K-STATE Research and Extension: MF-2610

A Grower's Guide

Calendula

Calendula officinalis

Calendula is also known as pot marigold, but is not related to the common garden marigold, *Tagetes spp.* Historically, calendula blossoms were used to color broth, rice and other foods as a substitute for saffron, but is now primarily used as skin cream, oil or lotion.

Family: *Asteraceae*

Life cycle: Herbaceous annual

Native: Europe to Africa

Height: 12 to 15 inches

Sun: Full sun. Tolerates hot conditions.

Soil: Well drained, not overly moist. Prefers loam.

Water: Moderate

Flowers: Flowers are bright yellow and orange, single or double, and bloom from early summer until a killing frost. Flowers close at night and reopen in the morning. Calendula will bloom from summer to early fall if deadheaded at the right time. Flowers attract beneficial insects. High resin varieties are available.

Propagation: Sow seed in the field. No treatment is needed. Seed can be started indoors and transplanted. Seed germinates in one to two weeks and will have about 80 percent germination. Use 10- to 12-inch spacing. Reseeds itself easily.

Pests: Calendula will attract whitefly, aphids and thrips. Cucumber beetles and blister beetles also may be a problem. Damping off can occur in the greenhouse.

Harvesting: Harvest flowers by hand when they are completely open. Avoid flowers that have gone to seed because medicinal properties are not as active. If plants are allowed to go to seed, they will quit growing. If harvesting only once for essential oil, harvest three weeks after flowers appear. One source reported that flowers need to be picked at least three times per week for optimal quality. It is estimated that 1 acre of calendula could keep a crew of three to four people busy every day for three or four months, with dry flower yields of 400 to 600 lbs/A. Flower petals dry quickly, but the rest of the head requires at least a week in the drying oven.

Parts used: Fresh or dried flowers

Used as: Medicinal food, food coloring, infusion, tincture, compress, poultice, ointment, salve, cream, balm, foot soak, bath herb, infused oil, liniment, cosmetics, insect repellent. Petals have a nutty flavor.

Medicinal benefits: Several clinical studies show antimicrobial activity, antiviral activity and wound healing in skin tissue. Calendula was also shown to induce the formation of new blood vessels, which is important in wound healing. Approved in Europe for inflammation of the mouth and pharynx, and for wounds and burns. Typical forms are as a gel, ointment, tincture, tea, shampoo and hand cream.

Market potential: Moderate to high, preferred in dry form. Prices for flowers range from $4.80 to $39 per pound (lb) dry weight.

Summary of field trial data: To get complete yield data, weekly harvests are necessary, but that was beyond the capabilities of this project. The plants were in full flower most of the year, but only harvested in the fall. We estimated the yields

K-State Field Trial Data 2000-2002 *Calendula officinalis*					
				Average	**Comments**
Age of plants in years	1	2	3		
Number of test sites[1]	7	0	0		Calendula is an annual crop.
Survival rate (%)	84.7	—	—	84.7	
Vigor rating[2]	3.7	—	—	3.7	Did not do as well in non-irrigated sites.
Height (cm)	45.0	—	—	45.0	
Dry weight herb (g/plant)	73.0	—	—	73.0	
Dry weight root (g/plant)	7.5	—	—	7.5	
Maturity rating[3]	4.6	—	—	4.6	
Insect damage rating[4]	1.8	—	—	1.8	Damage from thrips and whiteflies noticed, especially with high-resin varieties.
Disease rating[5]	1.1	—	—	1.1	Some leaf spotting, probably related to the thrips damage.
Estimated planting density (number of plants/A)	43,560	—	—	—	
Plant density[6]	36,895	—	—	—	
kg/A dry weight (g/plant x plant number) – flowers	673	—	—	—	Rough assumption of 25 percent of top dry weight becomes flowers.
Estimated marketable yield (dry weight lbs/A) – flowers	1,483	—	—	—	
Yield x ½ of low price[1]	$3,559	—	—	—	
Yield x ½ of high price[1]	$28,919	—	—	—	

1 See "How Data Were Collected," on page 3.
2 Vigor rating (1=very poor, 3=slightly above average, 5=very good, well adapted)
3 Maturity rating (1=vegetative, 2=early bud, 3=early flower, 4=full flower, 5=seed production, 6=senescence)
4 Insect damage rating (scale of 0 to 5; 0=no damage and 5=severe damage)
5 Disease rating (scale of 0 to 5 with 0=no damage and 5=severe damage)
6 Calculated as starting plant density x survival rate.

we reported might be 25 percent of the top dry weight as flowers over the growing season. The crop must be harvested by hand for optimal quality in repeated harvests. Mechanization might be possible for a one-time harvest. This would imply some specialization in this crop, and/or other flowering crops, in order to pay for the infrastructure and equipment. A definite contract or market should be secured before taking on this debt. In our field plots, the calendula was robust even in hot, dry, windy summers. However, irrigation is needed for optimal yields. This also makes a nice plant for the flower garden.

How Data Were Collected

The plants described in this fact sheet were grown in K-State test plots in Hays, Colby, Wichita, or Olathe, Kan. Generally, four replications of each species were included at a site. Not all species were screened at each site or each year. The number of locations is noted in the table. Depending on the location and year, either five or 10 plants per plot were established in each of the replications. Details can be found at *www.oznet.ksu.edu/ksherbs*. Plants were grown from seed in the greenhouse and transplanted in the field in May or June.

All plants at each location were used to determine survival percentage, vigor rating, insect damage rating, and disease rating as described above. Three plants per plot were measured for height, and only one plant per plot was harvested to measure yield each year. Because there were four plots, this allowed us to estimate yield from four plants at each location per year.

Plants were dried, and top and root weights recorded in grams. Grams per plant were converted to kilograms per acre (kg/A) and pounds per acre (lb/A) to estimate field-scale yield. The population density used to calculate field yields was the optimal population density (determined by the average size of the plants) times the actual percentage survival as measured in the field. There was generally some loss due to transplant shock and, for some species, significant winter loss as well.

Plant spacing recommendations on each fact sheet are for spacing within a row. Distance between rows will depend on the particular farming operation and equipment used. The minimum row spacing will be the same as the plant spacing recommendation. For example, if the recommendation is to set plants 12 inches apart, rows should be a minimum of 12 inches apart as well. However, if cultivator or root-harvesting equipment is on 5-foot centers, plant rows 5 feet apart to facilitate cultivating and harvesting. Adjust estimated plant density per acre on the worksheets to estimate gross yield and net income.

Prices were taken from Appendix B of K-State Research and Extension publication S-144 *Farming a Few Acres of Herbs: An Herb Growers Handbook*. To calculate a rough gross income potential for each herb, estimated yield was multiplied by the lowest and the highest retail price, divided by two. This is a rough estimate of wholesale price. Actual prices would be determined based on a contract obtained from a buyer.

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Kansas State University Agricultural Experiment Station and Cooperative Extension Service

MF-2610 May 2004

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