

A Grower's Guide

Stevia

Stevia rebaudiana

Stevia has recently gained attention and become available in health food stores in the United States as a natural non-sugar sweetener. It is a tropical plant that is native to Paraguay and Brazil, but does well in Kansas and probably in other Great Plains states. An herb company in Missouri has recently obtained seed from a breeding selection program in Canada to improve Stevia and select for sweeter plants. Stevia was originally used in eastern Paraguay to sweeten the local tea, Yerba Mate, but the plant was also used medicinally.



Family: *Asteraceae*

Life cycle: Herbaceous tender perennial. Not winter hardy in Kansas.

Native: Paraguay and Brazil

Height: 12 to 15 inches

Sun: Full sun or partial shade

Soil: Responds well to rich soil with high organic matter.

Water: Prefers a hot and humid environment, but did well in Kansas field trials with heat and wind. Tolerates drought, but supply moderate to high irrigation if possible.

Flowers: Delicate, white flowers bloom on and off throughout growing season. Flowers are more abundant in the fall.

Propagation: Easily propagated from cuttings, especially before the plant blooms. Seed propagation is also possible. Keep seeds moist and warm, and expect about 30 percent germination over a two- to three-week period. This plant can be

grown outdoors year-round in tropical regions, and could be brought inside as a houseplant for the winter in Kansas. Not winter hardy outside in Kansas. Collect cuttings in the fall for rooting and spring replanting. As a field crop, treat as an annual.

Pests: No significant disease or insect pests noted in our plots. Rabbit and deer feeding does not appear to be a problem, but in one set of test plots, four of five plants mysteriously disappeared between field day and harvest.

Harvesting: Clip leaves or aboveground portion any time during the growing season. One source recommends fall harvest for the sweetest plants. A supplier in Missouri recommended the opposite – an early season harvest.

Parts used: Leaves, before flowering.

Used as: The leaves of the plant are powdered and used as a non-sugar based sweetener. In some cases, an extract of Stevia is sold as a concentrated white

powder to sprinkle on food.

Medicinal benefits: This plant has been used in folk medicine to treat hypertension, diabetes and as a contraceptive. However, it is popular as a sugar substitute, and the glycosidal diterpens in the leaves are 30 times sweeter than sugar. The concentrated extract is 300 times sweeter. One recipe conversion chart suggests that $\frac{1}{8}$ teaspoon of Stevia is equivalent to 1 tablespoon of sugar, and 2 tablespoons of Stevia could substitute for 1 cup of sugar.

Market potential: Moderate to high. Prices for the herb range from \$6.50 to \$36.77 per pound (lb) dry weight.

Summary of field trial data: This species did well under Kansas conditions, especially considering its tropical origins. It appeared healthy and vigorous even in the hot wind. In 2001, the Hays site (non-irrigated, central/western Kansas) yielded about half the dry weight (32 g/plant) as the Wichita site, which was irrigated (72

g/plant). The 2003 trial seems to be similar: larger plants in Wichita with irrigation, compared to Olathe, which was not irrigated. The vigor rating is 4.2 on a 5-point scale, and no significant insect or disease pests were noted. Because this is an aboveground herb, harvesting could be mechanized as long as quality is maintained. The price spread is a bit disconcerting with the high-end price more than five times the low-end price.

K-State Field Trial Data 2000-2002 *Stevia rebaudiana*

				Average	Comments
Age of plants in years	1	2	3		
Number of test sites¹	2	0	0		This is an annual crop.
Survival rate (%)	95.0	—	—	—	
Vigor rating²	4.2	—	—	—	
Height (cm)	60.5	—	—	—	
Dry weight herb (g/plant)	51.9	—	—	—	
Dry weight root (g/plant)	8.7	—	—	—	
Maturity rating³	2.0	—	—	—	
Insect damage rating⁴	0.6	—	—	—	
Disease rating⁵	0.4	—	—	—	
Estimated planting density (number of plants/A)	21,780	—	—	—	1- by 2-ft. plant spacing assumed.
Plant density⁶	20,691	—	—	—	
kg/acre dry weight (g/plant x plant number) – tops	1,074	—	—	—	
Estimated marketable yield (dry weight lbs/A) – tops	2,365	—	—	—	
Yield x ½ of low price¹	\$7,686	—	—	—	
Yield x ½ of high price¹	\$43,492	—	—	—	

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.

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. Cultivating four plots 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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