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## Sweet Clover.

C. C. CUNNINGHAM.

SWEET CLOVER, once considered a noxious weed, is now recognized as a valuable crop under certain conditions in Kansas. Until recently, sweet clover was grown only as a honey plant. It is now grown for soil-improvement purposes and as a pasture and forage crop, and its utilization for these purposes is steadily increasing. As a crop for soil improvement sweet clover is unexcelled; for pasturing purposes it has given satisfactory results; as a forage crop it can often be utilized to good advantage where alfalfa or red clover can not be successfully grown. However, as a dry-land crop or as a crop to be grown on upland, where alfalfa can not be successfully grown, because of insufficient moisture, sweet clover is yet in the experimental stage.

There are several varieties of sweet clover, of which the common white sweet clover (*Melilotus alba*) and the large biennial yellow sweet clover (*Melilotus officinalis*) are the most important. The white variety is most extensively grown in Kansas. It grows more vigorously and more upright and larger than the yellow variety and is generally to be preferred for farm purposes. Another variety, yellow sweet clover (*Melilotus indica*), is an annual, and is of very little value in Kansas.

Practically all of the soils in the state are adapted to growing sweet clover; very sandy soils, poorly drained acid soil, and possibly the "white ash lands" of southeastern Kansas, excepted. It thrives best on fertile land well supplied with lime, but will make a better growth on very poor soils than most

other crops. When grown for hay it is best to plant on fairly fertile land. Where sweet clover is to be pastured it may be planted on the poorer soils and yet yield justifiable returns. It is not to be expected that sweet clover will make as great a growth on very sandy soils as on more fertile land. However, there are many places in western Kansas where sweet clover is bringing larger returns, from sandy soils along river bottoms where the underflow is near the surface, than any other crop that could be grown.

Sweet clover has been overrated for growing on upland soils in western Kansas. Results obtained during 1913 and 1914 in cooperative tests with sweet clover conducted throughout that portion of the state have not been encouraging. Considerable trouble was experienced in obtaining stands. When seeded early in the spring the young sweet-clover plants do not seem to be able to compete with the ever-present Russian thistle, unless growing conditions are very favorable throughout the season. The young plants are susceptible to drouth, and if the ground gets dry before the plants become well rooted they will die out. Grasshoppers relish the sweet clover, and if they are numerous will soon destroy a new stand. Because of the high price of the seed, the short life of the crop, and the chances of failure in securing a stand, sweet clover has not proved profitable as a forage crop on the uplands of western Kansas.

#### PREPARING THE SEED BED.

To seed sweet clover successfully a thoroughly compacted seed bed is necessary. There should be just enough loose soil on top to enable the seed to be covered. The lack of a solid seed bed is probably the chief reason why sweet clover so often fails when seeded upon cultivated fields. Under natural conditions it reseeds itself readily on the hard, compact soils along roadways, in prairie sod and vacant lots, where the seed is scattered by natural agencies, and covered by rains and the alternate freezing and thawing of the ground. Evidently there is greater danger of having the seed bed too loose than too firm when seeding sweet clover on cultivated land.

However, sweet clover responds readily to good preparation of the soil, and it will pay to thoroughly prepare the land. Where land is plowed the work should be done several months in advance of seeding time, so that the soil will have ample oppor-

tunity to settle, Satisfactory results can usually be obtained by seeding sweet clover on clean corn ground or after some other intertilled crop by using implements to prepare the seed bed that merely stir the surface soil.

#### SEEDING SWEET CLOVER.

Under natural conditions sweet clover remains in the ground during the winter and germinates in the spring, although occasionally a few seedlings may be found in the fall. It may be seeded any time from January to the last of May, with good chances of success. From the little data available it appears that early seeding is preferable in eastern Kansas. In the eastern third of the state it may often be successfully seeded with a nurse crop of oats or barley, provided the seed bed is not too loose and open and a rather thin stand of grain is grown. In favorable seasons good stands of sweet clover may be obtained by seeding with fall wheat, the sweet clover being sown in the late winter or early spring in the same manner that red clover is usually seeded. Seeding sweet clover with a nurse crop may result in failure if the season is excessively hot and dry immediately after harvest or if the small grain makes too heavy a growth and completely shades the young plants.

The amount of seed to use per acre varies with the quality of the seed and the per cent of "hard seed." Sweet clover may contain from ten to ninety per cent of "hard seed" which, because of the excessively hard seed coat, does not germinate the first season, although it is good in vitality and will grow the second year. The amount of seed sown per acre should vary according to the per cent that will grow the first season. If sixty per cent or more of the sweet clover will germinate readily, from ten to fifteen pounds of seed should be sown per acre. If unhulled seed is used the amount should be increased about five pounds per acre.

Rough, wooded, or stony lands that are untillable may be seeded by sowing the sweet clover broadcast during the late fall or winter. The seed will be worked into the soil by the alternate freezing and thawing of the ground or washed under by rains. On very sandy soils sweet clover is often drilled into the thin native sod by using a disk drill, as any other preparation of the ground would make the seed bed too loose.



Threshing sweet clover seed.

INOCULATING.

Sweet clover, to produce satisfactory results, should be inoculated with the proper bacteria. If the crop is not growing along roadsides and in fence corners or anywhere else in the locality in which it is to be seeded, it is very likely that inoculating will be essential. This may be done by obtaining soil from an alfalfa field or ground on which sweet clover is growing and spreading it over the field which is to be seeded, at the rate of two hundred to three hundred pounds of inoculated soil to the acre. This should be harrowed in immediately, as exposure to the sunshine and the drying out of the soil will kill the bacteria. Best results will be obtained by applying the soil on a cloudy day. If inoculated soil is not available within reasonable distance it may be more practical to inoculate with the pure cultures that are sold for this purpose. This method consists of treating the seed with a pure culture of the proper kind of bacteria, according to directions accompanying the material. The inoculated seed should be sown soon after it is treated, and should never be exposed to the sun.

Fortunately the only portion of Kansas where it is necessary to inoculate for sweet clover is in those parts of the eastern fourth of the state where the crop is not growing naturally. The soil in the remainder of the state is evidently well supplied with the proper kind of bacteria.

HANDLING SWEET CLOVER FOR HAY.

Sweet clover properly handled produces a fair quality of hay which makes a desirable substitute for the more valuable kinds, such as alfalfa or red clover. One cutting of sweet clover can be obtained the first year. This crop should not be cut until the crown sprouts have begun to show on top of the roots about one inch underground. At this time the crop can be cut close to the ground. Two and perhaps three crops of hay may be obtained the second year. The first one should be cut just before the first bloom buds appear, since the plants rapidly become coarse and woody after they start to bloom. The sweet clover should be cut sufficiently high to leave a few branches and leaves on each plant. If cut too close at this time many of the plants will be killed. The second cutting should be handled in the same way as the first. The time of cutting will have to be governed by the



Cattle pasturing on sweet clover in Allen county, Kansas.



judgment of the farmer. The sweet clover will be continually in bloom soon after the second cutting comes on. Ordinarily it should be cut when about twenty inches high, and must be cut high, as at the first cutting. The third crop may be mowed close to the ground. The hay is cured in the same manner as alfalfa or red clover. More time is required to cure sweet clover hay than alfalfa or red clover because it is more succulent than the latter crops. If the weather is unfavorable at cutting, great difficulty is experienced in properly curing sweet clover hay. Also the tall stubble that it is necessary to leave in making the first cuttings interferes with the raking of the hay. For these reasons sweet clover will never be popular as a forage crop, except where other forage legumes can not be profitably grown.

#### SAVING THE SEED.

Where a seed crop is desired the second cutting of the second year's growth is the most practical one to leave, although maximum yields of seed can be obtained where the first cutting is allowed to grow to maturity. The sweet clover may be harvested readily with a binder, binding and shocking it like a small grain crop, or by cutting with a mower and raking and stacking similar to the way alfalfa grown for seed is handled. Along the Arkansas river in western Kansas, it is a common practice to head the sweet clover with an ordinary grain header. It is then put in medium-size shocks, usually placing one header-box load in each shock. This allows it to cure out readily and yet permits it to be shocked in a small space so that it can be brought rapidly to the thresher. Sweet clover should be cut about the time three-fourths of the seed pods become dark. Avoid handling the straw when in a very dry, brittle condition, as the seed will shatter badly at such times. The sweet clover should not be hulled or threshed until it is thoroughly dry. Yields of from two to eight bushels of seed per acre may be expected.

#### SWEET CLOVER AS A PASTURE CROP.

Sweet clover will undoubtedly prove of great value as a pasture crop throughout eastern Kansas, especially on lands to which it is adapted. It makes excellent pasture for cattle, sheep, horses, and hogs. It very rarely causes bloat and for this reason is preferable to alfalfa for pasturing cattle. Be-

cause of its vigorous growing habits, sweet clover will pasture, especially on the poorer types of soil, more stock per acre than most other pasture grasses or legumes. Sweet clover is about equal to alfalfa and red clover in feeding value, and stock pastured on it make gains that compare favorably with those secured on the latter crops.

Sweet clover can be used to a good advantage in supplementing other pasture. It produces early and late grazing, survives the midsummer droughts, often furnishing succulent pasture during the time regular pasture grasses are dormant, and will produce fairly well on soils that would otherwise be practically barren. Sweet clover may be grown along river bottoms, on land where the water does not stand, even though the water table occasionally rises within two feet of the surface of the soil. Because of this fact it is an important pasture crop on the low river bottoms not suited to alfalfa.

As a rule, live stock have to acquire a taste for sweet clover before they can be induced to eat it. The best way to accustom them to the crop is to pasture them upon it early in the spring, before other forms of green feed are available.

For best results the sweet clover should be pastured heavily enough to keep down the growth, so that at all times there will be an abundance of fresh shoots for grazing purposes. It may be necessary to clip back the old growth once during the second season to stimulate the development of fresh shoots. In case permanent pasture is desired sufficient plants should be left to thoroughly re-seed the field. If hogs are pastured on the sweet clover during the first year it is best to ring them to prevent them from digging up the roots of the young plants.

Maximum returns in pasturing sweet clover where the pasture enters into a rotation can be secured by maintaining two fields, one of which is seeded the year following the seeding of the other. Newly-seeded sweet clover will furnish pasture after it makes a growth of about twelve inches. Ordinarily it does not attain this height until some time in June in eastern Kansas and midsummer in the western part. The sweet clover can then be grazed for the remainder of the season if not pastured too heavily. The second year sweet clover makes a rapid early growth and will provide pasture from very early in the spring until the new seeding is available. The stock can then be transferred to the new field and the old field left



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Cutting a seed crop of sweet clover

for seed production or for hay, or it may be pastured alternately with the new field. By seeding a field to sweet clover every spring, this method of pasturing sweet clover may be continued indefinitely. Sweet clover pasture is available throughout the growing season and for a longer period than can be secured from most other pasture grasses.

#### SWEET CLOVER FOR SOIL IMPROVEMENT.

For quick results in improving the soil sweet clover is superior to most other crops. Its ability to thrive well on badly eroded soils, and on soils lacking in humus or otherwise badly run down makes it especially adapted for this purpose. Like alfalfa, cowpeas and other legumes, it has the ability to obtain nitrogen from the air by means of the nitrogen-gathering bacteria which live in tubercles on the roots of the plants. When plowed under for green manure or allowed to remain on the land this crop is a very efficient one in building up the humus and nitrogen content of the soil. The large roots, which penetrate deeply, break up the lower layers of the soil and add much humus to it when they decay, thus improving the physical condition of the soil some distance below the depth of plowing. Unproductive and heavy clay and hardpan soils may be so improved in texture and fertility by growing sweet clover on them for a few years that they become quite productive.