Crop: Poinsettia
Scientific Name: Euphorbia pulcherrim Willd.

I. Introduction

A. The scientific name of the poinsettia is *Euphorbia pulcherrima* Willd.

B. The Poinsettia is native to southern Mexico and northern Guatemala where it flowers naturally in mid-winter.

C Poinsettias were introduced to the United States in 1895 by Joel Robert Poinsett, the first U.S. ambassador to Mexico.

D. Poinsettias are the number one potted flowering crop grown in the U.S. In 1986, U.S. production was 36.3 million pots with a wholesale value of $123 million. Over 2.3 million pots were produced in Michigan with a wholesale value of more that $7.7 million. The average wholesale price in Michigan in 1986 was $3.39 per plant.

E. The growth in popularity of the poinsettia over the last 25 years is largely a result of three factors. They are the development of free branching cultivars, the development of cultivars which retain their leaves and bracts, and the development of growth retardants for height control.

F. The poinsettia is grown for its showy colored bracts which are modified leaves. the actual flowers (cyathia) are small, yellow, bud-shaped structures located at the center of the bracts.

II. Cultivars

A. Most poinsettia cultivars grown today are sports belonging to one of the following series.

1. Annette Hegg Series (8-9 week cultivars). Representative cultivars include: Annette Hegg Dark Red, Brilliant Diamond, Lady, Diva, Topwhite, Pink, Marble.

2. Gutbier Series (8-9 week cultivars). Representative cultivars include: "Gutbier" V-14 Glory, V-10 Amy, V-14 White, V-10 White, V-14 Pink, V-10 Pink, V-10 Marble.

B. The poinsettia is a short day (SD) plant. This means it requires a continuous long dark period each night to form flowers.

1. The length of the dark period for floral initiation can not be given without some qualifications, because both temperature and cultivar influence photoperiod perception.

2. Night temperature is critical for normal flower initiation and development. Night temperatures above 73°F can delay or prevent flower initiation.

3. In addition to the temperature influenced dark period required for initiation, there is a longer temperature sensitive dark period required for flower development. Both requirements are normally met by the naturally decreasing daylengths in the fall.

4. Floral initiation under natural photoperiods occurs from Sept. 20 to 25. The date varies somewhat with weather conditions. Clear skies will cause later initiation. Early morning or late evening cloud cover encourages earlier initiation.

5. Floral initiation can be prevented with night interruption lighting under natural short day conditions.

   a. Use a combination of light intensity and duration corresponding to a minimum of two foot candles for 4 hours to prevent flowering.

   b. Flowering may be unintentionally delayed or prevented by light pollution below 2 foot candles.

C. Poinsettia flower development is influenced by cultivar, temperature, and propagation date.

1. Poinsettia cultivars are classified into 8 to 11 week response groups (plants will flower 8 to 11 weeks after the start of short days).

2. Both day temperature and night temperature affect the rate of flower development when night temperatures are below 70°F. Slower flower development will occur as average daily temperature is reduced by either lowering the day temperature and/or the night temperature.

4. Temperature is used to control crop development rate after initiation. Night temperatures should be maintained at or below 70°F.

5. Reducing temperatures to 55-60°F during "finishing" in the final 1 to 3 weeks of the crop will enhance bract color.

6. Poinsettias are very susceptible to root rot at very low temperatures (50-55°F).

7. Plants should not be exposed to temperatures less than 50°F.

C. Nutrition

1. Poinsettias have a high nitrogen requirement, particularly in the early stages of development of rooted cuttings. Plants will benefit from constant liquid feed (CLF) rates of 350-400 ppm nitrogen. Leaf color is most rapidly improved with some nitrogen in the ammonium form. Ammonium nitrogen should not exceed 30% of total nitrogen at any time as poinsettias are susceptible to ammonium toxicity.

2. When light levels and temperatures begin to decline, typically near the end of September in Michigan, Nitrogen fertilizer should be supplied as nitrate to avoid ammonium toxicity. CLF rates of 250 to 300 ppm N should be sufficient for established plants. Ammonium toxicity has also been observed in June under cool weather conditions with no night heating.

3. Potassium (200-250 ppm), phosphorus (20-50 ppm), magnesium (25-50 ppm) and molybdenum (0.05-0.1 ppm), should be included in a poinsettia CLF program.

4. A CLF program to supply 263-30-135 ppm N-P-K plus 0.1 ppm Mo is shown below.

temperatures. Ammonium nitrogen also reduces calcium uptake. Calcium chloride sprays 2 times per week at 400 to 500 ppm have proven effective in reducing the problem. Sprays should begin at first sign of bract color. Calcium at 500 ppm can be made by adding 1.9 lb/100 gallon calcium nitrate <u>or</u> 1.5 lb/100 gallon calcium chloride.

10. Calcium has also been implicated as a factor in stem strength. Plants with low Ca are likely to have weaker stems.

D. Water

1. Poinsettias require large amounts of water and should not be allowed to totally wild between waterings. Excessive wilting can result in leaf drop.

2. Plants should be watered in the early morning during very hot weather. Cold water applied on a hot afternoon can cool the roots, restricting water uptake and causing severe wilting and foliar necrosis.

3. Overwatering should be avoided on newly planted cuttings, as root loss can occur.

V. Cultivation

A. Propagation

1. Poinsettias are vegetatively propagated by cuttings.

2. Cuttings can be purchased rooted or unrooted from a propagator or produced from stock plants.

3. Stock plant production

a. There are nearly as many methods of poinsettia production from stock plants as there are poinsettia growers. There are, however, a number of standard procedures for all cutting production schedules.

1) Cuttings for stock plants should arrive from March to June. Cuttings which arrive before May 15 must be placed under night interruption lighting to prevent flower initiation.

2) Small Stock plants

   a) Plant rooted cuttings in 6 inch pots in late May.

   b) "Soft pinch with leaf removal" the stock plants leaving 10-11 nodes about 3 weeks after planting.

   c) Cuttings (8 to 11 per plant) flush about 38-45 days after the pinch.

3) Tree Production

   a) Plant rooted cuttings in 6-12" pots in late March or early April.

   b) Grow plants single stem until 15-18 nodes have developed, then pinch.

   c) Take cuttings from lower nodes as they develop. Retain at least 2 nodes on the upper shoots, so later buds grow on and flower out as poinsettia trees.

4) Distribution of cutting production

   a) The average percentage of poinsettia cuttings taken per week by Michigan poinsettia propagators is shown below. Propagation percentages for individual growers may deviate greatly from the data in this table. Numbers are based on a survey of Michigan poinsettia producers.

d) A rooting hormone is not required for rooting, but its use will speed rooting and increase uniformity. Apply hormone as a quick dip of cutting stem in a 2500 ppm IBA solution made with 50% ethanol or isopropyl alcohol, and 50% water; alternatively dust the stem bases with a talc formulation. Do not store the IBA solution for more than a couple of days. If a quick dip is used, caution must be exercised to avoid spreading disease organisms.

e) Cuttings should be allowed as much space in the propagation area as possible. Do not allow leaves from one cutting to cover the shoot tip of an adjacent cutting, as this shading delays rooting. Remove dead and dying leaves to minimize *Botrytis*.

f) Bottom heat will speed rooting. Medium temperature should be maintained at 70-75°F.

g) A fertilization program should be maintained during the rooting stage. Misting tends to remove nutrients from the cutting and rooting medium. Fertilize with 150 to 200 ppm N from a complete water soluble fertilizer (e.g. 20-10-20) 7 to 10 days after sticking or once roots have started to develop. Fertilize weekly or as needed until cuttings are planted.

h) Cuttings can also be direct rooted in the finishing pot. Direct sticking reduces transplanting labor and reduces crop time about 1 week. However, more propagation area is required.

i) For 6" pots, direct stick cuttings no later than Aug. 10, and pinch no later than Sept. 11. For 4" pots, stick no later than Aug. 25.

j) Apply a fungus gnat control insecticide to the soil 7 to 10 days after cuttings are stuck on direct stick propagated plants.

7. Pinching must be done early enough before the start of short days to allow sufficient growing time to produce the length of stem required for the pot size. The number of leaves left on the plant will approximate the number of shoots which will develop. In Michigan, the latest recommended pinch date for a 6" pot poinsettia is Sept. 11 when using natural photoperiods for flower initiation.

D. Guidelines for cutting, propagation, planting and pinching dates in Michigan:

1. Listed below are the normal and latest suggested dates for propagating, planting, and pinching in the production of high quality poinsettias in Michigan. Highest quality will normally be obtained when the indicated procedure is carried out within a few days of the normal date. Dates are based on a survey of Michigan poinsettia growers.

Pot Size (inches)	**Normal Propagation Date**	**Planting Date**		**Pinching Date**	
		Normal	**Latest**	**Normal**	**Latest**
4	Aug. 18	Sept. 3	Sept. 11	Sept. 16	Sept. 21
5.5	Aug. 4	Sept. 1	Sept. 8	Sept. 10	Sept. 14
6	July 30	Aug. 24	Sept. 3	Sept. 7	Sept. 11

The propagation dates of growers direct sticking cuttings averaged about 1 week later than those shown above.

E. Growth Regulators

1. Cycocel, B-Nine, A-Rest, and Bonzi are labeled for height control in the poinsettia.

2. Cycocel is the most frequently used. It is labeled for use as a drench, but is often applied as a spray.

   a. Cycocel as a spray is typically applied at 750 to 2000 ppm. The most commonly applied rate is 1500 ppm. The most common spray application rate is 2 to 4 quarts per 100 ft^2 or to foliage run-off.

7. Growth retardants are most effective when applied before first color. Potential for growth is less after color, and potential for reduction in bract size occurs when applied after first color.

VI. Problems

A. Diseases

1. Root rot

   a. *Rhizoctonia solani* causes stem and root rot. Symptoms include brown rot of the stem at the soil line, and roots with brown lesions.

   b. *Pythium ultimum* is water-mold root rot. Symptoms include rotting of root tips and cortex. It may advance up the stem, causing lower leaves to yellow and rot. *Pythium* is the most common root rotting pathogen attacking poinsettia plants under commercial conditions.

   c. *Thielaviopsis basicola* causes a black root rot. Roots develop black rooted areas. Plants show lack of vigor, leaf yellowing, leaf drop and sometimes sudden collapse, particularly after temperatures have been lowered below 60°F.

   d. Control root rot with a drench at planting and at 1-2 month intervals.

2. *Botrytis cinerea* or grey mold on leaves and bracts is often a problem, especially during propagation and late in plant development. Symptoms include rotting of tissue, frequently starting on the leaf and bract edges. Control can be obtained by maintaining adequate air circulation and lowering humidity. Dead plant tissue should be removed from plants regularly during propagation.

3. *Erwinia carotovora* causes a stem rot characterized by the complete collapse of the stem. Erwinia is a problem normally only during propagation, particularly when sanitation is poor. Erwinia is a bacterial pathogen which can spread rapidly and be difficult to control. The best prevention is good sanitation. There are no effective chemical controls.

5. "Bract burn" or necrosis has been linked to a number of cultural and environmental factors. High rates of fertilization late in crop development, particularly with high ammonium percentage of fertilizers, will cause bract necrosis. A physiological calcium deficiency observed under high humidity and cool media temperatures can also cause bract necrosis. *Botrytis* infection will often follow in damaged bracts.

6. "Leaf crippling" distortion or puckering is thought to be caused by environmental factors which promote gutation. Gutation in younger tissues may result in concentration of salts at the tips of the veins, killing the young cells. Subsequent enlargement thus can not occur in these regions and hence the leaf puckers as the blade expands.

7. "Rabbit tracks" is a disorder characterized by the breakdown of the bract tissue located on either side of the midrib of the bract. It occurs late in the development of the flower. The appearance of this condition is associated with high nutritional levels late in plant development, along with warm night temperature (>65°F).

VII. Harvesting, Handling, and Marketing

A. Production conditions to maximize postharvest longevity

1. Cool finishing temperatures increase bract and leaf retention.

2. Reduced fertilization during finishing (stop fertilization 1 to 2 weeks before shipping) increases leaf retention.

B. Handling

1. Store plants for a minimum time and in the light. Plants stored in the dark have increased leaf drop and cyathia abscission.

2. Plants should be sleeved just before shipping to minimize damage in transit. Sleeves should be removed as soon as possible to limit epinasty (droopy leaves).

3. Store plants at temperatures in the 50-60°F range for best longevity. Do not expose plants to temperatures less than 50°F.

C. Display conditions

1. "High" light intensity (75-225 fc) and long photoperiods reduce leaf loss. Less leaf loss occurs under incandescent light than cool white fluorescent.

2. Cooler temperatures (about 60°F) increase longevity.