

VETCH

for Soil Improvement

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Shawnee Brown, Director
Oklahoma A&M College
Stillwater, Oklahoma

VETCH FOR SOIL IMPROVEMENT

Wesley Chaffin
Extension Agronomist

Hairy vetch has been grown in Oklahoma for many years. It is the most popular winter legume grown in the state and is an excellent soil building crop. Hairy vetch is also the most cold resistant of the winter annual legumes used for soil improvement and has proved quite satisfactory under Oklahoma conditions.

Need For Soil Improvement

The cultivated soils in central and eastern Oklahoma have lost 30 to 38 percent of the nitrogen and 33 to 43 percent of the organic matter they contained in the virgin state. The greatest losses have occurred on sloping soils where peanuts, cotton, and other row crops are grown and where erosion is severe.

Each year nearly five million acres of peanuts, cotton, corn, sorghums, and other row crops are grown in the state. Much of the land on which these crops are grown is left without adequate protection against erosion during the winter and early spring.

Many of the soils in the central and eastern parts of the state are deficient in lime and available phosphorus. On these soils, it will be necessary to apply lime and phosphate fertilizer in order to secure a good growth of vetch, sweet clover, and other legumes which are most valuable in improving depleted soils.

Vetch As A Soil Improvement Crop

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 provides a good protective cover for the land during the winter and early spring when wind and water erosion are most severe. It takes up soluble nitrogen and other plant nutrients which might otherwise be leached out of the soil during the winter and conserves them for succeeding crops.

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. This is equivalent to the amount of nitrogen contained in 200 pounds of ammonium nitrate.

Vetch may be plowed under as a green manure crop. It is more often used for pasture or for a seed crop and the residues utilized for soil improvement. In this way, it provides a cash return in addition to improving the soil.

Vetch is sometimes plowed or disced into the soil when the plants are small in order to permit earlier seeding of a summer crop. A good stand of vetch plants six to eight inches high will add 30 to 40 pounds of nitrogen per acre to the soil.

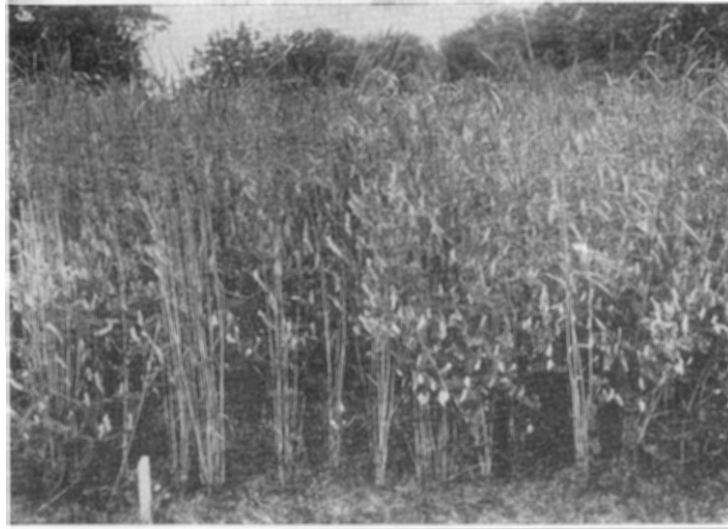


Figure 1. A mixture of vetch and rye is excellent for winter cover and for pasture.

Vetch As A Pasture Crop

Vetch is an excellent crop for pasture, especially when planted in mixtures with rye, wheat, fall sown oats, ryegrass, or barley. Mixed seedings are used extensively for pasture for dairy cattle, hogs, and sheep. Vetch is well suited for grazing and when planted with one of the small grains or with rye grass, it produces an abundance of palatable and nutritious forage.

Even when vetch is grown primarily for seed, a limited amount of pasturing is often desirable, especially if the growth is unusually rank. Many growers believe that pasturing vetch during the spring to remove excessive vegetative growth will increase the seed yield and make the seed crop easier to harvest.

Vetch Hay

Although vetch is grown mainly for soil improvement and pasture, it is used to some extent for hay. Vetch is somewhat difficult to harvest, but when properly cured, the hay is comparable to alfalfa as a legume roughage. It is higher in both digestible crude protein and total digestible nutrients than alfalfa. Vetch hay is especially valuable for feeding dairy cows.

Vetch should be cut for hay when the first pods are full grown but before they turn brown.



Figure 2. Vetch is used extensively for planting in orchards to supply organic matter and nitrogen for improving soil fertility.
 Figure 3. Vetch provides excellent pasture for dairy cattle.

Where Adapted

Hairy vetch is adapted throughout Oklahoma. It is grown most extensively in the eastern, central, and southwestern parts of the state. Vetch grows best on sandy, sandy loam, and loam soils but will grow on almost any well drained soil if phosphorus and calcium (lime) are present in adequate amounts. It is particularly sensitive to phosphorus deficiency.

Vetch is especially valuable as a winter cover crop in areas where cotton, peanuts, corn, sorghums, and other row crops are grown. It may be planted alone or in mixtures with rye, wheat, winter oats, or ryegrass.

It is a common practice to plant vetch with rye on sandy soils. The rye supports the vetch and makes it easier to harvest for seed. It also increases the value of the crop for winter cover and provides additional winter and early spring pasture.

On medium and fine-textured soils, vetch may be grown with wheat or winter oats. Mixtures of vetch and wheat are grown extensively in central, northeast, and southwest Oklahoma. Vetch and winter oats are well adapted in the central and southern parts of the state.

A mixture of vetch and ryegrass is excellent for both winter cover and for pasture. This mixture is adapted in central and eastern Oklahoma.

Varieties

Hairy vetch¹ is the only variety of vetch recommended in Oklahoma. The variety gets its name from the fact that both

¹Nearly all of the winter vetch grown in the United States at the present time is of a comparatively non-pubescent or smooth strain. This strain was selected at the Oregon Experiment Station and put into commercial production in that state. It has been referred to as smooth vetch but the name is not generally used. It is slightly less winter hardy than true hairy vetch but in tests conducted by the Oklahoma Experiment Station, it has shown satisfactory winter survival. This strain is also more vigorous and makes more winter growth than the old hairy types, which is important when the crop is used for winter cover or pasture.

stems and leaves are covered with a thick hairy growth, commonly referred to as pubescence. It is the most winter hardy variety grown and is the only one which has satisfactorily withstood severe winter temperatures in the state. Hairy vetch has also been the highest yielding variety under Oklahoma conditions.

Other varieties which have been grown in Oklahoma include Hungarian, Common, and Willamette. Hungarian vetch is less winter hardy than hairy vetch. Common is less winter hardy than Hungarian. Willamette is a selection of Common and is reported to be more cold resistant than Common. All of these varieties have frequently winterkilled in Oklahoma.

In a variety test conducted by the Oklahoma Experiment Station over a period of ten years, hairy vetch averaged 2.1 tons of dry forage per acre; Hungarian, 1.5 tons; and Common, 0.75 tons per acre. Hairy vetch did not winterkill during the ten years, Hungarian vetch winterkilled two years and Common winterkilled four years during the ten-year period.



Figure 4. Maximum soil improvement value is obtained from vetch by plowing the crop under.

Variety tests were also conducted at Lone Grove and Heavener in the Southern and southeastern parts of the state in 1941-42 and 1942-43. In both years, Hungarian, Common, and Willamette winterkilled almost completely while hairy vetch survived with no apparent winter injury.

These tests indicate that hairy vetch is superior in winter hardiness and will usually withstand winter temperatures in Oklahoma without serious injury. It is also more valuable for winter cover, soil improvement, and pasture because of higher yields.

Seedbed Preparation and Seeding

For best results vetch requires a seedbed that is 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. If the peanut crop has been properly cultivated, the vetch may be planted after the peanuts are harvested without further preparation. In some cases it may be necessary to disc the land to destroy weeds and grass before planting the vetch.

Usually no previous preparation of the soil will be needed when vetch is planted between cotton rows. This is especially true if the surface soil is loose and relatively free of weeds. The vetch should be planted in October if moisture conditions are favorable. To avoid damage to cotton, planting should be done immediately following a picking. If the surface soil is hard or if there is a considerable growth of grass and weeds, it may be better to delay seeding until the cotton crop is harvested. The land should then be disced in preparation for seeding the vetch.

Time Of Planting

The planting dates for vetch are about the same as for winter small grains. September 1 to October 15 may be considered as the optimum planting period, although vetch is frequently planted as late as November 10 with satisfactory results. Vetch should be planted as soon after September 1 as soil and moisture conditions are favorable. Early planting permits the vetch to make more rapid fall growth and to establish a thick cover before the winter period. Earlier seedings also make more rapid growth in the spring. Where vetch follows peanuts or cotton, it should be planted as soon as the previous crop is harvested if there is sufficient moisture in the soil to make planting conditions favorable.

Methods and Rates of Seeding

Vetch should be planted with a drill if this implement is available. Drills distribute the seed more evenly and cover it at a uniform depth. This means quicker germination of the seed and a more rapid early growth of the seedling plants.

If a drill is not available, the seed may be broadcast and covered by discing.

The depth of planting vetch varies with the type of soil and the amount of soil moisture. In sandy, sandy loam, and loam soils, vetch is usually planted at a depth of two to three inches. If the surface soil is dry, slightly deeper seeding may be necessary in order to place the seed in moist soil. In clay soils the depth of planting should usually not exceed two inches.

Under favorable conditions, 20 pounds of seed per acre will usually be sufficient, particularly if a seed crop is desired. A slightly higher rate of seeding will result in a thicker stand and a more dense growth which is important when the crop is used primarily for winter cover and for pasture.

When vetch is planted with rye, winter oats, wheat, or ryegrass, the following minimum rates of seeding are suggested:

- (1) Vetch, 15 pounds; rye, 30 to 40 pounds.
- (2) Vetch, 15 pounds; winter oats, 1 bushel.
- (3) Vetch, 15 pounds; wheat, 30 to 40 pounds.
- (4) Vetch, 15 pounds; ryegrass, 18 to 20 pounds.

Where maximum soil improvement is desired, vetch should

usually be planted alone. When the crop is to be used mainly for pasture, seeding the vetch and small grain in the same drill rows will result in better utilization of the forage by livestock. If a vetch seed crop is desired, seeding the vetch in alternate rows with rye, wheat, or winter oats is recommended.* Where vetch and wheat, or other winter small grains, are grown continuously and maximum grain production is desired, it is a good plan to plant two rows of the small grain and one row of vetch alternately.

Inoculation

Legumes are valuable in soil improvement partly because of their ability to obtain nitrogen from the air. This is made possible through the association of nitrogen-fixing bacteria which live in the root nodules. If legume plants are not inoculated, however, they do not increase the nitrogen content of the soil. For this

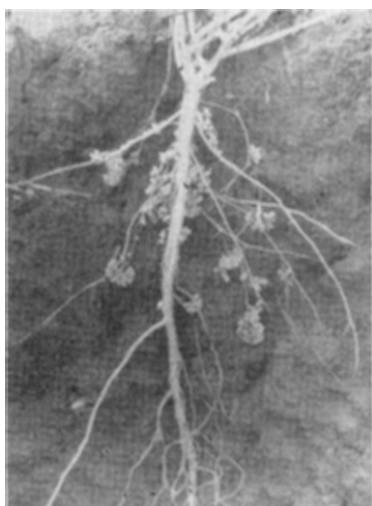


Figure 5. The organisms in the root nodules take free nitrogen from the air and synthesize it into forms in which it can be used by succeeding crops.

reason, vetch and other legume seeds should be inoculated before planting. This insures the presence of the proper type or strain of bacteria for the fixation of nitrogen. Well-inoculated vetch makes better growth, fixes larger quantities of nitrogen, and is more valuable for soil improvement.

Commercial preparations of inoculating bacteria are used for inoculating vetch and other legume seeds. These can be purchased at most seed stores. The method of inoculating seed is very simple and requires only a small amount of time. In using inoculating cultures the directions printed on the container should be carefully followed.

Lime Requirement

Vetch is more acid tolerant than sweet clover and will grow on soils which are moderately acid.

When other conditions are favorable, however, vetch will make better growth on soils which are well supplied with lime. The soil should be tested for acidity and if lime is needed it should be applied before the vetch is planted. Lime should be spread evenly over the surface of the land and thoroughly mixed with the plowed layer of soil to a depth of four to six inches.

*A combination grain drill with grass seed attachment can be used to seed the vetch and small grain in alternate rows and distribute fertilizer all in one operation.



Figure 6. Vetch and wheat fertilized with 200 pounds of superphosphate per acre.

Figure 7. Vetch and wheat planted without phosphate fertilizer.

Fertilizers For Vetch

Vetch has a very high requirement for phosphorus and will not make a satisfactory growth on soils deficient in this element unless a phosphate fertilizer is applied. If the soil is low to very low in organic matter, it is advisable to use a fertilizer containing nitrogen to give the young vetch plants a good start. Medium to strongly acid soils should be limed before vetch is planted.

1. Soils medium to high in organic matter, medium or lower in phosphorus, and low to high in potassium.

Use one of the following fertilizer treatments:

- a. 150 to 200 pounds of superphosphate per acre drilled in row with seeds, or 200 to 300 pounds broadcast.
 - b. 300 to 500 pounds of rock phosphate per acre drilled, or 400 to 600 pounds broadcast.
 - c. 100 pounds superphosphate and 300 to 500 pounds rock phosphate drilled with seed.
2. Soils low to very low in organic matter, medium or lower in phosphorus, and low to high in potassium.

Use one of the following:

- a. 200 to 300 pounds of 4-16-0 or 4-12-4 per acre.
- b. 100 pounds of 11-48-0 per acre.
- c. If soil is very low in potassium, apply 200 pounds of 3-12-12 or 5-10-10 per acre.

Vetch Seed Production

For many years nearly all of the vetch seed planted in Oklahoma was grown in the Pacific Northwest. Gradually local vetch growers started saving seed, and it was soon found that seed could be successfully produced in the state. Vetch seed production has shown a substantial increase each year since 1942, and Oklahoma is now an important seed producing center. Seed is harvested over a wide area, but the greatest concentration of acreage for seed production is in the central and south central parts of the state.

The vetch brucid or vetch weevil, which has greatly reduced seed yields in some areas, has not yet been found in Oklahoma.

Harvesting Vetch Seed

Vetch seed may be combined directly or the vetch may be windrowed and combined from the windrow.

Direct combining is the cheapest method of harvesting. This method is used by many vetch growers in Oklahoma. It is most successful when the vetch seed ripens evenly and the crop can be harvested without delay.

Vetch should be combined when the early pods are ripe. At this time the upper pods will be fully formed and the plants will be carrying a maximum quantity of seed. Vetch will shatter quickly after the pods are mature and delay in harvesting often causes heavy losses of seed from shattering.

The combine should be in good condition and properly adjusted to do the best threshing. It is not possible to indicate the exact cylinder speed and other adjustments for best results in threshing vetch. These will vary with the type of combine and condition of the crop. Under average conditions, the speed of the cylinder should be somewhat lower than that normally required for threshing wheat. It may also be necessary to increase the spacing between the cylinder and concaves. Cracked or damaged seed usually indicates that the cylinder speed is too high or that the spacing between the cylinder and concaves is too close. A combine having a normal or average cylinder speed of 1000 revolutions per minute for threshing wheat will, in most cases, thresh vetch satisfactorily at a speed of 600 to 800 revolutions per minute.

It is frequently necessary to make changes in adjustments of the combine during the day. The cylinder speed, concave setting, amount of wind on the screens, and other adjustments that are right in the morning may not be suited for mid-day or afternoon conditions when the vetch pods are dry. If the operation of the combine and condition of the harvested seed are watched closely, adjustments can be made as needed. This will insure more efficient harvesting and reduce seed damage to a minimum.

When combining vetch, the viny growth may tangle on the outside divider of the sickle bar. To a large extent, this can be

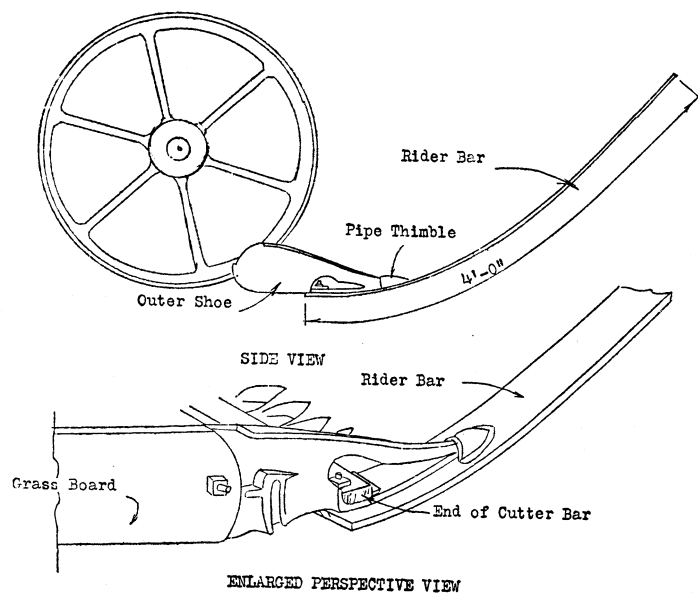


Figure 8. Showing construction and method of attaching divider bar to outer shoe of sickle bar on mower.

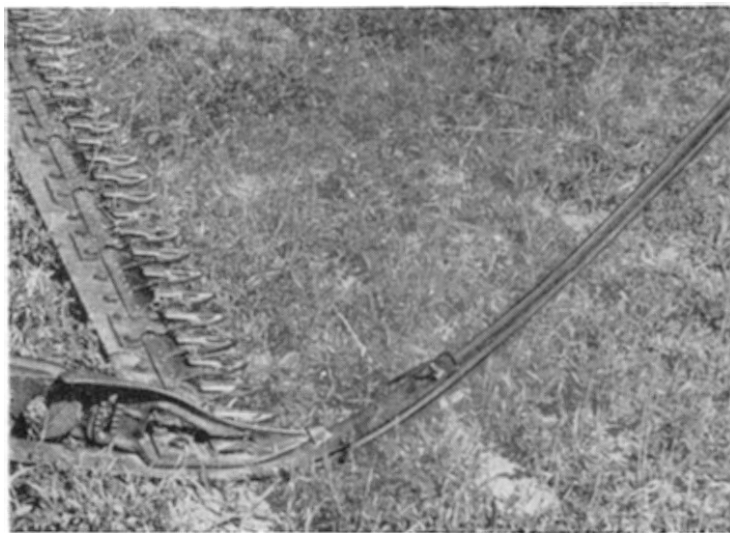


Figure 9. Showing divider bar on mower. It is attached to outer shoe of sickle bar.

prevented by attaching a divider bar underneath the outer shoe. The divider bar extends forward and curves gently upward. It slides over the lodged vetch and pushes it down, enabling the sickle to cut a clean swath. Many of the new combines are equipped with this device. The sickle will often do a better job of cutting if the sickle bar is equipped with stub or pea guards. Some growers use alternate stub and standard guards.

The threshed seed will contain parts of green leaves, stems, and some green seed with a high moisture content. It should be recleaned immediately after harvesting to remove all foreign material. The recleaned seed should be spread out to facilitate drying and to prevent damage from heating.

Combining From The Windrow

In some areas, vetch is harvested by mowing, windrowing, and combining from the windrow. Under favorable conditions this method has the advantage of saving more seed. The harvested seed also contains less moisture and is in better condition for storage.

The vetch should be cut when the seeds are fully developed

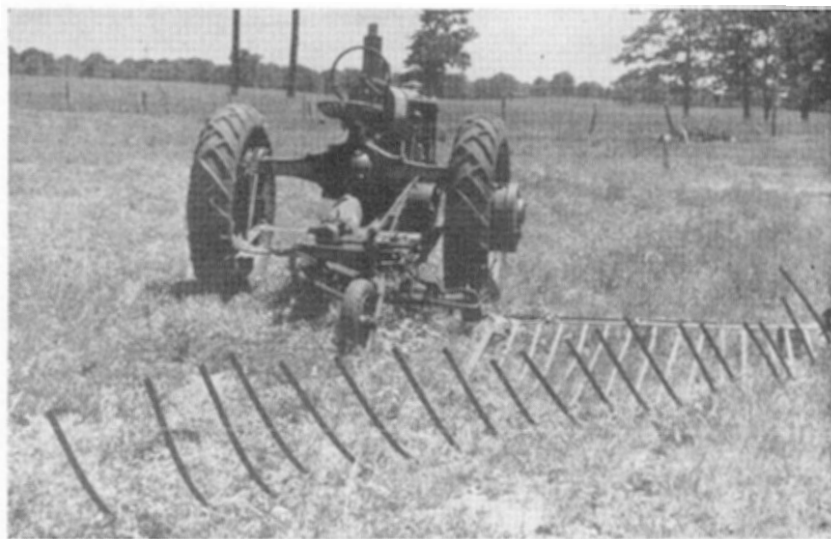


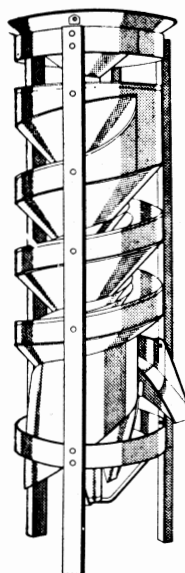
Figure 10. The swinging swather can be used for windrowing vetch.

and have started coloring. A good method of windrowing is to use a side delivery attachment or swather on the mower. The swinging swather, which is attached to and behind the sickle bar, is usually considered best for this purpose. It rolls the vetch into a windrow and to the outside, leaving the way clear to cut the next swath.

If the vetch is badly lodged, it may be desirable to use stub or pea guards on the mower. In some cases, alternate stub and standard guards are used. A divider bar should be attached to the outside shoe of the sickle bar. (See Fig. 10)

The vetch is combined from the windrow, using a pickup attachment on the combine. Since combines are not designed to handle large amounts of straw, the windrows should be small in size. In most cases the width of the swath for windrowing should be somewhat less than the width of the combine. It is important that threshing be started as soon as the vetch is dry in order to avoid unnecessary losses of seed from shattering and other damages caused by wind and rain.

The main disadvantage of windrowing is the danger of wind damage. A strong wind may roll the vetch into tangled masses causing heavy losses of seed and increasing the difficulty of threshing. Rain may cause more shattering of vetch in the windrow than of the standing crop.



Cleaning Vetch Seed

Vetch seed, as it comes from the combine or thresher, will contain cracked seeds, weed seeds, parts of stems, leaves and hulls, and the small grain with which it may have been grown.

Ordinary seed cleaners, such as are available on farms or at warehouses, will separate most of the foreign material in the vetch seed. They will also separate oats or barley, but wheat and rye are not so readily separated from the vetch seed. Separation of wheat and rye, however, can be satisfactorily accomplished by the use of a gravity spiral seed cleaner. (Fig. 11)

In some cases, mixtures of vetch and rye or other small grains are used without separation for planting the next crop.

Figure 11. A spiral separator for removing wheat, rye, or other small grains from vetch.