# Crop: Primula, Primrose
# Scientific Name: Primula vulgaris and P. x polyantha (Primulaceae)

## I. Introduction

A. *P. vulgaris* originates from Caucasus and Iran. The plant grows to a height of 15 cm (6 inches) and has 1 cm (1/2 inch) large flowers in yellow, blue or purple colors.

B. *P. x polyantha* is a hybrid group derived by crosses among *P. vulgaris, P. elatior* and *P. veris.* The species *P. elatior,* has yellow, 2 cm (1 inch) large flowers arranged in an one-sided umbel and originates from the Ural Mountains, Caucasus and northern Iran. The species *P. verishas* bright yellow, 1 cm (1/2 inch) large flowers in an often one-sided umbel.

## II. Species, Cultivars, Breeding, Development

A. *P. vulgaris* and *P. x polyantha* are the most used species for greenhouse production.

1. P. vulgaris (or P. aucalis) has flowers without or with short flower stalks.

   a. The 'Dania' mixture $F_1$ - the largest flowered aucalis type. Well suited for early production.

   b. The 'Ducat' mixture $F_1$ - popular in Europe. Flowers are large and plants are compact with dark green foliage. Ideal for early and mid-season crops.

   c. 'Aalsmeer Giant' mixture - good for late production.

   d. 'Julian' $F_1$ series is extra-dwarf with compact growth and small leaves.

2. *P. x polyantha* (or *P. veris)* has flowers in an umbel on a raised peduncle. Also called elatiors in the U.S. and polyanthus in Europe.

   a. 'Dwarf Jewel' mixture - comes in a wide range of colors and is especially adapted to pot plant production.

b. 'Pacific Giant' mixture - vigorous plants for indoor or outdoor use.

c. 'Colossea' mixture - large flower heads on extended stems. Produced for cut flower production and early flowering.

B. *Primula obconica* is also commercially produced. It has many good characteristics but causes skin irritation and rash in many people.

C. *Primula malacoides* has flower stalks with many smaller flowers; typically pastel in color.

## III. Flower Induction Requirements

A. Rapid flower initiation occurs under short days (8-9 hours of light) at a wide range of temperatures.

B. Under long days, low temperature (8-11°C, 45-52°F) is required for flower initiation and development.

C. Flower initiation and development is slow at low temperatures (9-10°C, 48-50°F) regardless of photoperiod.

## IV. Environmental Requirements

A. Light

1. Shade after transplanting (maximum 1,000 foot-candles, 200 $\mu mols^{-1}m^{-2}$) and then remove. Good light results in compact plants and reduces diseases.

2. Shading is required during the summer to facilitate temperature control. The maximum light intensity should not exceed 3,000 foot-candles (600 $\mu mols^{-1}m^{-2}$). Plants are normally shaded until about October 1.

B. Temperature

1. One reason for the interest of primula production is the low temperature requirements.

2. The optimum germination temperature is 16°C (60°F) soil temperature.

3. Keep temperatures as low as possible during the summer to avoid heat delay. Temperature of 15-18°C (60-65°F) are most desirable. Fan and pool cooling is essential. To begin forcing (after plants have attained 6-10 true leaves), reduce the temperature to below 10°C (50°F) for 6 weeks and then raise to 13°C (55°F). When buds show color, raise to 16°C (60°F).

4. Poor flowering and excessive leafiness results from forcing too soon while elongated, weak flower stalks results from forcing too late.

C. Water

1. Primulas prefer moist, humid conditions.

2. Too much water in the winter may cause loose plants and allow development of diseases. Avoid waterlogging.

3. Alkaline or hard water may cause leaf chlorosis due to high media pH.

D. Nutrition

1. Primulas should be fertilized sparingly.

2. The potassium level should be at least as high as the nitrogen level. A balanced fertilizer at 150 ppm nitrogen supplied by calcium and potassium nitrate is suitable. Avoid the use of ammonium nitrogen.

3. Common nutrient problems are phosphorus and iron deficiencies. Supplemental magnesium and iron are often helpful to help avoid leaf chlorosis.

E. Gases

1. $CO_2$ concentration of 900-1,000 ppm promotes vegetative growth.

## V. Cultivation

A. Propagation

1. Sow seeds on the surface of a porous, peat-lite medium in a seed flat or in plugs (e.g. 406 cell). Temperatures should be 16-20°C (60-68°F). Higher temperatures inhibit germination.

2. Light is required for germination.

3. Seeds should never be allowed to dry out, as this will reduce germination.

4. Seeds germinate in 10-30 days.

B. Medium and Planting

1. A good growing medium that stays moist while still draining well is desired, typically high in peat.

2. Maintain media pH at 5.5 - 6.0.

3. Transplant when 2 to 3 true leaves have formed (6-8 weeks after sowing). Finish in 9-10 cm (3 1/2 - 4 inch) pots.

C. Spacing

1. Space to provide adequate ventilation and air movement.

2. Plants can be spaced pot to pot after transplanting. Plants should be spaced 15 x 15 cm (6 x 6 inch) to 18 x 18 cm (7 x 7 inch) when leaves begin to overlap.

D. Growth Regulators

1. B-Nine at 1,000 - 2,000 ppm reduces stem elongation.

## VI. Problems

A. Insects

1. Aphids is the most common pest and can be controlled by insecticides.

2. Mites and thrips may also be a problem.

B. Diseases

1. Crown and root rot (*Pythium spp.*) are best controlled by good cultural practices. Sterilized media and proper watering will decrease the incidences of these diseases.

2. *Botrytis* occurs mainly on dead or decaying plant material but can occur on healthy flowers and leaves under high humidity conditions. Good sanitation and removal of infected plants facilitate the control.

3. *Ramularia primulas* causes leaf spots. The symptoms are dark, green-black spots on older leaves that later turn to brown spots with yellow edge. Conditions of low temperature and high humidity are favorable for attacks.

C. Physiological

1. Chlorosis and poor growth are often observed during production. They are usually symptoms of overwatering. A good medium with sufficient aeration and drainage, and careful watering will prevent the problem.

2. Chlorosis of younger leaves can be a result of iron deficiency and can be corrected by iron chelate sprays.

D. Viruses

1. Cucumber mosaic virus. Plants severely damaged should be destroyed.

## VII. Scheduling

| Growing Time for Cultural Segment | Cultural Procedures | Temperature |
|---|---|---|
| | Sow seed | 18°C (65°F) not above 20°C |
| | ↓ | |
| 2 weeks | | |
| | ↓ | |
| | Germination | 16°C (60°F) |
| | ↓ | |
| 4-6 weeks | | |
| | ↓ | |
| | Transplant to finish pot. Grow until desired plant size is achieved. | |
| | ↓ | |
| | Lower temperature | 4-7°C (40-45°F) |
| | ↓ | |
| 6 weeks or until 3-4 flower buds are visible | | |
| | ↓ | |
| | Raise temperature | 13°C (55°F) |
| | ↓ | |
| 2-4 weeks | | |
| | ↓ | |
| | When buds show color | 16°C (60°F) |
| | ↓ | |
| | Flower | |