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VETCH GROWING IN THE SOUTH ATLANTIC STATES.

BY

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U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF PLANT INDUSTRY,
OFFICE OF THE CHIEF,
Washington, D. C., March 8, 1913.

SIR: I have the honor to transmit herewith a paper entitled "Vetch Growing in the South Atlantic States," by Mr. A. G. Smith, Agriculturist, Office of Farm Management, of this Bureau. This manuscript was prepared by Mr. Smith under special arrangement with the Office of Forage-Crop Investigations.

The use of vetch is rapidly increasing in these States, and it is to encourage the proper use of this crop and to furnish information to the farmers of this great district in particular that the data here given are submitted.

Respectfully,

B. T. GALLOWAY,
Chief of Bureau.

Hon. D. F. HOUSTON,
Secretary of Agriculture.

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VETCH GROWING IN THE SOUTH ATLANTIC STATES.

INTRODUCTION.

Vetch is grown on practically every type of soil in North Carolina, South Carolina, and Georgia. Nearly all the plantings are small, as most growers have just begun to plant vetch, but on some farms where it has become well established 50 acres or more are planted annually. In the fall of 1911 approximately 1,000 plantings were made in South Carolina alone. Lack of knowledge of the proper cultural methods caused many failures, but where the principles involved in vetch growing were followed successful results were obtained.

Vetch should occupy an important place in the agriculture of these States. In four years' comparisons on over 800 fields, vetch, more particularly hairy vetch, has consistently made heavier growths and greater yields than crimson clover, red clover, or bur clover, although under favorable conditions these have done well. Vetch is high in protein content, is a good hay, pasture, and soiling crop, and its more general growth would aid in the development of the live-stock industry and remove much of the existing necessity for buying hay outside the State. Vetch is used as a cover crop to prevent the leaching and washing of soils. Like all legumes, it improves land by adding nitrogen and organic matter to the soil. As it grows through the winter and spring and may be harvested in time to plant corn, cowpeas, and sometimes cotton on the same land, it should be used in building up impoverished soils and in maintaining the productivity of the land.

The vetch crop does not require horse or man labor at any time when this is needed for the cowpea crop, except possibly at the harvest time of cowpea hay.

KINDS OF VETCH CULTIVATED IN THE SOUTH ATLANTIC STATES.

There are many kinds of vetch, but only three are cultivated to any extent in the South Atlantic States. These are the so-called "native" vetch, but more properly called narrow-leaved vetch

(*Vicia angustifolia*), since it is not native but is an introduced species that has become wild; English, Oregon, or common vetch (*Vicia sativa*); and hairy or sand vetch (*Vicia villosa*).

The "native" or narrow-leaved vetch is found growing wild by roadsides, in waste places, and frequently in meadows and pastures. It is not grown to any extent in plowed fields. It grows erect when the plants are close together, is hardy, and matures earlier than the other varieties, ordinarily ripening seed from April 15 to May 10 in South Carolina, although in early seasons some seed may be ripe by

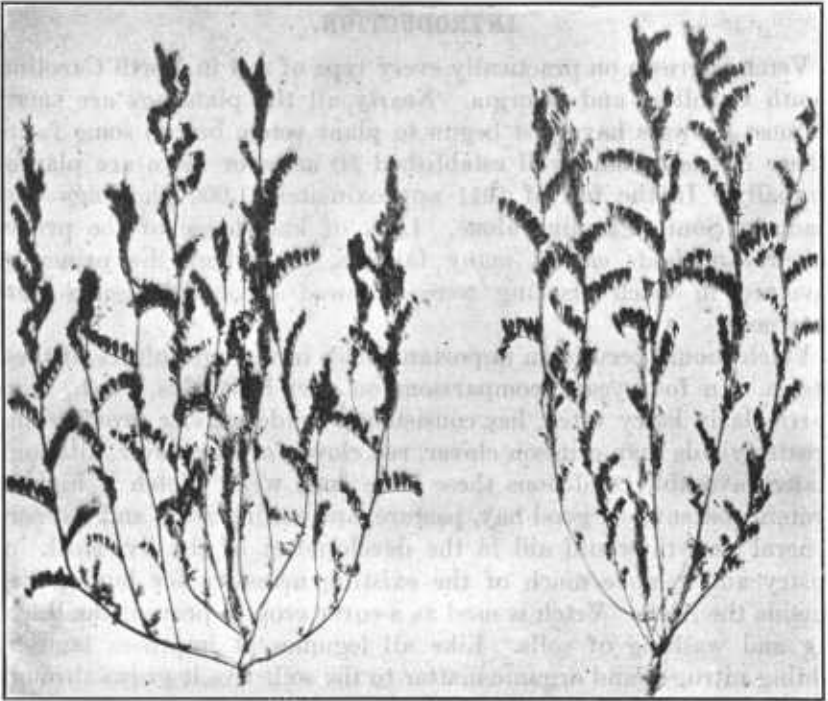


FIG. 1.—Plants of English, Oregon, or common vetch (*Vicia sativa*).

the last of March. It does not grow so large as the other varieties, although when planted thick it makes heavy yields. When ripe the pods burst open and scatter the seed.

Common vetch (fig. 1) grows erect where the plants are close together and ordinarily has from three to five stalks to the plant. It resembles the narrow-leaved vetch, but grows larger and does not shed its seed so readily. It is also later in maturing, ripening seed from May 10 to May 25 in South Carolina. It is not so hardy as either the narrow-leaved or hairy vetch, being subject to winter-killing at temperatures lower than 15° F. It does not do well on

light lands or in dry seasons, the best results being obtained on loamy soils with a moderate rainfall. Where conditions are favorable, it yields as large crops as hairy vetch and is much more easily handled.

Hairy vetch, or sand vetch (fig. 2), has a much more recumbent or reclining growth than common vetch. Unless sown with some other crop to give it support, it falls down and is more or less difficult to harvest. Each stalk produces from 5 to 100 branches (the number depending on the opportunity given the plant), frequently from 6 to 9 feet long. It usually matures from May 20 to June 10 in the latitude of South Carolina. The first pods near the ground ripen while the top of the plant is still in bloom. Hairy vetch is very hardy and never winterkills in the South Atlantic States when properly handled. Heavy yields have been made on all types of soil. The name "sand vetch" is applied to it on account of its ability to do well on sandy soil. It is hardier than common vetch, and when planted side by side with it on land that has never previously grown vetch it frequently makes a heavy growth when common vetch is a complete failure (fig. 3). For this reason hairy vetch should be grown on the land before attempting to grow common vetch. Many failures have been made by using common vetch on land that should have been planted with hairy vetch. When the

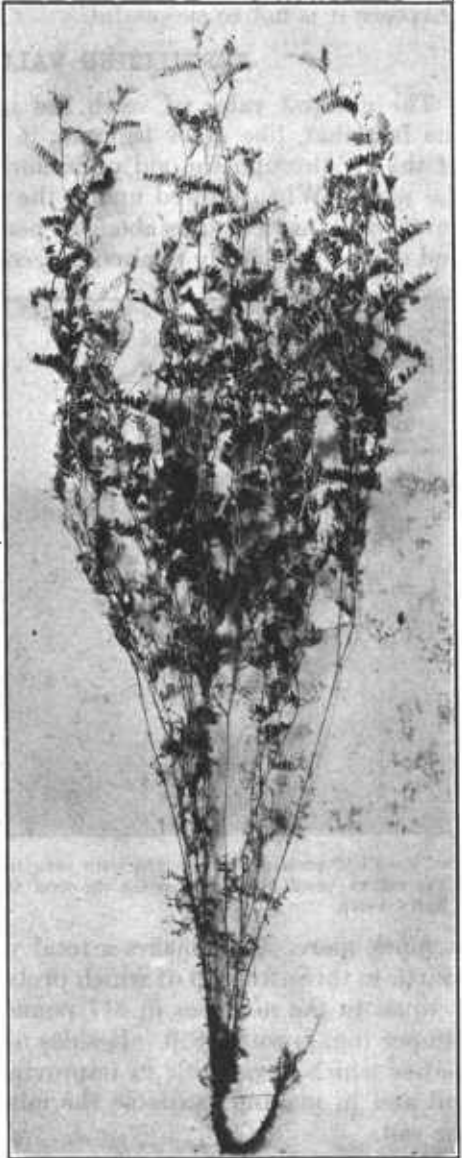


FIG. 2.—A plant of hairy, winter, or sand vetch (*Vicia villosa*).

land is suitable, well inoculated, and fairly fertile, common vetch does well, and because it is earlier, more easily handled, and less expensive in seeding it is preferred to hairy vetch, but for general purposes it is not so successful.

FERTILIZING VALUE OF VETCH.

The greatest value of vetch lies in its fertilizing powers, due to the fact that, like other legumes, it is able to use the free nitrogen of the air through the aid of bacteria which live in the nodules on the roots. When plowed under, the plants decay quickly. A ton of hairy-vetch hay contains about 50 pounds of nitrogen, while the roots and stubble, including the nodules, contain approximately one-fourth



FIG. 3.—Field showing hairy vetch with oats (at the left) and common vetch alone (at the right), sown on clay land for the first time, indicating the superior hardiness of hairy vetch.

as much more. This makes a total yield of 62.5 pounds (from one-fourth to three-fourths of which probably comes from the air), which is equal to the nitrogen in 417 pounds of nitrate of soda. This, at \$48 per ton, is worth \$10. Besides nitrogen, vetch furnishes organic matter which is valuable in improving the physical condition of the soil and in making available the mineral elements of plant food in the soil.

Vetch will increase the growth of a following crop of cowpeas more than a crop of cowpeas will increase a crop of vetch. Observation of the results and the percentage of nitrogen in the two plants indicate that vetch is superior to cowpeas in building up the productiveness of the land. A ton of cowpea hay contains approximately only four-fifths as much nitrogen as a ton of vetch hay.

TIME FOR PLANTING VETCH.

The fact that vetch if not harvested will reseed itself, the seed lying on the ground after maturing in the spring and coming up in the fall, shows that the season of planting extends over a long period. Vetch may be planted at any time from August until December, inclusive, but the best results are obtained by planting from August 15 to October 15. In years when the seasons are favorable, especially when the land is fertile and well inoculated, late planting may do well, but as a rule there is considerable risk in seeding after October 15. If the vetch gets well started and is inoculated there is little danger from any hot or dry weather that may occur in the fall, but it should have time to become firmly rooted before cold weather sets in. Late fall-planted vetch suffers from dry weather in the

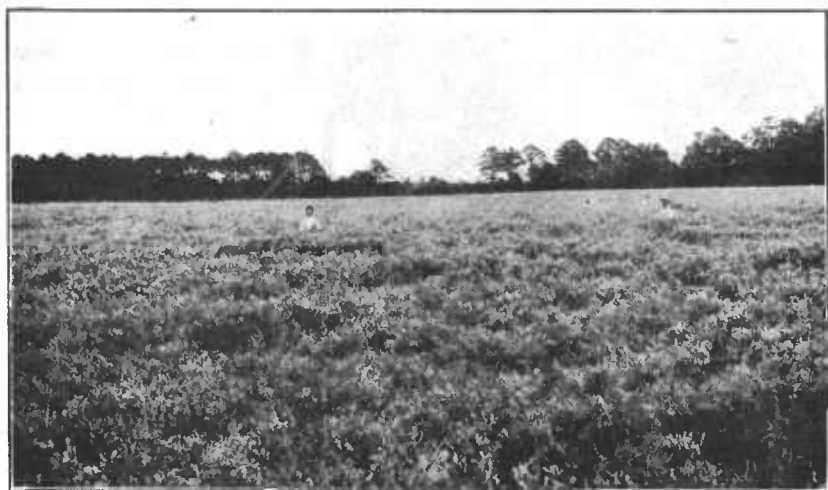


FIG. 4.—Field showing hairy vetch planted in cotton after the first picking. Yield, 1,000 pounds of seed cotton and 1½ tons of hairy vetch.

spring much more than the earlier fall-planted and better rooted vetch. In the spring of 1910 and 1911 there were many failures in South Carolina with vetch planted as late as December 1 because it failed to get sufficient root growth to withstand the spring droughts. In the winter of 1911 and 1912 much of the late-planted vetch was killed by the cold weather before it got well started.

Vetch may be planted in cotton when it is laid by or after the first or second picking. Figure 4 shows a field in Newberry County, S. C., of vetch planted in cotton after the first picking in September. This cotton yielded 1,000 pounds of seed cotton and the vetch yielded approximately 1½ tons of hay to the acre.

QUANTITY OF SEED REQUIRED.

Inasmuch as narrow-leaved vetch seed is difficult to obtain and is not commonly sown, nothing definite as to the quantity of seed required has been determined. As the seeds are small, 25 pounds per acre are probably sufficient. With common vetch 45 pounds are used by the best growers. In order to facilitate the harvesting of the

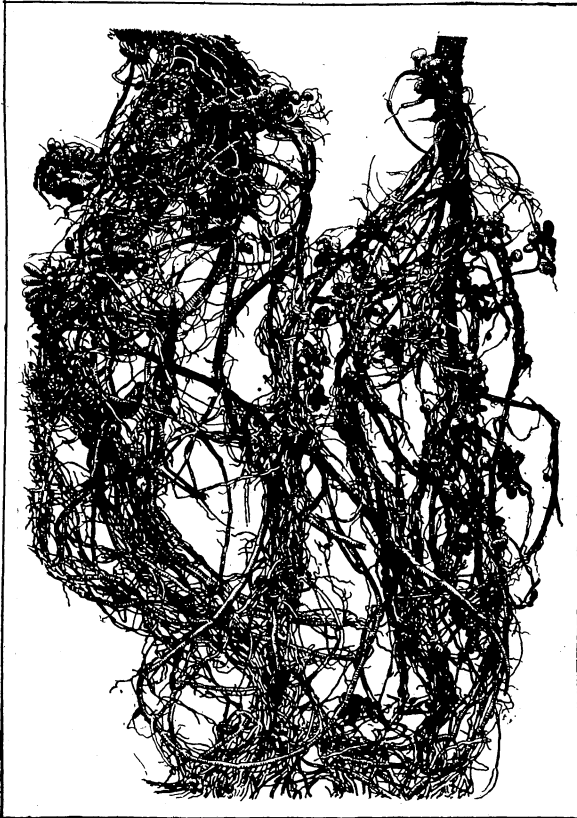


FIG. 5.—Roots of hairy vetch, showing nodules.

per acre with the common vetch. Thirty pounds of good hairy vetch seed and from 1 to 2 bushels of oats per acre are usually sown. Where hairy vetch has been grown previously, 20 to 25 pounds of vetch seed and 2 bushels of oats, handled properly, will give good yields on fertile soils.

If vetch is used for soiling, from 50 to 80 per cent more seed should be sown than when planted for hay. If used as a winter cover crop, smaller quantities will give good results.

The seed should be tested before planting and the quantity of seed sown per acre regulated accordingly because of the variability in the germination of vetch seed. This variability is due partly to the unevenness of the ripening of the vetch seed and partly to the fact that some of the seed must necessarily be harvested in an immature state.

INOCULATION OF VETCH.

On land that has never grown vetch, the best results are obtained by inoculation. The nitrogen-gathering bacteria, which take nitro-

gen from the air, must be present in the soil before a satisfactory growth can be made. The presence of the bacteria is indicated by the nodules on the roots of the vetch plants, as shown in figure 5. A part of the nitrogen produced by these bacteria is used by the plant and the remainder goes into the soil when the nodules decay. Without nitrogen-gathering bacteria the vetch plants come up in the fall, but turn red and die or make a poor growth the succeeding spring.

In some communities where narrow-leaved vetch is found growing wild there are occasionally enough bacteria already in the soil to produce good results, but this is rarely the case. Bottom lands subject



FIG. 6.—Field showing the result of the proper inoculation of vetch. The inoculating soil was covered as soon as applied. In the rows where no vetch is seen the inoculating soil was exposed to the sun for an hour.

to overflow are usually well inoculated for vetch, but, unless it is positively known that the necessary bacteria are present, the vetch should be inoculated.

There are two principal ways of inoculation: (1) By the use of artificial vetch culture, such as is distributed by the United States Department of Agriculture; and (2) by using soil from a field where vetch has recently grown thriftily. The second method has proved more uniformly successful. Soil from spots where narrow-leaved vetch has grown will inoculate for all kinds of vetch. Special care should be taken to avoid using soil that contains noxious weeds or

is infested with plant diseases. Soil for inoculation can be used to a depth of 6 or 8 inches. It should be protected from the sunlight as much as possible while it is being transferred from one field to another and should be worked in with a harrow or drag as soon as applied. As the direct rays of the sun kill the bacteria, better results are usually obtained if this transfer is made on a cloudy day, early in the morning or late in the evening.

Figure 6 shows a plat of vetch planted in cotton with a guano distributor. The seed and inoculating soil were put down together and covered immediately. On the adjoining plat the inoculating soil was sown and left exposed to the sun for an hour. Only where the seed and soil were immediately covered was the growth of vetch satisfactory.

The quantity of soil necessary for inoculating depends on its character and the previous growth of vetch on the land. Sandy soil does not seem to be as good as loam or clay for inoculating purposes. Soil containing a good supply of organic matter is best, as it usually contains the most bacteria. No soil should be used unless the growth of vetch on it has been luxuriant. Two hundred pounds of the proper kind of soil may be sufficient for 1 acre, although the chances of success are better with larger quantities. If the soil is convenient, 1 ton per acre should be used.

Basic slag can be mixed with inoculated soil and sown with vetch seed and oats with good results, using either a guano distributor or a combination wheat and fertilizer drill. In order to facilitate handling the soil in this way it should be run through a sieve. A common sand screen can be used for this purpose. Acid phosphate kills bacteria when they come in contact with it, and when used it should be applied several days before or the spring before the inoculation is attempted, either with soil or artificial culture. Where vetch is planted for the first time, basic slag has given better results than acid phosphate with both kinds of inoculation. At Pelzer, S. C., vetch planted on fertile clay soil had better inoculation and made a heavier growth with basic slag than with acid phosphate.

An application of lime assists in securing inoculation on acid soils, although on most soils of the South Atlantic States, even though lime is beneficial, vetch succeeds well without liming. Barnyard manure aids in making the inoculation more complete, but is not a substitute for inoculation. However, manure made from vetch hay may contain sufficient bacteria, so that when applied to the land no further inoculation is necessary.

Vetch seed carry some nodule-forming bacteria on their surface, and some growers have obtained fair success in inoculating land by sowing 2 quarts of vetch seed with winter oats year after year until

the soil becomes inoculated. Ordinarily this is not a good method, as it takes too long to obtain the maximum results. A good plan for any one just beginning vetch growing is to prepare thoroughly half an acre of fertile land, use plenty of barnyard manure, and inoculate the soil. Forty pounds of hairy vetch seed and 1 bushel of oats should be sown to the acre. This should make a good stand of vetch, and if the soil for inoculation has been carefully handled there should be an abundance of nodules on the vetch roots. The next year soil from this half acre can be used for inoculating larger fields and the farmer can extend his area of vetch as he sees fit. If the vetch does not become well inoculated the first year, it should be planted again on the same land until the inoculation is complete.

The necessity for inoculation can not be too strongly emphasized; more failures have been made with vetch in South Carolina from lack of inoculation than from any other cause. One cooperator reported on this point as follows: "On a 5-acre plat where soil was used from an inoculated field, the crop was a decided success. On a 7-acre field where no inoculation was used, the crop was a complete failure." After a field has once grown vetch successfully, however, it will require no more inoculation, unless it is not reseeded in vetch for several years.

PRODUCTION OF VETCH HAY.

Vetch is used for hay more than for any other purpose. At Augusta, Ga., where hay made from vetch and oats is well known, it sells on a par with cowpea hay. Liverymen buy it extensively, and it is shipped in considerable quantities to the sawmills and lumber camps of Florida. From 1 to 3 tons to the acre are common yields, which, at prices varying from \$15 to \$20 a ton, make it a profitable crop. Vetch makes the best hay if cut when the first pods appear or before the stems and lower leaves are damaged. If cut later, the yield will be greater but the quality will not be so good.

Narrow-leaved and common vetch are easily cut with a mower, but some difficulty may be experienced in cutting hairy vetch. This can be partly overcome by having a man follow the mower with a fork to keep the vetch from clogging on the cutter bar or by throwing the swath out of the way as soon as it is cut.

The problem of curing and handling vetch hay is much the same as with cowpeas. In favorable weather vetch may be cured in the swath and windrow, but ordinarily it should be raked and shocked when partly cured. After the hay is raked into windrows, it may be bunched with an ordinary dump rake or sweep rake, thereby decreasing the labor in shocking. Shocks should be tall and narrow to prevent heating in the middle. They are sometimes built on racks that keep the inside hollow and allow the hay to cure more rapidly.

MIXTURES FOR HAY.

For maximum yield and ease in handling the hay some other crop should be planted with vetch. Oats, rye, wheat, or barley may be used for this purpose. As a small-grain crop makes the best hay when cut in the dough stage, the variety of grain planted should be governed to a certain extent by the time it is desired to cut the vetch. Burt oats will be found satisfactory for early harvesting, and the Appler variety is suitable for later cuttings. When planted for pasture, vetch does well with any small grain. When planted for hay, hairy vetch especially needs a grain crop to hold it off the ground, as it then makes a better yield. On suitable lands, from 2 to 4 quarts of crimson clover seed to the acre may be planted with vetch and the native grasses, such as Johnson grass and Bermuda grass, for hay or pasture.

PRODUCTION OF VETCH SILAGE.

Vetch makes good silage and is ready at a time of year when the corn silage is likely to be exhausted. Hay and silage making may be worked together. When the weather is favorable, the vetch may be cured for hay, and in rainy weather it may be cut for silage, so that but little time need be lost in harvesting. A large dairy farm near Columbia, S. C., uses vetch in this way, feeding the silage to dairy cattle with good results.

PALATABILITY OF VETCH FORAGE.

Reports from farmers differ as to the palatability of vetch. Some say that stock will not eat it, others report that they gradually become accustomed to it, and still others that all kinds of animals eat it readily. A number of farmers use it extensively for swine pasturage. The green forage of the native vetch and of common vetch is more readily eaten than that of hairy vetch, but when cut for hay there is no apparent difference. It is the common opinion among farmers that vetch hay ranks higher in palatability as compared with other crop than does the green forage. No difficulty seems to be experienced in getting young stock to eat vetch.

PRODUCTION OF VETCH SEED.

The source of seed has an important bearing on vetch growing in the South Atlantic States. The seed of "native" or narrow-leaved vetch can rarely be purchased in the market. Since the pods burst open when ripe, it is almost impossible to gather any quantity of the seed. Where oats are sown on land on which narrow-leaved vetch is

growing, the oats and vetch may be cut together, and by binding into bundles the vetch seed is saved though the pods burst open. When thrashed, the oats and vetch will be mixed together. When narrow-leaved vetch is mixed with Johnson and Bermuda grasses some seed can be saved by placing a blanket under the baler when the hay is baled. Anyone desiring to grow narrow-leaved vetch, however, must depend mainly on its reseeding itself. This it does very well on meadows and in pastures where it is not grazed too close, as considerable seed becomes shattered by the time the native grasses are ready to cut for hay.

Thus far, practically the entire supply of seed of the common and hairy vetch has been obtained from European markets. Seed of common vetch may be purchased from growers in Oregon, but the western demand and high transcontinental freight rates make Oregon seed more expensive than that from France, Germany, and England. Hairy vetch seed is mostly imported from Russia and Germany, as there is no adequate supply in this country.

Vetch growers should consider the production of their own seed. No attempt has yet been made in the South Atlantic States to harvest common vetch for seed. It can be cut with a binder and thrashed with an ordinary thrasher like wheat and oats. In Oregon, fair yields are from 10 to 20 bushels per acre, ordinarily worth from \$1.50 to \$2.25 per bushel. Common vetch does not reseed itself well.

Hairy vetch can be made to reseed itself by cutting early, before the leaves and stems near the ground begin to die. It will then continue to grow and set sufficient seed to reseed the land by June 10. Or, if cut late, after the lower pods have matured, enough seed will shatter out in handling to reseed the land. In either of these cases the land should not be plowed too deep for the summer crops which follow, nor should these crops be cultivated too late, as the seed may be buried too deep to come up or too many plants be killed to leave a stand. If the land is not plowed at all or no summer crop is planted, the seed will germinate and come up in the fall, unless the grasses are too thick. When left to reseed itself on Bermuda or Johnson grass sod, hairy vetch will gradually disappear in the course of three or four years.

Hairy vetch can be thrashed for seed with the ordinary grain thrasher. For producing seed, vetch should be sown by itself, or with only a small quantity of oats or wheat, so as to make the percentage of vetch seed in the mixture as high as possible when thrashed. If there is too large a proportion of oats for a proper mixture, the oats can be removed by running through a fanning mill. Special machines to separate the grain from the seed are on the market.

Hairy vetch ripens its seed unevenly, so that the time of gathering should be whenever there is a good crop of seed ready to harvest. This is usually after the bottom pods have become dry and burst open. If hairy vetch is well matured, it can be harvested without cutting by raking it up into windrows with an ordinary hayrake. If the rake does not get it all the first time, the field should be gone over again in the opposite direction. This should be done when the vines are damp, to prevent the seed from shattering. If this method is not satisfactory, as is sometimes true on stiff land where the roots are held firmly in the ground or where some other crop is planted with the vetch, it will be necessary to use a mower. After the vetch is raked or cut it can be piled and left until hauled to the thrasher.

Hairy vetch usually yields about half as much seed per acre as common vetch when planted in the same region. On a farm near Newberry, S. C., a field of hairy vetch, estimated to make $1\frac{1}{2}$ tons of hay per acre, yielded $3\frac{3}{4}$ bushels of seed to the acre. Hairy vetch seed varies in price from \$4 to \$9 per bushel of 60 pounds, so that under ordinary conditions seed production should be a profitable operation. This is especially apparent when it is noted that the thrashed straw makes a fair quality of hay, that enough seed has shattered out to reseed the field, and that nitrogen and humus have been added to the soil.

VETCH HONEY.

Vetch growers report that while the vetch is in bloom bees make two or three times as much honey as at any other time in the year. From 25 to 50 pounds of vetch honey per stand of bees is obtained during the season. Vetch honey is white and clear and of excellent quality.

ROTATIONS WITH VETCH.

Vetch, being a winter crop in the Southern States, is well adapted to use in rotations with ordinary crops, as it can be grown without seriously interfering with some of the summer crops. The following rotations are suggested for the various conditions.

ROTATIONS FOR BOTTOM LANDS.

Low lands subject to overflow should be devoted to pasture or hay growing. Cultivated crops, such as corn and cotton, are more easily damaged by high water in case of an overflow, and the loss is greater than with hay or pasture. Vetch can be used on such lands with the native grasses, oats, cowpeas, and Johnson grass in various rotations,

three of which now practiced in the South Atlantic States are shown in Table I.

TABLE I.—*Three rotations showing how vetch is used with native grasses, oats, and Johnson grass for hay or pasture on overflow bottom lands.*

Rotation.	Winter.	Summer.
First.....	Vetch and native grasses.....	Johnson grass.
Second.....	Oats and vetch.....	Do.
Third:		
First year.....do.....	Do.
Second year.....do.....	Cowpeas.

In the first rotation narrow-leaved vetch should be used, as it is the only vetch that will reseed itself and hold its own with Johnson grass year after year. A large part of the seed is ripe and scattered by the time the first cutting is made and being hardy it gains a foothold and makes a stand the following year. A farmer near Chester, S. C., reports as follows: "In a creek bottom where three years ago there was little or no vetch in a native grass meadow the narrow-leaved vetch is gradually spreading over the field." This rotation is common in the Savannah and Congaree river bottoms. Vetch has a twofold purpose in this rotation: (1) Johnson grass is not ready to cut until late in the spring, so that, if vetch is not grown, weeds will grow on the land and one cutting of hay is lost; and (2) the vetch adds nitrogen to the soil, which causes a heavier growth of the Johnson grass.

In the second and third rotations it is necessary to plow the land in order to sow the oats and vetch. Either common or hairy vetch may be used, depending on the character of the soil. On loamy, moist soils some vetch growers plant three-fourths common and one-fourth hairy vetch, thereby extending the haying period. Any of these rotations are also suitable for uplands.

The western corn rootworm appears to be gradually working its way southward where corn is grown continuously on bottom lands. A rotation of crops is an effectual preventive and it would seem that vetch might be here profitably employed as an alternating crop.

ROTATIONS FOR MIXED FARMING ON UPLANDS.

Where it is desirable to make a specialty of hay on a mixed farm on uplands, the following rotation, shown in Table II, of vetch with corn, cotton, oats, and cowpeas may be used.

TABLE II.—*Rotations of vetch with corn, cotton, oats, and cowpeas for mixed farming on uplands.*

Year.	First field.	Second field.	Third field.
First.....	Cotton; vetch for winter cover crop.	Corn with cowpeas between rows.	Oats and vetch; cowpeas.
Second.....	Corn with cowpeas between rows.	Oats and vetch; cowpeas....	Cotton; vetch for winter cover crop.
Third.....	Oats and vetch (winter); cowpeas (summer).	Cotton; vetch for winter cover crop.	Corn with cowpeas between rows.

This rotation is especially recommended for the Piedmont section where the land is likely to wash and cultivation is difficult. On clay lands that become hard in dry weather or can not be plowed after a rain, oats and vetch handled carefully do well. Hairy vetch properly inoculated and planted has made good growths even on bald clay spots. Sorghum is frequently used in place of the cowpeas in this rotation.

ROTATIONS FOR DAIRY FARMS.

In dairy farming, where plenty of forage is needed, vetch can be used for silage, hay, or pasture in a 3-year rotation with oats, corn, and cowpeas, as shown in Table III.

TABLE III.—*Vetch in 3-year rotations with oats, corn, and cowpeas on a dairy farm.*

Year.	First field.	Second field.	Third field.
First.....	Early corn with cowpeas between rows.	Oats and vetch; cowpeas....	Oats and vetch; silage corn.
Second.....	Oats and vetch (winter); cowpeas (summer).	Oats and vetch; silage corn..	Early corn with cowpeas between rows.
Third.....	Oats and vetch (winter); silage corn (summer).	Early corn with cowpeas between rows.	Oats and vetch; cowpeas.

In this rotation, the oats and vetch may be used for making silage or pasture. With the barnyard manure returned to the soil there will ultimately be an excess of nitrogen. This can be reduced by planting silage corn or sorghum instead of cowpeas after the oats and vetch.

ROTATIONS FOR COTTON FARMS.

Table IV shows how vetch can be used in a system of cotton farming with cotton, corn, oats, and cowpeas.

TABLE IV.—*Vetch in rotations with cotton, corn, oats, and cowpeas on a cotton farm.*

Year.	First field.	Second field.	Third field.	Fourth field.
First.....	Cotton.....	Oats and vetch; cowpeas.	Cotton; vetch for winter cover crop.	Corn, with cowpeas between rows.
Second...	Oats and vetch; cowpeas.	Cotton; vetch for winter cover crop.	Corn, with cowpeas between rows.	Cotton.
Third.....	Cotton; vetch for winter cover crop.	Corn, with cowpeas between rows.	Cotton.....	Oats and vetch; cowpeas.
Fourth....	Corn, with cowpeas between rows.	Cotton.....	Oats and vetch; cowpeas.	Cotton; vetch for winter cover crop.

The vetch preceding the cowpeas in this rotation should be handled so that it may reseed itself for a winter cover crop. The land should be plowed shallow or disked for cowpeas to avoid covering the vetch seed too deep. It will be necessary to go over heavy growths of vetch with a disk harrow or stalk cutter before they can be turned under.

EXPERIENCES OF FARMERS WITH VETCH.

South Carolina is growing more vetch than any other of the Southern States. The experiences of some of these farmers are shown in the following characteristic reports, some of which were secured through the cooperation of the Farmers' Cooperative Demonstration Work:

E. A. Brown, Kershaw County.—Planted hairy vetch on sandy loam soil without inoculation. The vetch was a failure. Inoculated the second year and made a success.

M. W. Doty, Fairfield County.—Planted hairy vetch on light, sandy land and inoculated the seed with vetch culture from the United States Department of Agriculture. A good stand was secured, but only a few spots became inoculated; the remainder died. The vetch was plowed under, barnyard manure was applied, and the land sowed in cowpeas. Vetch was planted again the next fall and a heavy growth was made. Cotton following the vetch made a heavier yield than where no vetch was planted.

A. D. Hudson, Newberry County.—Planted hairy vetch on poor clay land in September. The first year no inoculation was used, and vetch was practically a failure. Inoculated soil the next year, sowed in September, and obtained 1½ tons of hay per acre. Hairy vetch planted in cotton where soil was inoculated did well. Common vetch did not yield as well as hairy vetch. Now plant nearly one-third of the farm in vetch every year.

R. A. Hudson, Fairfield County.—Planted hairy vetch on a clay soil; used no fertilizer and inoculated with soil; made 2,400 pounds of hay per acre.

R. O. Janson, Horry County.—Planted hairy vetch on sandy land with clay subsoil. Some barnyard manure and fertilizers were applied and a fair stand was secured. No inoculation was used, and the vetch was a complete failure.

T. C. Johnson, Florence County.—Planted hairy vetch on sandy loam soil after inoculating with soil from an old field. The inoculation the first year was not complete and only a partial success was made. The vetch was left to reseed itself, and a good stand, perfectly inoculated, came up in the fall. This made a heavy growth and was pastured with calves and colts with good results.

C. W. Josey, Lee County.—Planted hairy vetch on sandy loam soil following corn and peas; used soil for inoculation; made 2 tons of hay per acre.

George E. Showman, Orangeburg County.—Planted hairy vetch on light, sandy soil. Inoculated with soil. The vetch yielded 2,500 pounds of hay per acre. Some common vetch sowed in comparison with the hairy vetch made a complete failure.

Milton L. Sifty, Orangeburg County.—Secured inoculation by planting vetch year after year. Hairy vetch, oats, rye, and barley were sown in early September. It was grazed by cows and hogs in the spring and considered a success.

E. V. Turner, Fairfield County.—Planted hairy vetch on clay land in cotton after the second picking. Inoculation was obtained from wild vetch growing in the neighborhood. The fall was very dry, but a good stand was secured and a yield of from 1 to 1½ tons of hay per acre was made.

Jacob S. Wheeler, Newberry County.—Planted hairy vetch on sandy land that had become inoculated by a previous crop. The yield was 2½ tons per acre. The vetch was fed to milch cows with good results.

Welch Wilbur, Newberry County.—Inoculated land and planted 100 acres of vetch in cotton in September. Hairy vetch did better than common vetch. Hairy vetch yielded from 1 to 2 tons per acre. Some stands of bees gathered an average of 50 pounds of honey per stand from vetch.

U. Alvin Vincent, Florence County.—Planted hairy vetch on sandy land so poor that it could hardly grow cowpeas. The soil was inoculated with soil from another field. One ton of hay per acre was obtained and fed to horses.

SUMMARY.

Vetch is grown on practically all types of soil in the South Atlantic States.

Vetch can be used for hay, pasture, soiling, silage, honey production, and soil improvement.

Three varieties of vetch are now grown in these States, viz, "native" or narrow-leaved vetch; common, Oregon, or English vetch; and hairy or sand vetch.

In the latitude of South Carolina "native" or narrow-leaved vetch usually matures from April 15 to May 15, common vetch from May 10 to May 25, and hairy vetch from May 20 to June 10.

The narrow-leaved vetch grows wild, is hardy, will reseed itself, and will hold its own against native grasses. The common vetch is more easily handled and the seed is cheaper than that of other varieties, but it is not so hardy. Hairy vetch is hardy and for all conditions is the best variety for these States.

Vetch adds nitrogen and organic matter to the soil and is superior to cowpeas for increasing the productivity of land. It does for the soil in the winter what the cowpea does for it in the summer.

Vetch has a long planting period, but best results are obtained by planting from August 15 to October 15.

Vetch can be planted in cotton at the last working, or after the first or second picking. It can be planted after corn or cowpeas.

Forty-five pounds of common vetch or thirty pounds of hairy vetch seed per acre are sufficient for ordinary purposes.

The necessity for inoculation can not be too strongly emphasized; more failures have been made with vetch from lack of inoculation than from any other cause. The seed should be inoculated with artificial vetch cultures or the land should be treated by transferring soil from an old field to the new one. Other methods sometimes employed are to plant a small amount of seed on the land until inoculation is secured or to apply barnyard manure made from vetch. A field that has once grown vetch successfully will not require inoculation again unless it is not planted in vetch for several years.

Small grains should be sown with vetch to hold it up and to allow the hay to be more easily cured. This is more necessary with the hairy vetch than with the other varieties.

Most of the hairy vetch seed now used is imported from Europe, but it can be and should be produced in the South Atlantic States.

Vetch hay is cured similarly to cowpea hay.

Vetch can be used in rotations for hay, dairy, cotton, and general farming.

The experiences of farmers show that all kinds of stock will eat vetch and that by proper inoculation and seeding it can be grown successfully on all ordinary soils in the South Atlantic States.

