72 \pm 13	4 \pm .6
2	7 \pm .3	19 \pm 2	11 \pm .7	318 \pm 83	8 \pm 1
3	8 \pm .5	25 \pm 2	18 \pm .8	719 \pm 62	13 \pm 1

Table 2. The influence of drying and the presence of offsets on foliage height, leaf number, and leaf area in plants grown from 2 cm rhizomes of *Zantedeschia aethiopica* 'Childsiana'. Different letters within columns designate significant differences ($p=0.05$).

Treatment	Foliage height	Leaf number	Leaf area
<i>Offsets removed</i>			
Dry	11 \pm .7x	8 \pm 1a	318 \pm 83j
Green	7 \pm .6y	4 \pm .5b	88 \pm 8k
<i>Offsets attached</i>			
<i>Main rhizome</i>			
Dry	15 \pm .9z	6 \pm .7a	250 \pm 31j
Green	11 \pm 1x	4 \pm .4b	176 \pm 11jk
<i>Offsets</i>			
Dry	—	25 \pm 5c	386 \pm 83j
Green	—	15 \pm 2c	237 \pm 37j

nor the presence of offsets influenced flower size or height (results not shown).

Similarly, dry rhizomes always resulted in larger leaf area and more leaves than green rhizomes regardless of the presence or absence of offsets (Table 2).

DISCUSSION

'Childsiana' can be successfully grown as a pot plant from freshly lifted or dried rhizomes. All rhizome sizes tested produced flowers. Flower and foliage dimensions increased with larger rhizomes but the proportions of the plant were maintained. The plant proportions were generally adequate for pot culture (1) and would probably not require the use of growth retardants. Flowers were always borne above the foliage regardless of rhizome size. 'Childsiana' has also been shown to have good keeping qualities (4), a feature highly desirable for pot plant production.

Dried rhizomes produced more foliage than plants grown from freshly lifted, green rhizomes. Rhizomes become quiescent under dry conditions and the data indicates that they may perhaps benefit from a period of rest. Both the main rhizome and offsets contributed to the foliage but leaves from offsets were considerably smaller.

White callas are currently being used as pot plants to a limited degree in overseas countries. The development of a production blueprint for 'Childsiana' to be grown as a compact potplant will help to create a useful plant for the potted flower market. This will create opportunities for New Zealand growers to produce rhizomes for export and the domestic market. Work continues with the production and marketing phases as part of the new crops programme at the New Zealand Nursery Research Centre.

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