

# AGRICULTURAL GUIDE

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Red clover

## Red clover

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Red clover (*Trifolium pratense* L) is a short-lived perennial and is the most widely grown of all the true clovers. Classifying red clover is sometimes confusing, but the red clovers grown in this country may be grouped into two divisions—*early flowering and late flowering*.

The more useful of the two types grown in Missouri is the early flowering type, usually referred to as *medium red clover*. This type produces two or three hay crops per year and is usually treated as a biennial, although it is actually a short-lived perennial. Some new varieties of this type will produce to their full capacity for three years or more. An example is Kenstar, released by the University of Kentucky.

The late flowering types are referred to as *mammoth red clovers*. They usually produce one hay crop plus an aftermath growth. Mammoth red clover has yielded from 15 to 40 percent less hay in tests throughout the lower Cornbelt. *Mammoth red clover is not recommended for use in Missouri*; its best performance is in areas of short growing seasons such as Canada.

### Use and adaptation of red clover

Red clover is effective as a pasture legume and for hay. It can withstand more shading in the seedling

stage than most other legumes, making it easy to establish in grass sods.

Follow these management practices to make red clover more effective:

- Maintain adequate fertility level—test soil and top-dress accordingly.
- Use rotational grazing, especially during second year.
- Rest pasture in September and early October.

Medium red clover is most productive on soils of medium to high fertility levels, with a pH<sub>s</sub> of 5.5 or higher with good internal drainage. It will tolerate and grow on soils of lower pH, less fertility and poorer drainage than alfalfa.

### Selecting seed and varieties

Always use medium red clover rather than mammoth.

Two varieties of medium red clover—Kenland and Kenstar—are superior to others in Missouri. Buying certified Kenland or Kenstar is the only way to be sure of getting seed that has not been contaminated with mammoth red clover or varieties unadapted to Missouri.

Using resistant varieties is about the only control for diseases such as northern and southern anthracnose, powdery mildew, and root and crown rots which can seriously damage red clover.

Table 1. Red clover yields

	1974	1975	Total Tons
Kenstar	4.85	2.93	7.78
Kenland	4.06	2.46	6.52

1975 UMC North Missouri Center Field Day Report.  
Seeded Sept. 1, 1973.

**Kenland.** Kenland red clover was released some years ago. It has good resistance to southern anthracnose which is especially destructive to red clover stands in the southern Cornbelt. It has superior yielding ability to most other varieties and has a longer life than common red clover. It reportedly has more resistance to crown and root rots than seed originating from the northern part of the United States.

**Kenstar.** Kenstar is a new variety of medium red clover released by University of Kentucky. It is very similar to Kenland in its area of adaptation and resistance to southern anthracnose and powdery mildew. It is slightly superior to Kenland in yielding ability during its first and second harvest years.

Kenstar's greatest advantage over Kenland is its ability to persist and produce during the third harvest season.

When sufficient seed is available it is expected to replace Kenland for general use in Missouri. Kenstar is protected under the Plant Variety Protection Act and use of the name Kenstar is prohibited beyond the certified seed class.

**Common red clover.** This refers to all classes of seed of unknown varietal origin. Unless a variety is certified, it might not be genetically pure.

One of the great concerns about using mammoth clover, aside from the yield reduction to the first grower, is the propagation of this inferior strain by seed harvest and its finding its way back to Missouri farms as common red clover seed.

Although there is a greater advantage in using certified red clover seed compared to other commonly grown forages, many pounds of common red clover are seeded in Missouri each year. If common seed must be used, locally produced seed (although there is no way to tell its genetic purity) is usually superior to common seed produced outside the southern Cornbelt. If you purchase from an individual or neighbor, have a sample tested for germination and for the presence of troublesome weeds. Avoid seed low in germination that contains a high percentage of troublesome weed seeds.

When buying common seed from dealers, check the tag to verify its purity and origin.

Red clover seed sold under a brand name with no variety specified has no guarantee as to its genetic purity.

## Establishment

Red clover can be seeded in late summer or early fall. This usually increases total yield for red clover during its lifetime as compared to spring or winter seedings.

One of the most common ways to establish red clover is to broadcast the seed on winter wheat fields during late winter. Freezing and thawing will work the seeds into the soil enough so that germination can occur. One of the drawbacks of this method is that good clover stands may be difficult to obtain in heavy wheat stands that are harvested for grain. To avoid smothering the clover, the straw should be clipped and removed as soon as possible following wheat harvest. Shredded straw can also aggravate seedling diseases.

Red clover may also be seeded with spring oats.

Red clover is well adapted to sowing on a prepared seedbed, either in the early spring or late summer (Aug. 15 to Sept. 14). The seedbed should be firm and the clover seed should not be covered with more than  $\frac{1}{4}$  to  $\frac{1}{2}$  inch of soil.

Fertility treatments are best recommended on the basis of a soil test.

In the absence of a soil test, use a fertilizer treatment of about 20 pounds of nitrogen, 60 pounds of phosphate, and 40 pounds of potash at seeding time when seeding on a prepared seedbed in the fall.

When red clover is seeded on small grains during winter, some phosphorus (about 60 lbs.), topdressed at the time of seeding, has proven beneficial, especially if the soil is low in phosphorus. Seed and fertilizer may be mixed together and applied at the same time.

## Seeding rates and mixtures

Red clover is best grown with a grass. The stand will remain longer and will continue to be productive when the legume has thinned. Also, the danger of bloat with red clover is greatly minimized when grown with a grass.

All of cool season grasses adapted to Missouri can be used with red clover. Timothy has universally been used and it is an excellent choice. It is a quality grass and it matures at about the same time as red clover.

Usually about 8 pounds of medium red clover seed per acre is used in association with a grass.

Examples of red clover-grass mixtures.

- Red clover 8 lbs.  
Orchardgrass 6 lbs.
- Red clover 8 lbs.  
Timothy 2 lbs. (fall) or 4 lbs. (spring)
- Red clover 8 lbs.  
Tall fescue 10 lbs.
- Red clover 8 lbs.  
Reed canarygrass 6 lbs.



## Management in year of establishment

Red clover seeded in winter or early spring may be grazed the first summer. If it blooms before Sept. 10, it should be removed. The most practical way to prevent this is to graze during August.

Do not graze between Sept. 10 and Nov. 1 or frost. Root reserves are important in building up winter hardiness and resistance to disease.

Usually some fertilizer applied in fall or winter will benefit a new stand of red clover. This is especially true if the crop was not adequately fertilized at seeding time. Red clover is not stimulated to higher yields by potash to the same degree as alfalfa, but some potash is very beneficial in maintaining stands.

In the absence of a soil test, a mixed fertilizer such as a 0-30-90 applied each year to red clover fields used for hay should be adequate.

## Management in second and third years

Grazing red clover in pre-bloom stage doesn't harm the crop. Because red clover is high in magnesium, it can be used for early spring grazing in the fight against grass tetany.

Practice rotation grazing to get the highest yields and stand persistence into the third year. Removing the forage with three grazings will result in better third year stands than four grazing harvests. If used for hay, or hay and seed, two cuts or harvests are desirable.

Always rest in September and most of October, if possible. The fall growth need not be wasted. It can be grazed after Oct. 25 or frost, whichever occurs first.

## Red clover for pasture renovation

Red clover is an excellent choice for seeding in grass sods. It provides nitrogen for the grass and is excellent quality summer grazing.

Red clover seeded into fescue sods has increased yields about 35 percent above those plots receiving 120 pounds of nitrogen per acre.

Red Clover Fescue	Fescue 60 lb. - N	Fescue 60 lb. - N - March 60 lb. - N - August
6797*	3996*	5035*

\*Yields in pounds of dry matter per acre. Univ. of Mo.

Red clover is one of the easiest legumes to re-establish in predominantly grass sods. This may be done in one of several ways, but the grass *must* be controlled until new clover seedlings become established. High seeding rates (10-12 pounds per acre) have resulted in better stands than lighter seeding rates.

**Method 1** - Use a disc or field cultivator to disturb the grass sod from November through January or early February. Broadcast the clover seed early enough during winter so that freezing or thawing will cover the seed. Seedings made in mid-February have a 50 percent better chance of success than those made in mid-April. When early grass growth begins, graze or clip the new growth. Fertilizer containing phosphorus and/or potash may be broadcast prior to seeding. Don't use nitrogen in the fertilizer mix because it will stimulate the well rooted grass more than it will benefit the young clover seedlings.

**Method 2** - This method is similar to method one, but the sod is not tilled. For this method to be successful, several management details are necessary. The grass should be weakened as much as possible by grazing prior to seeding. The seeding should be made no later than Feb. 15 in the northern part of the state and by Feb. 1 in the southern part.

New spring growth should be grazed early in the growing season. This step cannot be over emphasized because early, repeated heavy grazing is a must to control the grass growth and retard its production while the young clover plants are establishing their root systems. It is best to use large numbers of cattle and to overgraze the grass quickly. This procedure should be repeated as necessary throughout late March (in South Missouri), April and early May.

Nitrogen fertilizer should not be used and it is best if the grass was not topdressed with nitrogen during the previous late summer or fall period. Adequate phosphorus and potash should be applied prior to seeding.

**Method 3** - This method eliminates a number of tillage operations, reduces soil erosion and can be done later in the spring than methods one or two.

This method uses a chemical to retard grass growth. In most cases the chemical used has been paraquat. Since the chemical is a contact killer, seeding must be done after the existing grass has started its growth. Thus, it must be done either in early spring or late summer. Rates of one to two pints of paraquat has proven satisfactory.

Some type of grassland drill or seeder must be used to incorporate the seed into the undisturbed sod. Seedings made during the early spring after grass growth has started cannot be broadcast onto the soil surface with any great chance of success for a new seeding.

For more detail on establishing red clover in grass sods, see UMC Guide 4651.

## Producing seed

Missouri farmers have the opportunity to produce both certified and uncertified red clover seed.

For details regarding certified seed production contact the extension agronomist at the local Univer-

sity of Missouri Extension Center; the Foundation Seed Stocks organization, Department of Agronomy, UMC; or the Missouri Seed Improvement Association at Columbia.

Seed harvest is best taken from the second growth of red clover in the year following the year of seeding.

Highest seed yields usually are obtained from red clover when the first growth is used for hay. Hay should be harvested no later than 15 days after the earliest heads appear; this is normally early full bloom.

Seed yields average about one or one and one-half bushels per acre but can be doubled or tripled with proper cutting management if sufficient pollination occurs.

Red clover must be pollinated by insects for producing seed. Bumblebees are usually depended on for pollinating but they usually are inadequate in number. This is probably the number one reason for low seed yields in Missouri.

Honeybees can be and should be used to increase pollination of red clover. The notion that honeybees do not pollinate red clover because it has deeper florets than other legumes is false. Pollination of the flower occurs on each visit of the bee regardless of whether it gets nectar.

Provide at least one hive of honeybees per two acres of red clover. Don't place them in the field too early or they will tend to orient to other clover. Place colonies in or near the field as soon as 5 to 10 percent of the second crop is in bloom. In Missouri, this is usually sometime in July.

For highest seed yields, windrow red clover for drying. Although it is occasionally harvested in the standing condition, yields obtained in this method are usually low.

Red clover should be cut for seed when the interior of the heads is brown, the stems show a yellowish tinge and the seeds show color ranging from yellow through purple. Cutting the seed crop sooner than this results in light seed of poor viability and germination. If cutting is delayed much beyond this point, heavy seed losses occur as the dead-ripe heads are broken and lost by weather and harvesting operations.

Windrow the crop immediately after mowing. If it is allowed to dry in the swath, rake it in the morning while it is damp and tough.

Seed is sometimes harvested from a new seeding of red clover made during the winter, but it is usually not a desirable practice because yields are low.

## Red clover quality

If red clover is harvested for hay when no more than one-half of the plants are blooming, the feeding value approaches that of alfalfa.

The protein content of red clover can be nearly as high as that of alfalfa. Red clover cut for hay at the 50 percent bloom stage usually exceeds 14 or 15 percent protein. Many times red clover is not harvested soon enough, and it is under these conditions that unfavorable quality results. Don't wait until it is in full bloom. Also when harvested too late, new growth from the crown has started to elongate. When these young shoots are removed, a sharp reduction in the second growth often occurs.

Livestock sometimes slobber excessively when feeding on second cutting red clover hay. This condition, caused by a fungus, is rather rare, and usually does not harm animals. A good way to avoid this is to pasture the second growth.

## Red clover insects

Insects are extremely troublesome to red clover in Missouri. They reduce yields and quality, interfere with seed production, and in some cases destroy the stand.

Unfortunately there is no practical, efficient overall control for all red clover insects.

In particular, little can be done to control insects in seed fields. Because bumblebees and honeybees are largely responsible for seed pollination, chemical treatment to control insects would also destroy the pollinators.

There is opportunity for economic control of some insects such as army worms and grasshoppers. Both of these are capable of completely destroying red clover stands, and when populations of these insects begin to build, extreme damage may be imminent. It is then best to contact your county extension center to determine the latest control methods.

Early recognition of insect damage and the insect causing it is the key to effective control. The pests are generally grouped according to the location and type of damage they inflict on the clover plant. These groups are: (a) root infesting species, (b) stem and leaf feeders and (c) flower, head and seed eaters.

## Root infesting species

**Clover root curculio:** A short-snouted, dark gray to brown weevil or a grayish white, legless brown-headed grub about 1/6-inch long. Plants wilt and die during dry weather from feeding scores along the roots and girdling near the crown. Injury most severe in late spring and early fall.

**Clover root borer:** A very small black or dark brown, cylindrical beetle or very small, legless, curved brown-headed grub about 1/10-inch long. Clover turns brown, wilts, and dies from their feeding on the root surface and from tunneling through the roots. Injury is most common in old stands of clover.

**Grape colaspis:** Clover roots are fed upon by 1/8-inch long white-curved bodied, brown-headed



grub. The adult, a light-brown chunky beetle  $\frac{1}{10}$ -inch long, feeds on clover leaves.

### Stem and leaf feeding species

**Grasshoppers:** Especially damaging during times of moisture stress.

**Clover leaf weevil:** Small, green, legless larvae with a yellow-white stripe edged with red down the center of back. It feeds at night on the leaves. It may be mistaken for alfalfa weevil larvae when small, but grows to  $\frac{1}{2}$ -inch long. The larvae hide at the base of the plants during the day. The adult has black flecks on its back and is  $\frac{1}{2}$ - $\frac{1}{3}$ -inch long. Both larvae and adults feed on clover leaves leaving smooth-edged notches along the margins. Damaging populations occur more frequently in late cool, dry springs.

**Lesser clover leaf weevil:** A small, pale brown or green, legless grub, up to  $\frac{1}{4}$ -inch long, feeds in the heads and lateral buds. Buds die and plants are stunted. The adult weevil is green or bluish-green with a black head and snout approximately  $\frac{1}{8}$ -inch long. The female lays eggs in small slits cut in the stem or in the bud at the axil of the leaf or in the terminal bud of the plant.

**Alfalfa weevil:** Damage usually occurs when adults migrate from nearby alfalfa fields that have just been harvested. Usually the alfalfa weevil is not a serious red clover pest.

**Green cloverworm:** Light green,  $1\frac{1}{4}$  inches long, with a narrow white stripe and a second faint white line on each side. The adults are dark-brown, black spotted or mottled moths with a wing span of about  $1\frac{1}{2}$  inches.

**Armyworms:** Dark green worms with longitudinal light stripes down their sides and back. Caterpillars strip foliage from clover and eat tender shoots at night but hide beneath debris during the day.

**Cutworms:** Plump cylindrical worms up to  $1\frac{1}{2}$  to 2 inches long, of varying shades and markings. Eat leaves and cut plants off at the base.

**Clover stem borers:** Yellowish, smooth-sided cylindrical worms about  $\frac{1}{2}$ -inch long with two curved hooks at the end of the body. The larvae tunnel inside core of clover stems (usually sweet clover) eating out the pith. Stems swell, crack open, and sometimes break off.

**Aphids:** Small, pale green, soft bodied plant lice. Infected plants become coated with a sticky fluid from the aphids.

**Leafhoppers:** Elongated, wedge-shaped bugs mostly less than  $\frac{1}{4}$ -inch long and variously colored. Leaves become mottled and white in appearance. They may become dwarfed and yellowish or reddish in color.

**Lygus bugs:** Greenish to yellowish-brown, flat bugs about  $\frac{1}{2}$ -inch long. They cause blasted buds, flower drop, and shriveled seeds.

**Meadow spittlebugs:** Concealed in frothy masses on clover stems. They suck juices from the plant causing it to wilt and die.

### Flower head and seed eating insects

**Clover head caterpillar:** A small hairy caterpillar, about  $\frac{1}{2}$ -inch long that feeds on developing seeds and destroys many florets at the base.

**Clover seed chalcid:** Very small, fat, white, legless, maggot-like larvae that feeds inside the seeds. Infested seeds are often dull-colored and may later break and crack.

**Clover seed midge:** Very small, pinkish, legless maggot that feeds on the outside of green seeds, causing them to shrivel and dry up. Heads fail to develop evenly, only a part of the pink florets open, the rest of the head stays green.

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