

United States Department of Agriculture,

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**U. S. Department of Agriculture.** **CRIMSON CLOVER.**

DESCRIPTION.

Crimson clover (*Trifolium incarnatum* L.), also known as scarlet clover, German clover, Italian clover, and carnation clover, is an annual plant native to southern Europe and has long been cultivated as a forage crop in the warmer portions of that country. It is an erect, tufted plant, 1 to 2 feet high, with soft-hairy stems and leaves, and usually bright scarlet flowers in elongated heads. The root system is well developed and penetrates deeply into the soil and the plant is a vigorous grower. The seed is larger than that of red clover, oval in shape, bright reddish-yellow when fresh (paler in the white-flowered variety) and has a highly polished surface. The plants stool freely, many stems arising from a single root.



FIG. 1.—Crimson Clover.

Several varieties are recognized in Europe, distinguished chiefly by the color of the flowers and the time required by the plants to reach maturity. Very little attention has been paid to these different varieties in this country. A white-flowered variety is sometimes seen on the market, but as a general rule only one sort is recognized by seedsmen and this is usually sold under the name of crimson clover.

#### CONDITIONS OF GROWTH.

Crimson clover will not stand severe freezing although it is one of the so-called "winter annuals" and under favorable conditions makes much of its growth during the cool, moist weather of fall, winter, and early spring. Its strong-growing roots enable it to secure nourishment in many soils so poor and thin that red clover would fail entirely. While requiring a warm climate, it will not endure severe drought. It thrives best on rich, rather sandy loams; but, when the conditions of moisture and temperature are favorable, it gives good results on light sandy soils as well as on clays if they are not too stiff and cold.

Crimson clover has come into prominence in this country within comparatively recent years. It can hardly be regarded as a successful crop outside of the region from New Jersey west to the Allegheny Mountains and south to eastern Tennessee and Texas. True, good yields are often obtained in other sections, but can not be depended upon year after year. In the middle and south Atlantic States this clover is one of the best crops that can be grown for forage and soil renovation. It has given good results in many portions of the Gulf States but many failures are also reported. In the colder sections of the country this clover is sometimes successfully grown as a summer crop but it usually winterkills badly when sown in the autumn. At the experiment stations in Rhode Island, New York, Ohio, Michigan, Illinois, South Dakota, Nebraska, and other States in the North and West, the general results of tests show that it is too tender for the climate and is less valuable than red clover. From results recently obtained at the Alabama Experiment station it seems very likely that in many cases, especially in the South, failures with this crop are to be attributed to the absence from the soil of the tubercle-forming organisms which are necessary for the proper appropriation of nitrogen by the plant. These organisms being supplied to the soil, excellent crops were obtained where without them the result was a failure.

#### CULTURE.

*Preparation of soil.*—There are many ways of preparing the soil for this crop, depending largely upon the purpose for which it is intended. Little if any fertilizer is needed, except what may be

used in connection with the clover to prepare the land for the next crop in the rotation. On very poor, worn-out soils it is usually a good plan to give a moderate application of phosphate and potash. When crimson clover follows a cultivated crop like corn no preparation is necessary other than that of the cultivation of the corn or other crop. When the clover follows a crop of small grain it is usually necessary to plow the land and this should be done just before the time for sowing the seed. Cloddy land should be well pulverized before seeding. A fine seed bed is essential to uniform germination.

*Seeding.*—It is extremely important that a farmer should sow none but *fresh* seed. It is an easy matter to test the germinating power of the seed; it requires but a very short time and is well worth the while of every farmer intending to sow in any quantity\*. Good fresh seed should germinate 90 to 95 per cent and under proper conditions the sprouting should take place within three days. American seed has given much better results than the imported, on account of its greater vitality. The amount of seed sown per acre varies from 10 to 20 pounds, depending largely upon the character of the soil and the use to which the crop is to be put. Rarely a smaller quantity may be used. The common practice is to use about 12 or 15 pounds.

The seed may be sown broadcast or with a drill. The former is the most common in practice, perhaps largely from the fact that the clover is so often sown on land already occupied by corn, potatoes, or some other crop. The seed is often sown by hand, sometimes from horseback, but better results will usually be secured by the use of some machine like the Cahoon broadcast seeder.

Throughout the middle Atlantic States and the South generally crimson clover may be sown any time from July 15 to September 15, and if the moisture conditions are favorable it may be sown still later in the Gulf States. As a rule the best results are obtained from seed sown in July and August. The seed may also be sown in the spring, but, except in the colder northern States or for some special purpose, the results are much less satisfactory. In the North, spring sowing is necessary if this crop is grown at all. It may sometimes be grown to advantage in this section as a temporary crop in place of red clover.

Some farmers do not cover the seed at all; but many failures have resulted from following this method, attributed by some to heavy rains immediately after the seed is sown but more likely due to the exposure of the tender, unprotected plants to the hot summer sun.

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\* A full discussion of the selection and testing of crimson clover seed will be found in Circular No. 18, Div. Bot., U. S. Dept. Agric., August, 1899.

When its use is practicable, the roller is an excellent implement for covering the seed. It presses the seed into the soil and insures uniform germination. A light harrow or a brush drag may also be used.

*Harvesting.*—Crimson clover may be harvested in the same way as common red clover. It is sometimes difficult to cure properly, as it is ready to cut at a time when wet weather is likely to interfere. It may be cut for hay as soon as it comes into bloom and should never be cut for this purpose later than when it is in full bloom. The hairs upon the calyx of the flowers become hard and stiff as the plant matures and are likely to prove troublesome to animals eating the hay, forming "hair balls" in the stomachs of the animals, which sometimes cause death. When harvested for the seed, cutting should take place as soon as ripeness has been reached to avoid loss through shattering. It is also well to thrash the crop or put it under cover as soon as it is dry, as heavy rains may injure the seed by causing it to sprout in the head.

Under average conditions from 8 to 15 tons of green, or  $1\frac{1}{2}$  to 3 tons of cured forage may be obtained from an acre of crimson clover. Very poor soil or drought may result in a lighter yield, while as high as 20 tons are reported under favorable conditions. The yield of seed per acre usually ranges from 8 to 12 or 15 bushels.

#### USES.

*For hay.*—When cut in proper season and well cured, the hay is, if anything, superior to that of red clover, having much the same chemical composition and a somewhat higher percentage of digestibility. It is relished by all kinds of stock and is very highly prized for feeding to animals that are required to do heavy work. Its nutritive ratio varies from 1:3.5 to 1:4.

*For soiling.*—Crimson clover is an excellent crop for this purpose. It is ready for use some time before red clover and at a time when there are few other forage crops at hand. It is particularly valuable for this purpose on dairy farms. In experiments made at the New Jersey station, nearly one and one-half tons per acre of digestible food, valued at \$25.00, were secured. A ton of crimson clover in proper condition for soiling contains about 325 pounds of dry matter, of which about  $5\frac{1}{2}$  pounds of crude fat, 50 of crude protein, and 150 of carbohydrates are digestible. Rape is sometimes sown with the clover when a soiling crop is desired and the resulting forage is excellent.

*For pasturage.*—This crop readily lends itself to use for pasturage, especially in the early spring. It may be used alone or in connection with winter rye or rape. At the New Jersey experiment station

it was estimated that an acre of crimson clover six inches high contained "sufficient food to properly nourish twelve cows for one week."

*For silage.*—This is one of the best of the clovers for use in the silo. The yield of forage is large, is easily handled, and it makes a better quality of ensilage than most other legumes commonly grown for this purpose. The silage is especially valuable for feeding dairy stock.

*For green manure.*—This is one of the most important uses to which this crop can be put. Its season of growth is such that it can be used without in any way interfering with the production of the primary crop of grain or vegetables and it affords a large amount of fertilizing material. The herbage is heavy, the roots are abundantly produced and penetrate deeply into the soil, and together these form a large amount of vegetable mould, exerting a beneficial effect on the physical condition of the soil as well as adding much nitrogen and other valuable elements of plant food to the surface soil where it will be available to corn, wheat, and other crops. It is estimated that the average crop of crimson clover is worth from \$15 to \$30 per acre for the fertilizing value of the nitrogen alone. An important advantage which crimson clover has over cowpeas as a fertilizer lies in the fact that it decays more readily and is less likely to "burn" the soil when a heavy crop is turned under. Another advantage arises from the possibility of producing the crop of clover between the time of harvesting the regular crop of one season and the planting of the next. It may often be used along with cowpeas to good advantage, the cowpeas being used as a summer crop and followed by the clover for the winter.

*As a soil cover.*—In many sections of the country, especially where the soil "leaches out" or washes badly, it is imperative to have the land covered with vegetation during the time it is not occupied with the primary crop, particularly during periods of heavy rains. Crimson clover is peculiarly well adapted to use as a cover crop. It may be sown in corn, tobacco, potatoes, cowpeas, sorghum, and many other crops after the last cultivation and, when these are removed, will come on and occupy the land during the fall, winter, and early spring and may be pastured off or plowed under in time for the planting of the next crop. It is an excellent cover crop for use in orchards, where it is also one of the best of sources of nitrogen for the trees. Crimson clover in the orchard reduces the amount of cultivation necessary to keep the weeds in check, and if the crop is not needed for fertilizing the soil, it can be cut for hay, soiling, or silage. The roots and stubble left on the ground from a crop of clover cut when in full bloom at the New Jersey station contained

nearly 40 pounds of nitrogen, over 10 of phosphoric acid and over 14 of potash per acre. When the crop is allowed to mature the potash in the roots and stubble is increased but the nitrogen and phosphoric acid is reduced. This crop can be used in connection with small fruits as well as with peaches, pears, and apples.

SUMMARY.

1. Crimson clover is an annual, not adapted to use in permanent meadows and pastures and too tender for successful general cultivation outside of the Middle and South Atlantic and Gulf States. It thrives best in warm, moist loams of at least moderate fertility and makes most of its growth in the fall and early spring.

2. The seed should be sown in late summer or early autumn (July 15 to September 15) at the rate of from 10 to 20 pounds per acre on a well prepared seed bed. It may be sown alone or with other crops, a frequent practice being to sow with corn, potatoes, and like crops at or after the last cultivation. The seed may also be sown in the spring, but the results are not as satisfactory as when sown as above stated.

3. Crimson clover has a high feeding and fertilizing value and is one of the best crops that can be grown in short rotations for forage and soil renovation, lending itself readily to use for hay, pasturage, soiling, silage, green manure, and as a soil cover to prevent leaching and washing.

4. The crop should be cut for hay at or before full bloom, and for seed as soon as ripe; in the latter case it should be thrashed or put under cover as soon as dry.

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Approved:

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