

Are Potted Sunflowers

For You?

By John M. Dole,
Brian Whipker
and Laurence Pallez

Pacino, Elf and Teddy Bear offer the best height, foliage/flower balance and postharvest life. NC State research shows you how to produce them for optimum results.



A well-grown sunflower radiates color and excitement. The large, bright flowers of this North American native are well-known to most consumers and make a great impulse buy. Potted sunflowers are easy-to-grow from seed with a short crop time, but postharvest remains the greatest problem and limitation to sales. Recent work has attempted to provide ways to extend sunflower postharvest life and help growers who have experienced problems with this crop; the most common of these are excessively short production times and height.

CULTIVARS

Sunflowers are widely grown as a field crop and as a commercial cut

flower; however, potted plant production requires genetically dwarf cultivars. The most important potted sunflower cultivars are 'Big Smile', 'Elf', 'Pacino', 'Sundance Kid', 'Sunspot' and 'Teddy Bear'. Typically, the best results were obtained with Pacino, Elf and Teddy Bear, which have an acceptable height, proper balance between foliage and flower, and a postharvest life of 10 days or more. Pacino and Elf flowers have a single row of yellow petals, green to yellow centers and abundant pollen. Teddy Bear flowers are heavily double with bright yellow petals. Unfortunately, Pacino and Elf have the longest crop times at 10.5-12.5 weeks. Teddy Bear crop time ranges from 9.5-12 weeks but is typically 9.5-10.5 weeks.

In our research, Big Smile plants were too short with very small flowers, while Sundance Kid plants were too tall, with long stems having few leaves and resulting in

unattractive plants. Sunspot's flowers were often malformed, and petals did not expand. Elf gave similar results to Pacino and the two cultivars could be interchangeable.

PROPAGATION

Sunflower seeds are large and rapidly germinate with ease. At 70-75° F, germination occurs within 2-7 days in the greenhouse. Optimum temperatures for Pacino plug production are: Stage 1, 65-70° F for 5 days; Stage 2, 70° F for 5-8 days; Stages 3 and 4, 62° F for

7-14 days. Transplanting should be done at the two true leaf stage. Plants are usually ready to be transplanted within 2-3 weeks when germinated in a 1203 flat.

FLOWERING

All cultivars tested were facultative short-day plants, with a critical daylength of approximately 12 hours, except for Sundance Kid, which was day-neutral. Short daylengths encouraged rapid flowering but also decreased plant height. The decrease in height and crop time

Table 1. Recommended nutrient concentrations for potted sunflower leaf tissue collected from a limited number of plants at flowering.

Nutrient	Recommended concentration
Nitrogen (%)	5.0-6.0
Phosphorus (%)	0.7-0.8
Potassium (%)	5.4-6.3
Calcium (%)	2.2-2.5
Magnesium (%)	0.59-0.80
Boron (ppm)	43-53
Copper (ppm)	6.7-7.2
Manganese (ppm)	67-99
Molybdenum (ppm)	0.42-1.80
Zinc (ppm)	77-115

Plants can flower prematurely and be too short if grown under short days and warm temperatures.

was beneficial for all cultivars except for Big Smile, which tended to be too short. When daylight hours shortened from 16-hour days to 8-hour days, the short days reduced crop times by 6 days for Pacino and Elf, and by 13 days for Teddy Bear. Elf and Pacino plants were 7 inches shorter, and Teddy Bear plants were 4.5 inches shorter under short days than under long days. Seeds

should be germinated in 1- x 1.5-inch cells or large plugs, held under long days for 10-14 days after germination, then transplanted and moved into short days to help control height and decrease crop time.

PRODUCTION PROTOCOL

Actual crop time depends on the temperatures and time of

1/2 Horizontal

HARRIS SEEDS
Ad #

Write in 789

1/6 Vertical
CAROLINA
GREENHOUSES
Ad #

Write in 706

year plants are grown. Temperature tends to override daylength, as the fastest crop time occurs during warm weather in the late summer, despite the long days, and the longest crop time occurs with plants sown in January or February. Plants can flower prematurely and be too short if grown under short days and warm temperatures.

Growth is best between 65-75° F. Growth and development slow at temperatures below 63° F and are significantly delayed below 50-55° F. Plants in production can tolerate cold temperatures as low as 32° F but will grow very slowly. Full sun is always preferred. If grown in the greenhouse in periods of low light, supplemental lighting will improve quality.

Do not overwater; allow the medium to moderately dry, then thoroughly water. Drought stress will delay floral induction and flowering. Underwatered plants will also result in the yellowing and dropping of lower foliage and weak growth. Automated irrigation is highly recommended as plants are difficult to keep moist due to the extensive root system and large leaves, which cause them to dry out rapidly.

One seed is placed in a plug tray cell, peat pot or plastic pot. Generally, one plant is placed in a 4-, 5- or 6-inch pot; however, 2-3 plants can be selected for plant uniformity and placed in 6- or 7-inch pots. Potted plants



1/2 Page Island

HARNOIS INDUSTRIES
Ad #

Write in 806

1/2 Page Island

WHITMIRE MICROGEN
Ad #

Write in 712

can be grown pot to pot for the first 2 or 3 weeks after transplanting, then spaced 4-6 inches apart as leaves become large. Any substrate that is well-drained and has a pH of 6.0-6.5 is acceptable. Pinching is not required and usually not practiced.

Sunflowers require high nutritional levels. A nitrogen rate of 150-200 ppm is used after roots are established for top-irrigated plants; use 100-125 ppm for subirrigated plants. Pot sunflowers are heavy users of potassium, and the optimal fertilizer ratio of N:P:K:Ca:Mg is 8:1:10:4:2. Recommended tissue nutrient concentrations are reported in Table 1 on page 18. Magnesium and iron deficiencies can occur, with iron deficiency in particular occurring when the sub-



Fig. 3. Effect of photoperiod on Pacino potted plants

strate pH is higher than 6.8. When the substrate pH drops below 5.5, however, both magnesium and iron can become toxic.

HEIGHT CONTROL

For potted plants, dwarf cultivars are required. Single sprays of B-Nine (daminozide) at 4,000-8,000 ppm or Sumagic at 16-32 ppm provided suitable height control of plants grown in 6-inch pots. Drenches of Bonzi at 2-4 mg a.i. per 6-inch pot were also effective. Growth retardants can be applied 3-5 weeks after sowing and multiple applications may be needed. Weekly sprays of B-Nine (1,500-5,000 ppm), A-Rest (33-66 ppm) or Bonzi (5-10 ppm) may also be used, commencing with the first true leaves. The lower rate may be used with the first application; use the higher rate with subsequent applications.

DIF is also effective in controlling height. Photoperiod control and placing plants under SD immediately after transplanting the plugs into pots are also efficient methods for reducing height.

INSECTS

Aphids, whitefly, thrips and spider mites are the primary concern in the greenhouse and may cause flower injury. Thrips can be especially difficult to control in sunflowers, for which growers have reported good control with Conserve7. During warm weather, when the vents are open for long periods of time, numerous species of caterpillars may appear and can quickly defoliate a crop. Monitor daily and act immediately to prevent extensive damage.

DISEASES

Potted sunflowers are especially prone to Pythium root rot, and growers should avoid overwatering, cool air and medium temperatures. Powdery mildew can also cause extensive damage; provide good air circulation and vent humid air in the evening to reduce this problem.

Leaf-edge necrosis can also be a problem; it may not be a fungal or bacterial infection, but a toxic reaction to whitefly. For pot plants, the dark brown and black irregular marginal symptoms are serious. Also, check substrate EC to be sure the problem is not due to high soluble salts, which should be 3.0 ms/cm or less (based on the PourThru method).

POSTHARVEST

Market pots when the ray flowers are one-half to fully expanded. High fertilizer rates of 200 ppm nitrogen can reduce postharvest life of potted sunflowers to 9 days from 11-12 days for plants fertilized with 100 ppm nitrogen. The best postharvest life for ebb-and-flow irrigated plants is obtained with 100 ppm nitrogen in fertilizer applications that are terminated 7-10 days prior to flowering. Plants are able to tolerate one week of 41° F cold storage without any reduction in postcooler life. Two weeks of cold storage, however, resulted in foliage damage. Promalin did not delay foliage yellowing or increase postharvest life. GPN

John M. Dole is associate professor, Brian Whipker is assistant professor in floriculture extension and research and Laurence Pallez is associate professor at North Carolina State University, Raleigh, N.C. They can be reached at (919) 515-5374 or brian_whipker@ncsu.edu.

The authors thank Alex R. Masson, Inc. for their financial support and Leah Aufill and Ingram McCall for technical assistance. We also want to thank Modena Seed, Benary Seed and Sakata Seed for supplying the plant materials.

1/3 Page

ATAMI
Ad #