Crop: African Violet
Scientific Name: Saintpaulia ionantha Wendl. (Gesneriancea)

I. Introduction

A. African violets are native to the hilly regions of Eastern tropical Africa.

B. The plant was discovered in 1892 by baron Walter von Saint Paul in the Usambara district of East Africa. Hermann Wendlan, a German botanist, named the genus *Saintpaulia* in honor of its discoverer.

C. The plant was discovered growing in wooded places near vanilla and India-rubber plantations. The location had soil high in organic matter in fissures of limestone rock and on granite rocks at an altitude of 15 to 750 meters (50 to 2,500 feet). The temperature in this area never goes below 18°C (64°F) and the amount of rain is 1,500-2,000 mm (60-80 inches) per year.

D. The African violet is an excellent flowering house plant as it tolerates low light intensities, warm temperatures and low humidity.

E. Plants are produced year-round and most commonly retailed as house plants in 10 cm (4 inch) pots.

F. Production of African violets in 10 cm (4 inch) pots requires 8-10 months from propagation to sale.

II. Species, Cultivars, Breeding, Development

A. Several species have been described. Present varieties are probably largely descendants of *S. ionantha* and *S. confusa*.

B. One year after the discovery of African violets, plants and seeds were distributed in Germany and two years later, 1894, they were available in the United States. In 1936, the first cultivars for commercial production were available from Armacost and Royston.

C. The plant became popular with the amateur and literally 1000's of varieties have been developed, many essentially identical. Most plants sold today are from a series of cultivars. The primary cultivar series are the Rhapsodie, the Optimara and the Ballet series.

III. Flower Induction Requirements

A. Flowering is controlled by light intensity.

1. The plants will flower poorly or remain vegetative when grown at a daily photon flux of less than 1.5 mol $day^{-1}m^{-2}$ (500 foot-candles maximum light level at noon on a sunny day).

2. The ideal light quantity for flowering is 5-8 mol $day^{-1}m^{-2}$ (800-1,000 foot-candles maximum light at noon on a sunny day).

IV. Environmental Requirements

A. Light

1. Natural light

a. See section III A.

b. High light intensity above 1,400 foot-candles (280 μmol $s^{-1}m^{-2}$) should be avoided as it will cause bleaching or burning of the foliage.

c. Apply a shading compound to the greenhouse roof in early March. Additional shading should be added as light intensity increases. In the fall, the shade is removed as the light decreases until all is removed in October-November.

d. Retractable shade curtiin systems are very desirable as they allow full light on cloudy days, but reduce light on sunny days.

2. Fluorescent or high pressure sodium light

a. Quality plants can be produced using cool-white fluorescent lamps at 4 - 8 mol $day^{-1}m^{-2}$ (600 foot-candles for 18 hours per day or 400 foot- candles for 24 hours per day) in a closed room structure.

b. Using fluorescent or high pressure sodium lights, plants can be grown on shelves stacked on top of each other. The light intensity drops off rapidly towards the edges of the shelves and

lack of uniformity may cause problems when this system is used.

3. The light level must be known for African violet production. Foot-candle meters are sufficient for measuring the light intensity. Foot-candle meters are easily accessible from electrical suppliers.

4. Photoperiod has no influence on flower induction.

B. Temperature

1. Optimum temperature for fastest growth and flowering is 22-25°C (72-77°F) during the day and during the night.

2. Temperatures lower than 16°C (60°F) cause slow growth and brittle, downwards curled leaves.

C. Water

1. Plants require a constantly moist medium. This is especially important during flowering.

2. Water systems used in production include:

   a. Subirrigation in form of capillary mats, sand beds, or ebb and flow system.

   b. Tube water systems.

   c. Overhead watering.

3. Capillary mats or sand beds are frequently used commercially.

4. The water temperature should be 21-23°C (70-74°F). The water temperature is especially important for overhead watering.

   a. Cold water causes ring spotting on the foliage.

   b. Rule of thumb: Use water within 3°C (5°F) of the greenhouse temperature but never over 27°C (80°F).

5. Drought causes plants to appear grayish green. Too much water may cause crown rot.

D. Nutrition

1. Plants have relatively low nutritional requirements and they do tolerate high soluble salt levels in the media.

2. Danish recommendations are 100 ppm nitrogen, 25 ppm phosphorous and 175 ppm potassium at every irrigation.

3. A high nitrate-nitrogen source is recommended over a high ammonium-nitrogen source.

E. Gases

1. African violets benefit from CO_2 enrichment. A CO_2 level of 450-500 ppm results in faster development and greater dry weight compared to no CO_2 enrichment. Higher levels of CO_2 (800 - 1000 ppm) result in very brittle leaves and in some cases, blossoming in plug trays.

V. Cultivation

A. Propagation

1. Cuttings

a. The principle commercial method of propagation is by leaf-petiole cuttings.

b. Leaf cuttings are used with 0.5-1.3 cm (1/4 - 1/2 inch) petioles. The petiole is inserted into the rooting medium. Adventitious roots and buds develop from the petiole base. Young plants develop slowly from long petioles.

c. Cuttings can be taken during any season.

d. A good rooting media is composed of peat and perlite.

e. Cuttings are typically rooted in flats placed in an environment of 21°C (70°F) minimum temperature, infrequent watering and no misting. Very heavy shade should be avoided as it causes very early stretching of shoots. Maximum light levels should be 1500 fc (300 μmol $s^{-1}m^{-2}$) on sunny days.

f. Rooting occurs in 3-4 weeks. The top half of the mother leaves can be removed after 10 weeks when the new shoots are 0.5-1.3 cm (1/4 - 1/2 inch) tall.

g. Rooting hormones (auxins) hasten rooting but often delay shoot development and should not be used.

2. Seed

a. Only a few cultivars will come true from seed.

b. The seed is fine and should be germinated on a screened, well prepared medium at 21°C (70°F).

B. Medium and planting

1. Plants grow best in media that are loose, well-drained and high in organic matter. A peat:perlite medium with pH from 5.5 - 6.2 is suitable for good plant development.

2. Plants are divided off the mother leaf and planted in plug flats. The plantlets are sorted and planted so that all plants in a flat are uniform in size. Whole flats of plants can then be transplanted at the same time. The sorting by size is based on the diameter of the plantlet stem base rather than on height.

3. The mature violet plug is ready for transplanting into a 10 cm (4 inch) pot after 6-8 weeks depending on the size at division.

4. Planting of the plug lower than the existing soil level forces upright growth of the petioles and makes sleeving much easier. Crown should not be covered by soil however, since a plant with a soil covered crown will die.

VI. Problems

A. Insects

1. Cyclamen mite can be a major insect problem during plug and leaf growth. The insects feed by sucking the cell sap from meristematic areas. Young leaves curl upwards and remain small.

2. The major pest during the last 5 weeks of production is thrips. Streaks and pollen dust on the petals are typical thrips damages.

3. Aphids are sometimes a problem but can be controlled with several insecticides.

4. Mealybugs attack the plant top and roots, and often collect by the base of the leaves.

5. Fungus gnats can be troublesome at any stage of development.

B. Diseases

1. Good air circulation, adequate spacing and good sanitation are practices to observe for preventive control of *Botrytis* blight (*Botrytis cinerea*).

2. 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. Routine fungicide drenches every 4-5 weeks may be required.

3. Powdery mildew (*Oidium* spp.) can be a problem under variable humidity conditions and affects especially the flowers and older leaves.

4. Stem rot (*Rhizoctonia solani*) can be controlled by fungicides.

C. Physiological

1. Ring spotting is caused by cold water. See section IVC.

VII. Harvesting, Handling, and Marketing

A. Plants are sold in 10 cm (4 inch) pots when in flower.

B. During the last 3 weeks of production, the plants should only be watered by subirrigation and the relative humidity lowered to 65%.

C. High temperature (>26°C, 80°F) will result in poor flower color and reduced flower size.

D. The plants may be put in plastic or cellophane sleeves and packed in compartmentalized boxes for shipping.

E. African violet will acclimatize to low light conditions. The acclimatization process and time to flower take 3 months at a light level of 200 footcandles for 12 hours (1.7 mol $day^{-1}m^{-2}$) and 6 months at 100 foot-candles (0.9 mol $day^{-1}m^{-2}$). Minimal flowering will take place only after 9 months of plant growth at 50 foot-candles (0.4 mol $day^{-1}m^{-2}$).

VIII. Scheduling

Growing Time For Cultural Segment	Cultural Procedure	Night Temperature
	Propagate Cutting	21°C (70°F)
20 weeks	↓	
	Divide and plant in plug flat	20-21°C (68-70°F)
6-8 weeks	↓	
	Plant in 10 cm pot (or plant commercially propagated plants) Pot to pot spacing	20-21°C (68-70°F)
5 weeks	↓	
	Space (40 plants/m^2) (4 plants/ft^2)	20-21°C (68-70°F)
5 weeks	↓	
	Flower	