

A Grower's Guide

Chinese Milkvetch

Astragalus membranaceus

This plant is widely and safely used in Chinese medicine but is related to many species from North America, including Missouri milkvetch (*A. missouriensis*) and woolly loco (*A. mollissimus*), which are poisonous to livestock.



Family: *Fabaceae*

Life cycle: Herbaceous perennial (Zone 5)

Native: Northeastern China

Height: 3 to 4 feet, sprawls as it matures

Sun: Partial shade to full sun

Soil: Well worked, sandy, dry soil

Water: Moderate, will not do well in poorly drained soil

Flowers: Pale yellow, blooms from mid-summer until frost

Propagation: Stratify seed for at least three weeks before sowing, then scarify and soak in warm water for several hours before planting seed. Germination rate will be about 50 percent. Sow directly in field or start indoors and transplant after last frost date. Susceptible to transplant shock. Plant 15 inches apart and water moderately.

Harvesting: The roots are harvested in the fall after at least two years growth,

generally between the third and fifth year depending on location and how fast the plants grow. Dig roots using a needle-nose spade or a garden fork to extract the entire root. Appears to be a taproot with branches. Harvest could be partially mechanized.

Parts used: Roots, fresh or dried.

Used as: Medicinal food, tonic, decoction, traditional tincture, syrup, elixir, lozenge, honey, powder

Medicinal benefits: Stimulates the immune system. Also an antioxidant with antiviral activity and cardiovascular effects.

Market potential: High, used in many Western and Chinese herbal formulations. Profits and volume up. Prices range from \$7.50 to \$56 per pound (lb) dry weight. Often sold as ground dried root or root slices.

Summary of field trial data: Chinese milkvetch is an attractive, sprawling legume that would fit well in the back of a

perennial flower bed or as a field crop. Though we had high hopes for this crop, the root yields in year three were not large. Potential demand is still high because this is a widely used herb with many properties. Digging and drying the root can be a lot of work, but mechanization may be possible. The plant does not have many insect or disease pests, but likes well-drained soil. It needs a bit of coddling for the first couple of months after transplanting because it grows slowly the first year. It may not work as a direct-seeded crop due to the stratification and scarification required for good seed germination. This is a fairly competitive crop once it gets established, but the percent survival in the second and third years was below 50 percent, so start with a high planting density. Some of the native *Astragalus* species in the Great Plains may have potential as medicinal plants, but medical research has not addressed this yet. Plants flowered and set seed prolifically under field conditions, so growers could plant their own seed after year two.

K-State Field Trial Data 2000-2002 *Astragalus membranaceus*

				Average	Comments
Age of plants in years	1	2	3	—	
Number of test sites¹	4	3	2	—	
Survival rate (%)	64.3	41.7	42.5	49.5	
Vigor rating²	2.9	4.3	4.5	3.9	
Height (cm)	34.0	73.0	115.0	74.2	
Dry weight herb (g/plant)	4.8	95.4	195.0	—	
Dry weight root (g/plant)	1.7	26.1	32.3	—	
Maturity rating³	0.7	2.2	4.4	4.2	
Insect damage rating⁴	0.5	0.5	1.2	0.7	
Disease rating⁵	0.1	0.5	0.5	0.4	
Estimated planting density (number of plants/A)	27,878	27,878	27,878	—	
Plant density⁶	17,926	11,625	11,848	—	
kg/A dry weight (g/plant x plant number) – roots	31	303	383	—	
Estimated marketable yield (dry weight lbs/A) – roots	67	668	843	—	
Yield x ½ of low price¹ - roots	\$251	\$2,505	\$3,161	—	
Yield x ½ of high price¹ - roots	\$1,876	\$18,704	\$23,604	—	

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. 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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