

# A Grower's Guide

# Red Clover

*Trifolium pratense*

The word “trifolium” refers to the three leaves of clovers. Demand is high for quality red clover blossoms, but the price will need to be high to pay for the labor-intensive harvest of this crop. Historically valued for its use in controlling coughs, bronchitis and skin problems, red clover contains phytoestrogens, which have several important properties.



**Family:** *Fabaceae*

**Life Cycle:** Herbaceous, short-lived perennial (Zone 3)

**Native:** Indigenous to Europe, central Asia, northern Africa and naturalized in many other parts of the world.

**Height:** 12 to 24 inches

**Sun:** Full sun to partial shade

**Soil:** Any soil. Will fix its own nitrogen, but requires some fertility (phosphorus and potassium) for high yields.

**Water:** Moderate

**Flowering:** Flowers are large, pink blossoms that appear throughout the summer, with a particularly large flush in mid-spring and early summer.

**Propagation:** Some say seed germinates easily in the field (is probably scarified first), while others suggest that seed must be stratified for several weeks before sowing. Germination takes seven to 10 days with a germination rate of about 75 per-

cent. Space 12 inches apart in row. When grown as a forage crop, direct seed in early spring or fall, or broadcast seed into standing oats or wheat in early to mid-March for a clover crop after the grain is harvested. Since red clover is a common forage crop, the seed won't be expensive compared to other herbs.

**Pests:** Pests were not a problem in our field plots, except for rabbit and deer feeding. With only a few red clover plants scattered in each plot among other plants that are less palatable, the animals fed heavily on the red clover. In a larger, solid-seeded field of red clover, this would probably not be a problem. One reference reported some powdery mildew on the leaves and flowers in late summer and early fall. There is also a root weevil that is common in many parts of the country that limits red clover's productive life to about two to three years. Plan to rotate this crop.

**Harvesting:** Harvest the flowers carefully by hand in the early morning while dew is still on the plant. Clover will bruise easily, so handle with care. Place the flowers on a screen in one layer and allow them to dry naturally. When fully dried they have a deep purplish-red color. Store them in a glass jar or paper bags away from direct heat and light until use.

**Parts used:** Flowers, fresh or dried. Some use the dried herb or leaves.

**Used as:** Infusion, tincture, syrup, elixir, lozenge, medicinal food, ointment, salve, cream, balm, honey

**Medicinal benefits:** Red clover is reported to have antispasmodic and expectorant effects, and promotes the skin's healing process in treatments for athlete's foot, sores, burns and ulcers. Traditional uses also include for coughs, bronchitis and whooping cough. It is also used as an anticancer remedy. Science has not confirmed red clover's traditional uses, but has identified many biologically

active compounds, including phytoestrogenic isoflavones, which activate estrogen receptors in mammals. Some standardized extracts of red clover are sold with eight times the amount of phytoestrogens consumed in the typical diet. Phytoestrogens can cause physical problems in cattle that are fed late cut hay, and reduced fertility and conception rates in sheep that graze on red clover pasture. Red clover contains volatile oils and cyanogenic glycosides. Though red clover leaves are sold by several herb companies, there is not much written about the medicinal value of the

leaves, as compared to the flowers, which have been used and studied more.

**Market potential:** High for quality flowers. Flowers sell for between \$5.70 and \$47.03 per pound (lb) dry weight, and the leaves for \$8 to \$52.80 lb dry weight. Because harvest is so labor intensive, growers might want to secure a market, probably local, to obtain a return for the time investment.

**Summary of field trial data:** Red clover was grown under less than optimum conditions, and we didn't have the

people or time to harvest individual red clover blossoms for yield estimates. We grew all of the herbs in the greenhouse in the spring and transplanted them to the field so various species could be compared. Most growers direct seed red clover. In our trial, survival ranged from 20 to 85 percent for first year transplants, and biomass differed by location, ranging from 4 to 150 g/plant dry weight in the first year. The differences can be partially explained by irrigation, but rabbit and deer feeding were also a factor. Solid-seeded, large stands of clover probably

**K-State Field Trial Data 2000-2002 *Trifolium pratense***

				Average	Comments
<b>Age of plants in years</b>	1	2	3		
<b>Number of test sites<sup>1</sup></b>	4	2	0		
<b>Survival rate (%)</b>	57.3	48.3	—	52.8	
<b>Vigor rating<sup>2</sup></b>	3.5	3.5	—	3.5	
<b>Height (cm)</b>	37.0	38.0	—	37.5	
<b>Dry weight herb (g/plant)</b>	67.5	140.8	—	—	Year 2 – Flower yield estimate: 25 percent of dry weight is flowers, or 35.2 g/plant. See price calculations below.
<b>Dry weight root (g/plant)</b>	9.9	38.6	—	—	
<b>Maturity rating<sup>3</sup></b>	3.8	5.2	—	4.5	
<b>Insect damage rating<sup>4</sup></b>	0.6	0.4	—	0.5	
<b>Disease rating<sup>5</sup></b>	0.5	0.2	—	0.3	
<b>Estimated planting density (number of plants/A)</b>	43,560	43,560	—	—	Assume a solid seeded stand, with at least 1- by 1-ft. spacing.
<b>Plant density<sup>6</sup></b>	24,960	21,039	—	—	
<b>kg/A dry weight (g/plant x plant number) – tops</b>	1,685	2,962	—	—	
<b>Estimated marketable yield (dry weight lbs/A) – tops</b>	3,711	6,525	—	—	
<b>Yield x ½ of low price<sup>1</sup></b>	\$14,844	\$26,100	—	—	
<b>Yield x ½ of high price<sup>1</sup></b>	\$97,970	\$172,260	—	—	
<b>kg/A dry weight (g/plant x plant number) – flowers</b>		741			
<b>Estimated marketable yield (dry weight lbs/A) – flowers</b>		1,631			
<b>Yield x ½ of low price<sup>1</sup> - flowers</b>		\$4,648			
<b>Yield x ½ of high price<sup>1</sup> - flowers</b>		\$38,361			

<sup>1</sup> See "How Data Were Collected," on page 3.

<sup>2</sup> Vigor rating (1=very poor, 3=slightly above average, 5=very good, well adapted)

<sup>3</sup> Maturity rating (1=vegetative, 2=early bud, 3=early flower, 4=full flower, 5=seed production, 6=senescence)

<sup>4</sup> Insect damage rating (scale of 0 to 5; 0=no damage and 5=severe damage)

<sup>5</sup> Disease rating (scale of 0 to 5 with 0=no damage and 5=severe damage)

<sup>6</sup> Calculated as starting plant density x survival rate.

wouldn't suffer unless a large herd of deer fed on it during the winter.

If we assume that about 25 percent of the dry weight of the aboveground plant in the second year could be flower blossoms (especially if harvested over several weeks of repeated picking), then a yield of about 1,600 lbs/A dry weight of flowers should be possible. However, labor is more likely than land to be the limiting factor for this crop. One reference estimated that an

experienced harvester can pick 1 lb dry weight flowers per hour, while an average value is  $\frac{1}{2}$  to  $\frac{3}{4}$  lb per hour. A grower would certainly need a price closer to \$25 to \$30 per lb to make it worthwhile to grow and harvest.

Though prices were found for the leaves, their medicinal value is unclear. Another option for a diversified farm is to harvest the field for livestock hay once or twice per year.

### 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](http://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.

Rhonda Janke, sustainable cropping systems specialist  
Jeanie DeArmond, extension assistant

Brand names appearing in this publication are for product identification purposes only. No endorsement is intended, nor is criticism implied of similar products not mentioned.

Publications from Kansas State University are available on the World Wide Web at: <http://www.oznet.ksu.edu>

Contents of this publication may be freely reproduced for educational purposes. All other rights reserved. In each case, credit Rhonda Janke, *Farming a Few Acres of Herbs: Red Clover*, Kansas State University, May 2004.