Proc. Fla. State Hort. Soc. 119:425-428. 2006.

HAND POLLINATION AND SEED PROPAGATION OF *PHILODENDRON BIPINNATIFIDUM*, SYN. *P. SELLOUM*

LAURA M. MILLER[1]* AND ROGER D. NEWTON[2]
[1]*UF/IFAS Hillsborough County Extension*
5339 County Road 579
Seffner, FL 33584

[2]*Suncoast Plant Nursery*
5512 West Thonotosassa Road
Plant City, FL 33565

Additional index words. *Erioscelis emarginata*, thermogenesis, Araceae

Abstract. ***Philodendron bipinnatifidum* is a large-leaved self-heading philodendron that is an economically important nursery crop in Central Florida. It is a popular landscape plant across USDA hardiness zones 8B through 11. Highly valued for its dramatic tropical appearance, *Philodendron bipinnatifidum* is also used in interiors and protected areas outside its hardiness range. It tolerates a wide variety of environmental conditions from low to high light and moisture levels and has relatively few pest problems. In its native Brazil, *Philodendron bipinnatifidum* is pollinated by a single species of large scarabaeid beetle. Because this beetle is not present in the United States, and the female flowers on a inflorescence are receptive 48 hours before the male flowers produce pollen, hand pollination is necessary. Due to the effort required to produce them, seed can be difficult to obtain and expensive, ranging from $5.00 to $10.00 per thousand in cost. This paper documents the pollination process and describes seed collection, cleaning and storage methods for *Philodendron bipinnatifidum*.**

Philodendron bipinnatifidum is a large-leaved self-heading philodendron. It is a popular landscape plant across USDA hardiness zones 8B through 11. Highly valued for its dramatic tropical appearance, *P. bipinnatifidum* is also used in interiors and protected areas outside its hardiness range. It tolerates a wide variety of environmental conditions and can be successfully installed in interior and exterior applications ranging from low light interiorscapes in containers to full sun ground plantings (Gilman, 1999). There are few pest or disease problems associated with this plant. Bacterial disease caused by *Erwinia* species is sometimes a problem, especially under humid conditions.

Philodendron bipinnatifidum is an economically important nursery crop in Central Florida. It is grown and sold by 41% of the members of the Tampa Bay Wholesale Growers as listed in their 2005-2006 Plant Availability Locator. While numerous named cultivars are vegetatively propagated, generally by tissue culture, the species is typically and quite easily grown from seed. Seed can be difficult to obtain and expensive, ranging from $5.00 to $10.00 per thousand in cost.

In its native South America, *P. bipinnatifidum* is pollinated by a single species of large scarabaeid beetle, *Erioscelis emarginata* (Seymour, 1999). The pollinator responds to the heat and odors produced by spadix. Because this beetle is not present in the United States, and the female flowers on an inflorescence are receptive 48 h before the male flowers produce pollen, hand pollination is necessary for seed production. The same thermogenic process that attracts the beetle pollinator can be used by the human pollinators to indicate when propagation will be successful.

Materials and Methods

Mature plants will produce five or more inflorescences each year in the axils of 1 year old leaves. In Central Florida (USDA hardiness zone 9) the flowering period begins in mid April and lasts until mid to late June (Fig. 1). During this time period, plants should be checked for receptivity to pollination and then for pollen production every day in the late afternoon to early evening when receptivity peaks. It is helpful to think of the process of pollinating and collecting pollen from an individual inflorescence as a four day cycle of activities.

Fig. 1. Unopened *Philodendron bipinnatifidum* inflorescence.

*Corresponding author; e-mail: lmmiller@ifas.ufl.edu

Day 1

- Observe and flag plump unopened inflorescences.
- Gather tools for pollination: knife, brush and pollen storage container.

Day 2

- Inflorescence is open (Fig. 2).
- Receptive inflorescence will feel warm to the touch. Its temperature can reach 112 degrees Fahrenheit.
- Receptivity and temperature peak around 5:00 PM—the best time to hand pollinate. Peak temperatures last less than two hours.
- Remove spathe with a sharp knife.
- Apply previously collected pollen to female flowers located on the basal third of spadix with a brush or by hand (Fig. 3).

Day 3

- Inflorescence will appear unchanged from Day 2. If the spathe had not been removed, it would close slightly.

Fig. 2. Open inflorescence showing spathe and spadix.

Fig. 3. Applying collected pollen to receptive female flowers at base of spadix using a paintbrush.

Day 4

- Pollen is produced by the male flowers on the inflorescence (Fig. 4).
- Cut the spadix in the center above the previously pollinated female flowers.
- Deposit pollen in container and dispose of cut spadix.
- Refrigerate pollen or use immediately to pollinate receptive female flowers.

Continue to observe inflorescences. If pollination is successful, an inflorescence will develop a blackened crusty appearance (Fig. 5). If pollination was not successful, the inflorescence will decay. A curl at the tip of a closed inflorescence indicates that it opened and closed without pollination and will eventually decay (Fig. 6).

Fruit matures from mid June to mid August in Central Florida. During this time, the propagator will need to check for ripe fruit regularly. Fruit color ranges from white to golden yellow to orange, and mature fruit is soft to the touch (Fig. 7). Any remnants of the spathe will appear to flake away.

Remove ripe fruit from spadix with a knife. Ripe fruit may be collected and refrigerated before seed cleaning. Fruit should be harvested at least every other day as they mature.

Fig. 4. Male flowers shedding ripe pollen.

Pectinase enzyme (e.g., Pectinex, Novozymes Biologicals, Salem, Va.), which is commonly used by the citrus juice industry in Florida and also frequently used to remove pulp from palm and cycad seeds, can be used to break down pectin in the philodendron fruit and make the seeds easier to clean. Use one teaspoon pectinase enzyme per two quarts of fruit.

Fig. 5. Blackened, crusty appearance of successfully pollinated flowers.

Fig. 6. Inflorescence that opened and closed without pollination—compare to unopened inflorescence in Fig. 1.

Add enzyme and water 2-3 d before cleaning seed. To clean, place seeds and remaining pulp in a mesh sieve and use a high pressure stream of water to wash away pulp.

Spread seed out and allow drying in a well-ventilated room (Fig. 8). Stir daily until dry. A mesh screen may be used to remove any remaining dried pulp. Seed may then be stored or sown.

Results and Discussion

An observant and consistent propagator who has access to mature *Philodendron bipinnatifidum* stock plants can easily do the work of hundreds of beetles by dedicating an hour or so each afternoon from April to August to collecting pollen, applying the pollen to receptive female flowers, harvesting ripe fruit, and cleaning and storing seeds. Seeds can be sold to the large number of nurseries that grow this crop or planted and grown out year round.

To produce marketable plants, sow seed in 50 or 60 cell trays at a rate of 6-8 seed per cell. Do not cover. Any suitable substrate for germination may be used (e.g., Fafard Lightweight Mix #2, Conrad Fafard, Agawam, Mass.). Place in a protected growing environment—greenhouse or shade house and mist once or twice daily. Germination percentages typically approach 100%. Plants can be sold as liners or transplanted to #1 nursery containers in three to six weeks.

Fig. 7. Ripe fruit.

Fig. 8. Spreading cleaned seeds out to dry before storage.

Understanding the thermogenic nature of the plant as it relates to pollination is not only interesting but can be profitable for Florida plant propagators.

Literature Cited

Gilman, E. F. 1999. Philodendron selloum. Environmental Horticulture Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville. Fact Sheet FPS-473.

Seymour, R. S. 1999. Pattern of respiration by intact inflorescences of the thermogenic arum lily *Philodendron selloum*. J. Exp. Bot. 50:845-852.