

4-H Legume Manual



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Stillwater, Oklahoma

4-H LEGUME MANUAL

by

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The purpose of the 4-H Legume project is to assist club members in becoming familiar with the important legumes grown in Oklahoma and the best methods of growing these crops. The club member also has the opportunity to learn the value of legumes for hay, pasture, seed production, winter cover, and soil improvement.

GENERAL REQUIREMENTS

1. Boys between the ages of ten and twenty-one are eligible to join the 4-H Legume project.

2. A 4-H Club member enrolled in the Legume project may grow any of the following:

Alfalfa	Vetch	Cowpeas
Sweet Clover	Winter Peas	Mungbeans
Red Clover	Lespedeza	Soybeans

3. For alfalfa, sweet clover, red clover, vetch, winter peas, and lespedeza, the required minimum acreage is one (1) acre. A large acreage may be grown if desired.

4. For cowpeas, mungbeans, and soybeans, the minimum acreage is one-half ($\frac{1}{2}$) acre.

5. Club members enrolled in the 4-H Legume project may exhibit either legume seed or cured forage. Both seed and cured forage may be exhibited if desired. The exhibit requirements are as follows:

- (1) One-half ($\frac{1}{2}$) peck of seed.
- (2) One bundle of cured forage 3 to 5 inches in diameter.

ALFALFA

Alfalfa is grown throughout Oklahoma, but the largest acreage is in the western part of the state.

RECOMMENDED VARIETIES

The varieties of alfalfa recommended in Oklahoma are Oklahoma Common, Buffalo, and Atlantic. Oklahoma Common is a hardy strain of common alfalfa which has been grown in the state many years. Buffalo is a selection of common alfalfa which is resistant to bacterial wilt. Atlantic, another selection of the common type was developed in New Jersey. Oklahoma Common is recommended throughout the state. Buffalo and Atlantic are recommended in the seed-producing areas.

SOIL ADAPTATION

The most fertile soils on the farm should usually be selected for planting alfalfa. The crop is most commonly grown on bottom land soils. It also grows well on the better upland soils in the central and eastern sections of the state. A deep, permeable, well-drained soil is essential.

FERTILIZERS AND LIME

Alfalfa has a very high requirement for calcium (lime), phosphorus, and potash. Acid soils must be limed for this legume. Soils which are

Figure 1. Lime alone increased the yield of alfalfa 1777 lbs. of cured hay per acre. Lime and phosphate increased the yield 4916 lbs. per acre annually. Oklahoma A&M Agricultural Experiment Station Farm, Perkins, Oklahoma.



low to very low in phosphorus and potassium require applications of phosphate and potash fertilizers.

The best plan for fertilizing alfalfa is to have the soil tested and apply fertilizers according to need as indicated by the test.

PREPARATION OF THE SEEDBED

The seedbed for alfalfa should be firm, free of weeds, and well supplied with moisture and plant nutrients. The land should be plowed in late June or early July, to destroy weeds and loosen the soil for the absorption of moisture. During the summer and early fall a field cultivator or a disc can be used to control weeds, and keep the soil in condition to absorb summer rainfall. The land should be double-disked or harrowed just before seeding time to destroy all weeds and prepare a firm, smooth seedbed.

SEEDING

Fall seeding of alfalfa is desirable when conditions are favorable. Fall seeding reduces the weed hazard often encountered with spring seeding and, in addition, a good crop can be obtained the first year. Alfalfa is usually seeded as soon after August 25 as soil and moisture conditions are favorable.

In eastern Oklahoma the usual rate of seeding alfalfa is 15 to 18 pounds per acre. In the western section, good stands are often secured with as low as 12 pounds per acre, when soil and moisture conditions are favorable.

Alfalfa should be seeded with a drill in order to secure even distribution and uniform covering of the seed. The drill should be set to place the seed approximately one-half inch in depth. A corrugated roller used before and after drilling will make the soil surface firm and place the seed in closer contact with the soil particles.

INOCULATION

Alfalfa seed should be inoculated before planting. This insures the presence of the proper strain of bacteria for the fixation of nitrogen. Well inoculated alfalfa makes better growth and fixes larger quantities of nitrogen in the soil.

WHEN TO CUT ALFALFA FOR HAY

Alfalfa is ready to cut for hay when the plants are about one-tenth to one-fourth in bloom. By cutting at this time, maximum yields of high quality hay can be obtained without injury to the plants.

CURING

The curing of alfalfa hay should be done so as to preserve a bright green color and save as many of the leaves as possible. The best



Figure 2. The modern pickup baler picks up the alfalfa and bails it direct from the windrow.

method is to let the alfalfa wilt in the swath and then put it into small, loose windows with a side-delivery rake to complete the curing. A pick-up baler can be used to bale the alfalfa direct from the window.

SWEET CLOVER

Sweet clover is one of the best legumes which can be grown to improve soil fertility. It is especially valuable to grow in rotations with corn, cotton, and small grains. It will add more nitrogen and organic matter to the soil than any other legume grown for soil improvement.

SWEET CLOVER FOR PASTURE

Sweet clover is an excellent crop for pasture. It provides a large amount of grazing in late fall of the first year and in early spring of the second year. If a seed crop is desired, grazing should be discontinued when the plants start blooming.

SOIL REQUIREMENTS

Sweet clover will grow on almost any soil which is well supplied with lime and phosphorus. A deep, permeable, well-drained soil is desirable.

SWEET CLOVER NEEDS LIME AND PHOSPHORUS

Sweet clover has a high requirement for both calcium (lime) and

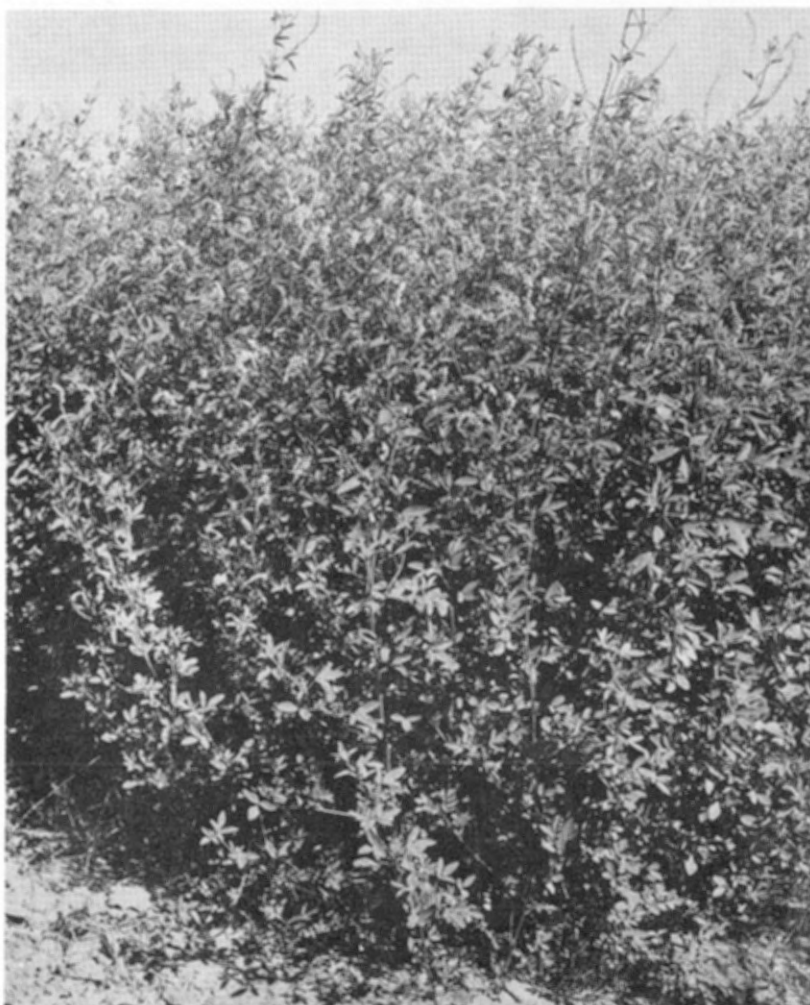


Figure 3. Sweet Clover.

phosphorus. Soil tests should be made before planting sweet clover. If the soil is acid, limestone should be applied and thoroughly mixed with the soil to a depth of 4 to 6 inches.

If phosphorus is needed, apply 200 to 250 pounds of superphosphate or 300 to 500 pounds of rock phosphate per acre. It is best to drill the fertilizer in the row with the seed. The phosphate may also be broadcast and disced into the soil before the sweet clover is planted. When fertilizer is broadcast, the rate of application should be increased about 50 percent.

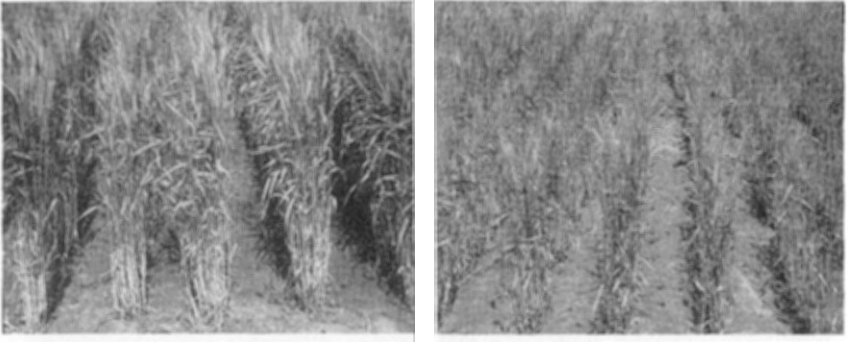


Figure 4. Sweet clover increased the yield of wheat from 15.4 bushels to 22.7 bushels per acre. (Oklahoma A&M Agricultural Experiment Station Farm, Perkins, Oklahoma.)

VARIETIES

The varieties of biennial sweet clover grown in Oklahoma are Madrid, Common White, and Evergreen.

Madrid, an early maturing, yellow blossomed variety is adapted throughout the state. It is recommended especially in the western section. Common White sweet clover, a medium maturing variety, is adapted in the central and eastern sections of the state. Evergreen, a late maturing, white blossomed variety is adapted in eastern Oklahoma.

Hubam is the best known variety of annual sweet clover. It is grown mainly in the south-central and south-western parts of the state.

KIND OF SEED TO USE

The kind of seed to use will depend somewhat upon the time of planting. For very early planting, unhulled or thresher-run seed is satisfactory. For planting in February or early March, hulled seed usually gives best results. For late planting, scarified seed is preferable since it germinates more rapidly and evenly.

INOCULATION

Sweet clover seed should be inoculated before planting. Well inoculated sweet clover makes better growth, fixes larger quantities of nitrogen, and is more valuable for soil improvement.

METHOD OF PLANTING

Sweet clover is usually planted with small grain as a nurse crop in order to provide some income from the land the first year. The best nurse crops are oats and barley. Wheat is also satisfactory in the central and eastern parts of the state in favorable seasons.

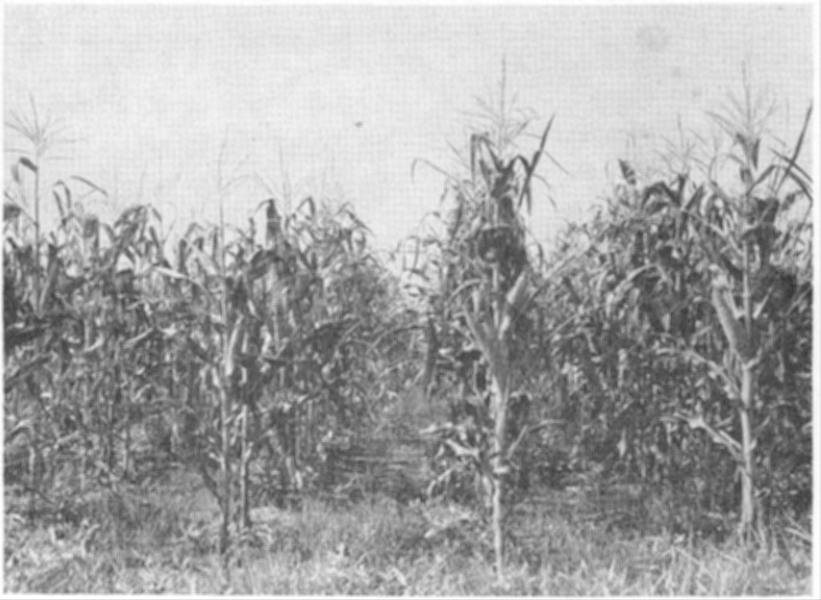


Figure 5. Sweet clover increases corn yields. Left: continuous corn, 23 bushels per acre. Right: corn following sweet clover, 76 bushels per acre.

The small grain should be planted in 14- or 16- inch rows to provide a more favorable condition for the growth of the sweet clover plants. This can be done by closing every other hole in the seedbox of the drill. In the western part of the state sweet clover should usually be planted without a nurse crop.

A grain drill with fertilizer attachment can be used for planting sweet clover and applying fertilizer. The fertilizer should be placed about 3 inches below the surface of the ground. The sweet clover can be scattered on the surface above the fertilized zone by removing the seed sprouts and letting the seed drop on the loose soil behind the discs and in front of the covers; or, the seed may be broadcast.

Where fertilizer is not needed, the seed may be planted with a drill and covered to a depth of not more than one-half inch. The seed may also be broadcast and covered by harrowing the land.

On soils affected by wind erosion, the sweet clover can be planted in sorghum or Sudan stubble. This is one of the best methods of planting in low rainfall areas where a nurse crop may not be practicable.

HARVESTING SWEET CLOVER SEED

Sweet clover seed can be harvested by combining, if the plants are not too large. The sweet clover may also be cut with a binder and bound into loose bundles. The bundles are then placed into small

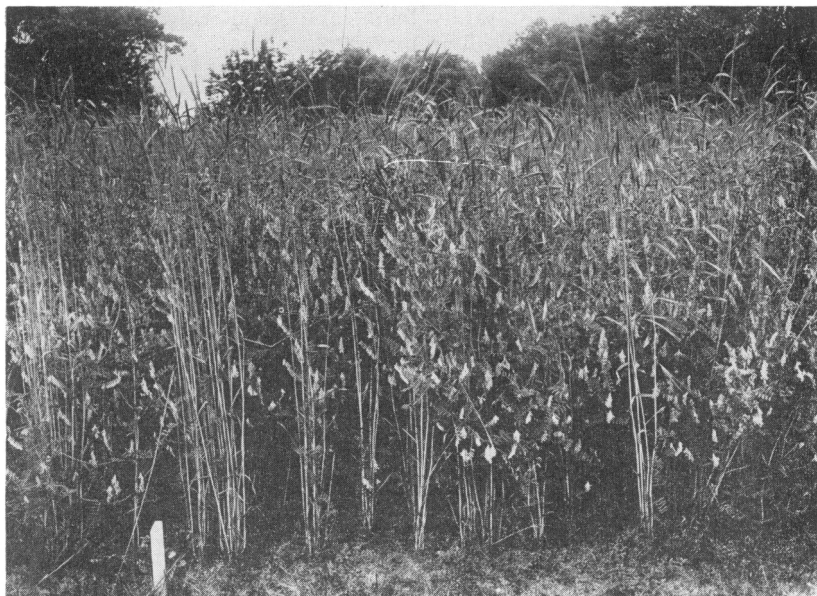


Figure 6. A mixture of vetch and rye is excellent for planting on deep, sandy soils.

shocks for curing after which the crop can be threshed. In some cases, sweet clover has been windrowed and combined from the windrow.

VETCH

Hairy vetch is the most important winter legume grown for soil improvement in Oklahoma. It is especially valuable to plant following cotton, peanuts, and other row crops in the fall.

Vetch is an excellent source of nitrogen and organic matter for improving depleted soils. A good growth of this legume will add 60 to 70 pounds of nitrogen per acre if the crop is utilized for soil improvement.

VARIETIES

¹Hairy vetch is very winter-hardy, and is the only variety recommended in Oklahoma.

WHERE ADAPTED

Hairy vetch is adapted throughout Oklahoma. It is grown most extensively in the central, eastern, and southeastern parts of the state.

¹ Nearly all of the winter vetch grown in the United States at present is of a comparatively non-pubescent or smooth strain. In winter-hardiness, it is similar to hairy vetch. This strain is more vigorous and makes more winter-growth than the old hairy types.

Vetch grows best on sandy, sandy loam, and loam soils but will grow on almost any well-drained soil if phosphorous and calcium (lime) are present in adequate amounts.

SEEDBED PREPARATION AND SEEDING

The seedbed for vetch should be firm, free of weeds, and well supplied with moisture and plant nutrients. Early plowing, followed by summer tillage to control weeds and conserve moisture, will usually provide a satisfactory seedbed.

When vetch follows peanuts, very little seedbed preparation will be needed. Usually no previous preparation of the soil will be needed when vetch is planted between cotton rows.

Vetch should be planted as soon after September 1, as soil and moisture conditions are favorable. The usual rate of seeding vetch is 20 to 25 pounds per acre.

LIME AND PHOSPHORUS REQUIREMENTS

Vetch is more acid-tolerant than sweet clover, but it will make better growth on soils which are well supplied with lime.

Vetch has a high requirement for phosphorus. If this mineral is



Figure 7. Vetch provides excellent pasture for dairy cattle.

needed 200 to 250 pounds of superphosphate or 300 to 400 pounds of rock phosphate per acre should be drilled with the seed. If the fertilizer is broadcast and disced into the soil before the vetch is planted, the rate of application should be 250 pounds of superphosphate or 400 pounds of rock phosphate.

VETCH AS A PASTURE CROP

Vetch is an excellent crop for pasture, especially when planted in mixtures with rye, winter oats, ryegrass, or barley. Mixed seedings are used extensively to provide pasture for dairy cattle, hogs, and sheep.

VETCH SEED PRODUCTION

Vetch seed is usually harvested by direct combining. It may also be windrowed and combined from the windrow.

FIELD PEAS

(Austrian Winter and Dixie)

The field pea is grown in Oklahoma for seed, winter cover, and for soil improvement. It is grown throughout the state, but mainly in the central and northwestern sections.

VARIETIES

The Austrian Winter Pea is the principal variety of field peas grown in Oklahoma. It is moderately winter-hardy and is adapted throughout the state. Dixie, a quick maturing selection of Austrian winter peas, is adapted in the southern half of the state.

SOIL REQUIREMENTS

The field pea is best adapted on medium and fine textured soils. It has a very high requirement for both lime and phosphorus. If the soil is acid, it should be limed. If phosphorus is needed an application of 200 to 250 pounds of superphosphate or 400-500 lbs. of rock phosphate per acre will be needed. The limestone fertilizer should be applied in the same manner as for vetch.

SEEDBED PREPARATION

The seedbed for winter peas should be firm, moist, and free of weeds. The land can be prepared in the same manner as for wheat.

SEEDING

Austrian Winter Peas are usually planted in September or early October. The seed should be drilled to a depth of about 2 inches. The rate of planting is 30 to 35 pounds of seed per acre. The Dixie pea should be planted later than Austrian Winter, and the rate of seeding is 60 to 65 pounds per acre.

HARVESTING

Winter peas are ready to harvest for seed when the pods are mature and the seeds are firm. The seed is usually harvested by direct combining. The crop can also be windrowed and combined from the windrow.

LESPEDEZA

Lespedeza is one of the most important legumes in eastern Oklahoma. It is a very popular pasture legume, and the crop is used extensively for grazing purposes. Oklahoma ranks third in vetch seed production.

VARIETIES

The varieties of lespedeza recommended in Oklahoma are Korean, Kobe, Climax, Common, and Tennessee 76.

SOIL AND FERTILIZER RECOMMENDATIONS

Lespedeza will grow on almost any soil which is well supplied with lime and phosphorous. Acid soils should be limed before seeding lespedeza. If phosphorous is needed an application of approximately 200 pounds of superphosphate or 400 pounds of rock phosphate per acre should be drilled or broadcast at seeding time. Best results are obtained by drilling the fertilizer in the row with the seed.

Lespedeza may be planted alone, but more often it is planted with winter small grain or with rye grass. It is common practice to seed winter oats or rye grass in the fall and plant lespedeza the following spring. Many farmers also plant spring oats and overseed with lespedeza. Lespedeza may be seeded in established stands of Bermuda or native grasses by drilling or by broadcasting the seed and discing the land.

METHODS OF SEEDING

The seedbed for lespedeza should be well prepared. The seed may be drilled or broadcast at the rate of 20 to 25 pounds per acre. The best seeding time is March 15 to April 15.

MUNGBEANS

The mungbean is a summer annual legume which can be used for seed production, forage, or for soil improvement. The mungbean is grown to some extent in nearly all parts of Oklahoma, but mainly in the central and eastern sections where it is best adapted.

VARIETIES

Mungbeans are of two major types, known as "Golden" and "Green" because of the color of the seed.

The Golden mungbean produces an erect, bushy type plant which reaches a height of 3 to 4 feet on good soil. This variety is grown mainly for soil improvement and for forage.

The Green mungbeans are of two types, known as "Native" and "Orientals." The Natives are the large, dull colored beans which have been grown in Oklahoma many years. The Orientals are the small, shiny, hard-textured beans which have been imported from foreign countries. The most popular variety or strain of Green mungbeans is a selection known as Oklahoma Strain 12. This strain produces good yields of beans which are used for commercial sprouting and canning.

CULTURE

The mungbean grows well on most types of soil, but is best adapted on sandy loams, loams, and silt loams.

Many growers plant mungbeans in 3 to 3½-foot rows, but drilling is the most popular method of planting. A two-row corn planter is best for row planting. If a grain drill is used each alternate hole in the seed box should be closed. The beans will thus be placed in 14- or 16-inch rows. Some growers plant mungbeans in 18- to 21-inch rows by double-rowing with a two-row planter. The amount of seed required per acre is 5 to 8 pounds for wide rows, 12 to 15 pounds for 18- to 21-inch rows, and 20 to 25 pounds for 14- to 16-inch rows.

Mungbeans may be planted from April to July, but highest yields of both hay and seed are obtained from planting in May or early June.

HARVESTING

Mungbeans are usually harvested by direct combining. The crop can also be windrowed and combined from the windrow.

Mungbeans should be harvested for hay when the first seed pods are filled.

COWPEAS

The cowpea is a very popular summer legume in Oklahoma. It is grown for hay, seed, and for soil improvement. A good growth of this legume will provide one or more tons of dry organic matter to plow under. If well inoculated, the cowpea will also add 25 to 40 pounds of nitrogen per acre to the soil.

VARIETIES

The leading varieties of cowpeas for forage and seed production in Oklahoma are Buff, Brabham, Iron, Red Ripper, Buff Crowder, Brown Crowder, White Crowder, Blackeye, Early Red, and New Era.

The most popular edible varieties are Cream Crowder, Blackeye, White Crowder, Blackeye, Early Ramshorn Blackeye, White Crowder, Virginia Blackeye, and Purple Hull.

SEEDING METHODS

The seedbed for cowpeas may be prepared in the same manner as for corn. Cowpeas are usually planted in wide rows. The plants should be spaced 2 to 3 inches apart in the row. This will require 8 to 12 pounds of seed per acre, depending upon the size of the seed. Cowpeas may also be drilled in 14- or 16-inch rows, using 60 to 75 pounds of seed per acre. In most sections of the state, cowpeas should be planted between May 1 and May 20.

HARVESTING

When cowpeas are harvested for seed, varieties with erect or semi-erect growth habit may be combined direct. Other varieties can be windrowed and combined from the windrow.

When cowpeas are used for hay, the method of harvesting is about the same as for other hay crops. They can be mowed, windrowed, and baled from the windrow.

SOYBEANS

The soybean is a summer annual legume. The crop is grown mainly for forage and for seed production. Soybean seed is one of the principal sources of vegetable oils which are used in the manufacture of paints, varnishes, soaps, shortening, salad oils, salad dressings, butter substitutes, and many other products.

VARIETIES

Varieties of soybeans adapted in Oklahoma include the following:

- (1) Early maturing—Wabash, Perry, and Hong Kong.
(Adapted in northeast part of the state.)
- (2) Medium early—S-100, Dorman, Dortchsoy 67.
(Adapted in northeast Oklahoma; also in the east-central area where early maturity is desired or late planting is necessary.)
- (3) Medium late—Ogden
(Ogden is the most popular variety grown in Oklahoma. It is adapted throughout the soybean section of the state.)
- (4) Late maturing—Roanoke, and Dortchsoy 31
(Adapted on fertile bottom land soils in southeast Oklahoma.)

For forage production, Ogden is the only variety recommended in Oklahoma.

SOIL REQUIREMENTS

The soybean has about the same soil requirements as corn. It grows best on fertile, well-drained soils.

The crop will grow on slightly acid soils, but for best results the soil should be well supplied with lime. The soybean has a high requirement for phosphorous. When soybeans are planted on soils of low

fertility, soil tests should be made and fertilizer applied according to need. Fertilizer for soybeans should be drilled in a continuous band along the row, two inches to the side and two inches below the seed.

SEEDBED PREPARATION

Preparation of the land for soybeans is about the same as for corn.

PLANTING

Soybeans are usually planted in rows 36 to 42 inches apart. The seeds should be planted at a rate which will provide an average of one plant every two inches in the row. This will require 25 to 30 pounds of seed per acre. The best dates for planting are May 10 to June 1, although later plantings often produce good yields. Soybean seed should be inoculated before planting.

CULTIVATION

The row type rotary hoe is the best implement to use for one or two early cultivations. Harrowing is often done soon after the young plants are up in order to destroy weeds and loosen the surface soil. A cultivator equipped with sweeps or shovels can be used for later cultivation.

HARVESTING

The combine, properly adjusted and carefully operated, will do a good job of harvesting soybeans. The crop is ready to harvest when the plants are fully mature and the moisture content of the beans is low.

The proper time to cut soybeans for hay is when the seeds are forming, but before the pods are completely filled.

RED CLOVER

Red Clover is grown as a hay crop in certain sections of northeast Oklahoma. It produces good yields of hay and fits well into legume rotations for maintaining soil fertility.

SOIL REQUIREMENTS

Red clover is adapted on soils which are deep, permeable, and well-drained. It has a high requirement for lime and phosphorous. Acid soils should be limed before seeding the clover. If phosphorous is needed an application of 200 to 250 pounds of superphosphate or 500 to 600 pounds of rock phosphate per acre will be needed.

TIME OF PLANTING

Red clover may be planted either in the fall or in the spring. When planted in the fall, it becomes a winter annual, producing a seed crop the following year. Red clover may also be planted in late February

or early March, in which case it is a biennial. It will produce a hay crop the first year and a seed crop the second year.

Red clover is usually planted at the rate of 8 to 10 pounds of seed per acre. If planted with timothy, 5 pounds of timothy seed and 5 pounds of clover per acre will produce a good stand under favorable conditions.

HARVESTING HAY AND SEED

Red clover should be cut for hay when the plants reach the full bloom stage. As soon as the clover is wilted it can be put into windrows to complete the curing. It may then be baled from the windrow with a pick-up baler.

Red clover is ready to harvest for seed when the seed pods have turned brown in color. It may be combined direct, or windrowed and combined from the windrow.

FORAGE EXHIBIT

Careful selection and curing of plant material is essential in the preparation of a good forage exhibit. Plants with medium to small stems and containing an abundance of leaves which are dark green in color are the most suitable.

Alfalfa and red clover should be cut when the plants are one-tenth to one-fourth in bloom. It is best to use young sweet clover which was planted in the spring. Second-year sweet clover plants will have large stems and are not suitable for making forage bundles. Vetch, winter peas, mungbeans, cowpeas, and soybeans should be cut when the first pods are about full, but before the leaves begin to turn yellow.

It is best to cut more plant material than will actually be needed to make the forage bundle. The plants should be cured in the barn, granary, or in some other suitable place where they can be protected against direct sunlight. In this way the curing can be done and the bright green colors preserved.

Bundles should be made when the leaves and stems are sufficiently moist to avoid shattering. They should be the actual length of the plants and may vary from 3 to 5 inches in diameter.