

A Grower's Guide

Licorice

Glycyrrhiza glabra and *Glycyrrhiza uralensis*

The earliest use of licorice was recorded in 2100 B.C. *Glycyrrhiza* is a Greek word meaning “sweet root.” In traditional Chinese medicine, licorice is the most used herb after ginseng. The compound glycyrrhizin is responsible for the sweet flavor of licorice roots. The herb has many uses, including as a cough suppressant and an anti-inflammatory for ulcers. It stimulates the adrenal glands and is often used in Chinese medicine to balance other herbs in a prescription. People at risk for high blood pressure should not use licorice. Most licorice candy is now flavored with anise, not *G. glabra*, though the herb is still used to flavor tobacco products.



Family: Fabaceae

Life cycle: Perennial (Zones 6-11 for *G. glabra*, Zones 4-11 for *G. uralensis*)

Native: *G. glabra* is native to southwest Asia and the Mediterranean region and was cultivated in Europe since at least the 16th century. *G. uralensis* is native to central Asia, China and Japan. A third species, *G. lepidota*, is native to North America and found in the Great Plains and west.

Height: 2 to 5 feet

Sun: Full sun to partial shade

Soil: Well-drained soil, seems to prefer a pH of 6.5 to 8.

Water: Moderate

Flowers: Lavender and white flowers bloom in mid- to late summer. *G. glabra* or *G. uralensis* rarely bloomed in our fields in Kansas.

Propagation: Seed must be stratified for several weeks and scarified and soaked

for two hours in warm water before sowing. Treated seed has an 80 percent germination rate compared to a 20 percent germination rate for untreated seed. Germination takes about two weeks. Can be planted directly into the field, but the germination rate is about 20 percent. Space 2 feet apart because the plant will spread. Also possible to plant from rhizome cuttings. This plant will re-sprout from harvested roots and rhizomes, so don't plant it in a spot unless you are prepared to have it there forever.

Harvesting: Harvest roots in the second or third year using a needle nose spade or other digging tool. Harvest in the spring or fall. The plant will form a sturdy taproot, several branch roots, and also send out runners up to 8 meters (26 feet) long.

Parts used: Rhizome and root, fresh or dried

Used as: Decoction, tincture, syrup elixir, lozenge, medicinal food, fluid extract, tonic wine

Medicinal benefits: In Europe, *G. glabra* is approved for use by physicians for coughing, bronchitis and gastritis. In laboratory studies, licorice has demonstrated anti-inflammatory effects and is protective against gastric ulcers. It also has antiviral and antifungal properties, but can increase water retention and cause high blood pressure. Common folk uses include winter tonic for immunity, digestive tract, respiratory tract and adrenal gland support. Native Americans used *G. lepidota* root tea to reduce fevers in children and a poultice of the leaves to treat earaches. Some chewed the root to keep the mouth moist and strengthen the throat for singing.

Market potential: High. Buyers need good organic sources for this herb. Much of the *G. glabra* is imported from Europe and *G. uralensis* is imported from Asia. Domestic, organic sources should be popular. *G. glabra* root sells for \$3.35 to \$25.60 per pound (lb) dry weight, and *G. uralensis* sells for \$18.20 to \$46.40/lb dry weight.

Summary of field trial data: Neither species seemed to be affected by insect or disease pressure, and at harvest in early fall, both were primarily in the vegetative stage (see maturity rating of 1.0 to 1.1, or vegetative). If the plants had flowered at all, there didn't appear to be any seed set or flowers by late August or early September. Both plants spread prolifically. *G. glabra* had a survival rating of 171 percent by the second year, and by the third year the survival rating of *G. uralensis* was 158 percent. Many licorice plants of both species were observed in neighboring rows that weren't just a few inches or a foot away, but 3 to 6 or more feet from the original planting. Both species appear to be winter hardy in Kansas, though one reference claimed that *G. glabra* was only

hardy to zone 9. Most of Kansas is in zones 5 and 6.

The main difficulty in growing and harvesting licorice might be in successfully and easily digging and washing roots and rhizomes. Both can be dug and sold, though the tap root can be pretty firmly rooted and difficult to get out of the ground. Some of the rhizomes are easy to pull up by hand because they run for several feet just a few inches above the ground. This makes harvest largely a hand-labor task, and it's not clear whether the economics justify the hand harvesting.

So far, the *G. glabra* we have grown does not have a particularly sweet root, especially compared to *G. uralensis*, and is a

little bitter tasting. It might be a good idea to check the biotype or find a superior biotype before planting a whole field to this crop. Also, once you plant, it will probably be there forever. This advice applies to flower gardens, too. However, it isn't like mint, which takes over absolutely everything. It will spread out its airy-looking fronds throughout the bed every 1 to 3 feet and be a lovely though unpredictable addition to the flower garden.

Field trials with *G. lepidota* are underway, but we don't have multiple years of data yet to report. So far, it appears to be doing well, but we haven't found any retail prices for this herb, so specialized contracts may be required to sell it.

K-State Field Trial Data 2000-2002 *Glycyrrhiza glabra*

				Average	Comments
Age of plants in years	1	2	3		
Number of test sites¹	5	3	2		
Survival rate (%)	85.2	171.7	126.0	127.6	Survival numbers higher than 100% indicate that the plant was spreading via rhizomes.
Vigor rating²	3.6	3.9	3.7	3.7	
Height (cm)	38.4	54.7	75.5	56.2	
Dry weight herb (g/plant)	12.1	46.0	49.9	—	
Dry weight root (g/plant)	8.7	53.2	50.8	—	These roots appear to be less affected by the drought in 2002 than the <i>G. uralensis</i> (see next table)
Maturity rating³	1.0	1.3	1.0	1.1	Observed blooms in late summer of 2001 only.
Insect damage rating⁴	0.5	0.5	0.5	0.5	
Disease rating⁵	0.1	1.5	0.6	0.7	
Estimated planting density (number of plants/A)	21,780	21,780	21,780	—	Assume 1- by 2-ft. spacing
Plant density⁶	—	21,780	27,443	—	Assumed 100% survival in second year, then 126% in second year.
kg/A dry weight (g/plant x plant number) – roots	—	1,159	1,394	—	
Estimated marketable yield (dry weight lbs/A) – roots	—	2,552	3,071	—	Root biomass of 5000 lb/a has been estimated by Tim Blakely. This might be possible if a larger area was harvested. For data purposes, we only harvested the root and rhizome attached to one plant, without extracting all the rhizomes that had spread.
Yield x ½ of low price¹	—	\$4,287	\$5,159	—	
Yield x ½ of high price¹	—	\$32,666	\$39,309	—	

¹ See "How Data Were Collected," on page 4.

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.

K-State Field Trial Data 2000-2002 *Glycyrrhiza uralensis*

				Average	Comments
Age of plants in years	1	2	3		
Number of test sites¹	2	2	2		
Survival rate (%)	72.5	69.0	158.0	98.8	
Vigor rating²	3.5	4.0	3.8	3.8	
Height (cm)	30.5	53.0	60.0	47.8	
Dry weight herb (grams/plant)	6.8	64.0	28.2	—	
Dry weight root (grams/plant)	4.6	41.8	20.5	—	Yields probably lower in third year due to drought effect on crop and difficulty in digging the root from a very dry soil.
Maturity rating³	1.0	1.0	1.0	1.0	
Insect damage rating⁴	0.6	0.8	0.7	0.7	
Disease rating⁵	0.2	1.3	0.5	0.7	
Estimated planting density (number of plants/acre)	21,780	21,780	21,780	—	Assume 1- by 2-ft. spacing
Plant density⁶	—	15,028	34,412	—	
kg/acre dry weight (grams/plant x plant number) – roots	—	628	705	—	
Estimated marketable yield (dw lbs/acre) – roots	—	1,384	1,554	—	The dry weight harvest of this species appears to be lower than that of <i>G. glabra</i> , even when taking the higher plant density in year 3 into account. Higher high-end prices could make up for the lower yields, if they are obtained in the market.
Yield x ½ of low price¹	—	\$12,594	\$14,140	—	
Yield x ½ of high price¹	—	\$32,109	\$36,053	—	

¹ See "How Data Were Collected," on page 4.

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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