



## GUIDE TO SUCCESSFUL POT SUNFLOWER PRODUCTION

Brian Whipker<sup>1</sup>, Shravan Dasoju<sup>2</sup>, and Ingram McCall<sup>3</sup>

Annual sunflower (*Helianthus annuus*) is a native of North America with an original range from the Great Plains to the West Coast. Pot sunflowers have been popular in Europe for a number of years. Pot sunflowers are a quick crop to produce and offer an opportunity for growers to capitalize on the current consumer demand for the plant.

### Keys to Success with Pot Sunflowers

1. Do not stress plants
2. Provide sufficient water
3. Avoid overhead watering
4. Manage your fertility program, providing a N to K ratio of 1:1.5. Cease fertilization 7 to 10 days prior to bloom
5. Control plant height with plant growth regulators
6. Space plants for proper growth and good air circulation

### Cultivars

The main pot sunflower cultivars are 'Big Smile', 'Elf', 'Pacino', 'Sundance Kid', 'Sunspot', and 'Teddy Bear'. 'Big Smile' has been available for a number of years. The 4 inch flowers have yellow petals surrounding a black center. Plants produce an individual flower and it is common for 3 plants to be grown in a 6 inch pot.

'Pacino' has flower petals and a center which are yellow and the plants are prolific pollen producers. Plants have sturdy stems with a single dominant 4 to 5 inch flower which blooms first, followed by 4 to 6 additional secondary flowers which open 4 to 6 days later. Plant size is sufficient for 1 plant per 6 inch pot. 'Sundance Kid' is a cultivar with a mixture of bronze to pure yellow shaded flowers (roughly 50% of each shade). The primary flower is 4 to 6 inches across and plants produce multiple blooms and 3 plants per 6 inch pot are recommended. 'Sunspot' produces a single large 5 inch head with yellow petals and a slightly darker center. The 4 inch, solid yellow-orange flower distinguishes 'Teddy Bear' from the other cultivars. The plant architecture and multiple secondary flowers of 'Teddy Bear' are similar to that of 'Pacino'. 'Elf' has 4 inch yellow flowers on branching plants and the plant architecture and multiple secondary flowers of are similar to that of 'Pacino'.

### Production: Propagation

Pot sunflowers are propagated from seed. The seed count ranges from 760 (Sunspot), 810 (Big Smile), 900 (Sundance Kid), 920 (Teddy Bear), 1560 (Elf), to 1600 (Pacino) seeds per ounce. Germination occurs in 2 to 5 days when germinated at 70 to 75 °F (21 to 25 °C). Seeds can be sown directly into 1203 or 1204 flats and transplanted 2 to 3 weeks

<sup>1</sup> Floriculture Extension Specialist

<sup>2</sup> Former graduate student at Dept. of Horticulture, Iowa State Univ.

<sup>3</sup> Research Technician, Dept. of Horticultural Science, NC State Univ.



later at the 2 to 4 leaf stage into the final container. Some growers sow seeds directly into the final container to be sold.

### Culture

Plants should be grown with 72 °F days and 65 °F nights. Warmer temperatures will cause the plants to elongate. The timing from sowing until flower varies by cultivar. 'Big Smile' flowers in the shortest amount of time, 7 to 8 weeks, resulting in a quick cropping schedule. 'Sundance Kid' and 'Sunspot' are 8 to 9 week cultivars. 'Teddy Bear' is a 9 to 10 week cultivar. 'Pacino' and 'Elf' have the longest production time of 9 to 11 weeks, but crop time varies with season. For example, 'Pacino' plants bloomed in 11 weeks when sown in January or February and 1 to 2 weeks less for summer and early fall sowings. The number of days from sowing until visible bud, first color, and flowering is listed for each cultivar except 'Elf' in Table 1.

Most sunflower cultivars are day-neutral, but will flower quicker under short day ( 10 hours of light). Under short days, plants can be excessively short and have fewer leaf nodes. Supplemental lighting to provide around 13 hour days will

improve plant quality.

### Irrigation and Fertilization

Sunflowers require adequate moisture. Using an automated drip watering system will assist in irrigating. Sunflowers are not tolerant of water stress. This will result in reduced plant growth, yellowing, and dropping of lower leaves.

Deficient fertilizer levels will result in the yellowing (nitrogen deficiency) or defoliation of the basal leaves. A recommended constant liquid fertilization rates is 150 ppm N, of which >75% of the N should be in the NO<sub>3</sub>-N form. High levels of NH<sub>4</sub>-N + urea in a fertilizer mix will stimulate stem elongation, resulting in the need for higher plant growth regulator rates to control plant growth. The type of fertilizer selected should supply the ratio of nutrients required by pot sunflowers. Based on research, in order to match the total shoot nutrient content of 'Pacino' pot sunflowers, the optimal fertilizer ratio of N:P:K:Ca:Mg would be 8:1:10:4:2. This would result in a recommended rate of <15 ppm P, 180 to 220 ppm K, 100 ppm Ca, and 50 ppm Mg for optimal growth. Pot sunflowers are heavy feeders of K, which would be expected because of

potassium's essential role in maintaining stalk strength. Rotating between fertilizers like Scott's Excel<sup>®</sup> 15-5-15 Cal-Mg and Excel<sup>®</sup> 14-5-38 K-CEL (or potassium nitrate) would provide a balanced fertilization ratio and a high amount of K. Foliar tissue standards for pot sunflowers are listed in Table 2.

### Diseases

The most serious disease of pot sunflowers is *Pythium* root rot. *Pythium* is usually present in most root substrates. Growers should

Table 1. Number of days from sowing until visible bud, first color, and flowering of potted sunflowers<sup>z</sup>.

Cultivar	Days Until			Plant height (inches) <sup>x</sup>	Plant diameter (inches) <sup>x</sup>	Bud Count <sup>x</sup>
	Visible Bud <sup>y</sup>	First Color <sup>y</sup>	Flowers Open <sup>x</sup>			
Big Smile	30	46	52	7.8	14.6	4.3
Sundance Kid	33	53	60	19.6	17.0	7.9
Sunspot	33	53	61	14.3	16.2	2.1
Teddy Bear	46	60	67	15.8	17.0	10.6
Pacino	53	67	76	23.5	17.7	13

<sup>z</sup> The comparison trial was conducted at NC State University. Seeds were sown on 14 Jan. and the seedlings transplanted into the final container on 28 Jan. Values are for plants without plant growth regulators applied.

<sup>y</sup> Based on visual observations.

<sup>x</sup> Mean value of 8 replications for the untreated control. Plants treated with plant growth regulators delayed flower opening, were shorter in height, and smaller in diameter.

avoid growing conditions which stress the plant: continuously water-logged root substrate, cool root substrate temperatures, or cool air temperatures. If needed, monthly drenches of Subdue, Aliette or Banrot can be applied as a preventive fungicide (see label for recommended rate). Other potential root rot diseases include *Phytophthora* and *Verticillium* wilt.

*Botrytis* can also be a problem on leaves and flowers. The vegetative growing tip of 'Pacino' plants forms a tight whorl prior to when the flower bud is visible. This whorl is susceptible to water droplet retention and *Botrytis* infection. Avoid overhead watering and controlling moisture condensation within double poly structures will prevent the problem.

Sunflowers are also susceptible to a number of foliar diseases, the most common being: Powdery mildew, Downey mildew, *Alternaria* blight and leaf spot, rust, and *Septoria* leaf spot. Foliar diseases can be controlled with preventative fungicide applications if needed. Impatiens necrotic spot virus (INSV), aster yellows, which is transmitted by the aster leafhopper, and sunflower mosaic, caused by the cucumber mosaic virus (CMV), have been reported on sunflowers.

### Insects

Thrips are the most common insect pest. Thrips feed on leaves, flower petals, and pollen. Tame and Orthene can be used as a control if needed, following label directions. Ideally, thrips should be under control prior to flowering to avoid the potential of any foliar sprays causing flower phytotoxicity. Whiteflies and a number of caterpillar species can occasionally be a problem. Sunflowers are also a tempting nectar source for honey bees.

### Height Control

For height control of pot sunflowers, marketable sized plants can be grown in 6 inch pots with foliar sprays of Sumagic between 16 and 32 ppm or with B-Nine between 4,000 and 8,000 ppm. Bonzi foliar sprays had little effect

Table 2. Foliar tissue standards for pot sunflowers.

Nutrient	Recommended Concentration
Nitrogen [N] (%)	5.0 to 6.0
Phosphorus [P] (%)	0.7 to 0.8
Potassium [K] (%)	5.4 to 6.3
Calcium [Ca] (%)	2.2 to 2.5
Magnesium [Mg] (%)	0.59 to 0.80
Boron [B] (ppm)	43 to 53
Copper [Cu] (ppm)	6.7 to 7.2
Manganese [Mn] (ppm)	67 to 99
Molybdenum [Mo] (ppm)	0.42 to 1.8
Zinc [Zn] (ppm)	77 to 115
Values are reported on a dry-weight basis, based on a limited number of plants. Tissue samples were collected at bloom from 'Pacino' pot sunflowers grown with 100 or 200 ppm N.	

on controlling height.

Bonzi substrate drench concentrations between 2 to 4 mg a.i./pot produced optimum height control when plants were grown in 6 inch pots for spring crops. For summer crops, slightly higher drench concentrations up to 8 mg a.i./pot of Bonzi should be used. Based on observations, a drench rate up to 8 mg a.i./pot of Bonzi could be suitable for a 4 or 4 1/2 inch pot, with growers using the lower rate range during the winter months. Sumagic substrate drenches had little effect of controlling height.

Foliar sprays of B-Nine at 4,000 or 8,000 ppm or Bonzi drenches at 2 or 4 mg were suitable for all the potted sunflower cultivars, with drenches providing a greater degree of control. Growers will need to decide the degree of height control desired and select the appropriate PGR that matches their needs.

### Post-harvest

For extended bloom life, the fertilization of pot sunflowers should be terminated 7 to 10 days

prior to bloom. Preliminary trials suggest that pot sunflowers with flower heads just beginning to show color can be held at 42 °F for up to 1 week without a reduction in flower life. Growers should conduct their own in-house test to confirm results before trying this on a large amount of their crop.

### **Marketing**

From an informal survey of growers, most are growing 'Big Smile' and 'Sundance Kid' with three plants per 6 inch pot and 'Pacino', 'Sunspot', and 'Teddy Bear' are being grown with either 1 or 3 plants per 6 inch pot. Wholesale prices ranged from \$1.95 to \$3.05 per 6 inch pot and retail prices were \$3.50 to \$4.50 per 6 inch pot.

### **For Further Reading:**

- Dasoju, S., M.R. Evans, and B.E. Whipker. 1998a. Paclobutrazol drenches control growth of potted sunflowers. *HortTechnology* 8:235-237.
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**Recommendations for the use of chemicals are included in this publication as a convenience to the reader. The use of brand names and any mention or listing of commercial products or services in this publication does not imply endorsement by the North Carolina Cooperative Extension Service nor discrimination against similar products or services not mentioned. Individuals who use chemicals are responsible for ensuring that the intended use complies with current regulations and conforms to the product label. Be sure to obtain current information about usage and examine a current product label before applying any chemical. For assistance, contact an agent of the North Carolina Cooperative Extension Service in your county.**

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