

## FORCING OF SELECTED ORNAMENTAL O X A L I S S P P . AS POTTED PLANTS

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### ABSTRACT

Preliminary studies on the forcing characteristics and cultural requirements of six California-grown *O x a l i s* spp. have been conducted. *O. R e g n e l l i i* is commercially available year-round, while the others are generally available only from September to December.

The scaly rhizomes of *O. R e g n e l l i i* should be stored at 5°C until planted. When forced at 16-18°C with medium (5000 ft. c.) light intensities and natural photoperiods, it was marketable in 4-5 weeks as a 10 or 15 cm potted plant. This species required a moderate to heavy fertilization. It is an excellent forcing species.

The other species required the following preplanting storage temperatures. For 1 October to 2 January plantings, the following treatments produced the best results: *O. b o w i e i* - 25°C to 13 Dec., then 5°C; *O. h i r t a* - 5°C; *O. m a r i t i a n a* - 5°C; *O. p u r p u r e a* (25°C plus 5°C for 2 weeks prior to planting; and *O. v e r s i c o l o r* - 5°C or 25°C. All these species, with the exception *O. m a r i t i a n a*, which is used as potted plant only, can be forced either as 10 or 15 cm potted plants or hanging basket plants at 16-18°C with medium light intensities and natural photoperiods. All species benefited from a moderate fertilization program. Average weeks to marketable plants were: *O. b o w i e i* - 4 to 6, *O. h i r t a* - 6 to 8, *O. m a r i t i a n a* - 6 to 8, *O. p u r p u r e a* - 7 to 8, and *O. v e r s i c o l o r* - 7 to 9. After January 2, planting of most of these species produced variable responses. This is an area that needs further investigation.

### 1. Introduction

While preparing Section C - Part 12 of the Holland Bulb Forcers Guide (De Hertogh, 1985), it was obvious that few studies have been conducted on the forcing of ornamental *O x a l i s* spp (Classified list 1975). Wilkins (1985) has provided the most comprehensive review on the physiology of flowering of *O x a l i s*. In it, he has cited only 2 research papers. Jackson (1960) studied the dormancy requirements of *O. l a t i f o l i a*, while Wikesjo and Schussler (1981) evaluated the forcing requirements for *O. d e p p e i*, *O.*

*pescaprae* and *O. articulata*. Aoba (1972) has reported on the effects of low temperature on flowering and bulbing of *O. bowiei*, *O. cerna*, *O. variabilis* (*O. purpurea*) Grand Duchess selections, and *O. versicolor*.

There is increased interest in the forcing of "new" floricultural crops. Thus, the following preliminary studies have been conducted to obtain information on the forcing characteristics and cultural requirements of six California-grown *Oxalis* spp. (Table 1) that are readily available for greenhouse operators in the U.S. and Canada.

## 2. Materials and methods

### 2.1. General aspects

All bulbs were grown in North San Diego County, California, and harvested in June. They were graded and subsequently stored at the prevailing room temperatures (10-24°C) until shipped to Raleigh, N.C.

### 2.2. Preplanting storage study

Bulbs arrived on 23 August 1985. Samples for % germination were planted on 29 September 1985. Four lots of 125 bulbs per species were stored either at 5 or 25°C constantly or at 5 or 25°C plus either 25 or 5°C for 2 weeks prior to planting. Planting dates were 1 October 1985, 1 November 1985, 2 December 1985, 2 January 1986, and 3 February 1986. Twenty four bulbs per species were used for each treatment. Eight bulbs were planted per 15 cm azalea pot, fertilized with 14-14-14 Osmocote (1 teaspoon/pot) and grown under natural daylengths in a 13-16°C night temperature medium light intensity greenhouse.

### 2.3. Number of bulbs per 10 and 15 cm pots

Bulbs were planted on 30 October 1985. Prior to planting all species were stored at 17°C, except for *O. Regnellii*, which was stored at 5°C. They were planted 2 to 5 per 10 cm pot and 4 to 7 per 15 cm azalea pot and 15 cm hanging basket. There were 2 replications per bulb number and species. All treatments received were fertilized and grown as described above.

### 2.4. Basic fertilizer requirements

All treatments described under 2.3 were grown with and without the addition of 1 teaspoon per pot of 14-14-14 Osmocote.

### 2.5. Influence of photoperiod

Bulbs of all species except *O. Regnellii* were stored at 25°C until planted on 1 October 1985, 1 November 1985, and 2 December 1985. Eight bulbs (4 reps) were planted per 15 cm azalea pot, fertilized with Osmocote, grown at 13-16°C night temperature and then exposed to either natural days (37°47' N latitude) or 60 W/sq. meter from 2200 to 0200 hours.

### 3. Results

#### 3.1 Preplanting storage

3.1.1. *O. bowiei* - The best overall treatment for 1 October to 2 January plantings was 25°C until 13 December, then 5°C. Average days to market stage was 29 days for these treatments.

3.1.2. *O. purpurea (variabilis)* - Grand Duchess selections -

Lavender - Constant 25°C storage with 2 weeks of 5°C prior to planting gave the most consistent results for 1 October to 2 January plantings. Average days to market stage was 50 days for these treatments.

Pink - Constant 25°C storage with 2 weeks of 5°C prior to planting gave the most consistent results for 1 October to 2 January plantings. Average days to market stage was 50 days for these treatments.

White - This appears to be the weakest strain of the Grand Duchess series. The best overall treatment was 25°C, then 5°C for 2 weeks before planting for 1 October to 2 January plantings. Average days to market stage was 46 days for these treatments.

3.1.3. *O. hirta* - Overall the best treatment was a constant 5°C for 1 October to 1 February plantings. Average days to market stage was 46 days for these treatments. Selected plants were pinched, but this did not appear to enhance branching of the plants.

3.1.4. *O. maritima* - A constant 5°C treatment was the most consistent storage treatment for 1 October to 1 February plantings. Average days to market stage was 48 days for these treatments.

3.1.5. *O. versicolor* - This cultivar was very inconsistent. It was not satisfactory for a 1 October planting. For 1 November to 2 January, the 2 most consistent treatments were constant 5°C and 25°C until 2 weeks before planting, then 5°C. Average days to market stage for these 2 treatments were 53 days.

#### 3.2. Number of bulbs per 10 and 15 cm pots

The range and preferred number of bulbs per 10 cm and 15 cm standard pots and 15 cm hanging baskets is presented in Table 2.

#### 3.3. Basic fertilizer requirement

*O. bowiei* and *O. versicolor* did not require fertilization for forcing, but it would be essential for maximum consumer satisfaction. All other species required fertilization for forcing.

### 3.4. Influence of photoperiod

With *O. purpurea*, the night-break in combination with a 2 December planting caused a significant delay in flowering. With the White selection, the delay was 26 days. The other species either did not show any marked responses or only slight delays were observed with the long day treatment.

### 4. Discussion

The preplanting storage results are in agreement with those of Aoba (1972). He found that *O. purpurea* and *O. bowiei*, if used for flowering, should be stored warm with only a short storage period at low temperatures. He also found that *O. versicolor* could be stored both at low and warm temperatures. It is essential, however, to determine how to store all the species available for long periods. At present, this can only be achieved with reasonable success with *O. Regnellii* when they are stored at 5°C.

It is clear from these preliminary studies that the use of a complete (NPK) fertilizer is essential for most *Oxalis* spp. Also, that it is best that *Oxalis*, and especially the Grand Duchess selections, not be exposed to long day conditions in the greenhouse.

The planting date range and average number of weeks to flower from planting for the six species studies are presented in Table 2.

### 5. Acknowledgments

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Table 1 - Bulb and plant characteristics of six California-grown  
*O x a l i s* spp.

Species	Storage Organ	Origin of Species	Flower Colors
<u>O. bowiei</u>	Tunicated bulb	South Africa	Rose to Red
<u>O. hirta</u>	Non-tunicated Bulb	South Africa	Rose
<u>O. maritiana</u> ( <u>corymbosa</u> )	Tunicated bulb	Tropical Americas	Pink
<u>O. purpurea</u> ( <u>variabilis</u> )	Tunicated bulb	Cape of Good Hope	Lavender, Pink, and White
<u>O. Regnellii</u>	Scaly Rhizome	South America	White
<u>O. versicolor</u>	Tunicated bulb	South Africa	Inside White, Outside Red

Table 2 - Forcing Characteristics of six California-grown *O x a l i s* spp.

Species	Pots		15 cm	Planting Period	Average Weeks to Flower
	10 cm	15 cm	Hanging Basket		
<u>O. bowiei</u>	3-4 (P)	5-6 (P)	5-6 (P)	Oct 1-Jan 2	4-6
<u>O. hirta</u>	3-4 (P)	5-6 (P)	5-6 (P)	Oct 1-Feb 1	6-8
<u>O. maritiana</u>	3-4 (P)	5-6 (P)	Not used	Oct 1-Feb 1	6-8
<u>O. purpurea</u>					
Lavender	4-5 (P)	6-7 (P)	6-7 (P)	Oct 1-Jan 2	7-8
Pink	4-5 (P)	4-5 (P)	5-6 (P)	Oct 1-Jan 2	7-8
White	4-5 (P)	6-7 (P)	6-7 (P)	Oct 1-Jan 2	6-8
<u>O. Regnellii</u>	2-3 (P)	4-5 (P)	Not used	Year-Round	4-5
<u>O. versicolor</u>	3-4 (P)	6-7 (P)	6-7 (P)	Nov 1-Jan 2	7-9

P = Preferred number based on 1 bulb not germinating