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Vetch Varieties for Soil Improvement and Seed Production in Alabama

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Contents

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INTRODUCTION

THE increased yields of cash crops which have resulted from turning under winter legumes and the value of these legumes in erosion control (4) have served to stimulate interest among Alabama farmers in winter cover crops. The progress of the winter legume program in Alabama has been extremely rapid; whereas, only 1,500 pounds of winter legume seed were planted in Alabama in the fall of 1918 when the program began, almost 22,700,000 pounds were planted in 1940.

It is believed that the progress of the winter legume movement in Alabama would have been even more rapid if seed costs had been lower or if more seed had been produced within the State. The magnitude of the cash outlay for winter legume seed greatly handicaps the program. For example, of the 4,251,270 pounds of hairy vetch seed planted in Alabama in 1940, only 812,970 pounds were home-produced. This means that approximately $320,000 worth of hairy vetch seed alone was imported into Alabama for planting in the fall of 1940.

Production of vetch seed within the State has failed frequently enough to discourage many farmers from setting aside a portion of their acreage for seed. The failures have been due to several causes: notably, adverse weather conditions, such as excessive heat during the flowering period or heavy rains during the harvesting season, the lack of adequate harvesting equipment, and the prevalence of destructive insects and diseases. It is also significant that the most commonly grown variety, hairy vetch, is a relatively uneconomical seed producer in Alabama as compared with certain other vetches now available or in the process of development by the Alabama Agricultural Experiment Station.

EVALUATION OF VETCH VARIETIES AS GREEN MANURE CROPS

Bailey, Williamson, and Duggar (2) and Tidmore and Sturkie (5) have emphasized the value of hairy vetch for increasing corn and cotton yields in Alabama. (Figs. 1 & 2.) Although hairy vetch, when adequately fertilized and properly planted, will produce ample green matter to supply the nitrogen requirements of the succeeding crop, most of its growth is made relatively late in the spring (Fig. 3). This, may, in certain years, cause delayed planting of the summer crop which is to succeed the vetch. Sometimes, in unfavorable years when growth is severely retarded, little or no benefit is derived from the vetch by the summer crop which follows. Efforts of workers in the Alabama Experiment Station have been directed toward the development of vetches which will pro-

FIGURE 1.—A good crop of vetch turned under prior to planting, or application of nitrate of soda would probably have tripled the yield of this North Alabama corn field.

duce sufficient growth to permit earlier turning and will also produce satisfactory quantities of seed.

Tests conducted in three general sections of the State show that several vetches are capable of producing as much vegetation as, or more than, hairy vetch, *Vicia villosa* L. (Table 1). The yields given are those determined on or near April 1 of each year, which is the time vetch usually must be turned so as not to interfere with spring planting operations. Vetch yields will increase greatly if turning is delayed, but it is not recommended that this practice be followed since poor stands and consequently low yields of the summer crop may result. The extremes in yields of the several

TABLE 1.—Yields of winter legumes tested in three general sections of Alabama, 1926-1940.

Legume	Green weight, average pounds per acre				Yield extremes Pounds per acre
	North[1]	Central[2]	South[3]	State	
Hairy vetch	7842	7388	7463	7527	Fail to 18317
Hungarian vetch	6008	3766	3736	4366	100 to 17642
Monantha vetch	8840	7590	9383	8500	Fail to 29054
Oregon common vetch[4]	9257	6395	6161	7271	697 to 21562
Willamette vetch	8204	6927	6049	6956	383 to 15682
Alba vetch[5]	6969	4866	6698	5974	700 to 14484
Crimson clover	12,104	3803	4483	6497	735 to 32779
Austrian peas	7236	7092	5658	6701	Fail to 17751

[1]Tennessee Valley and Sand Mountain Substations and Alexandria Experiment Field.
[2]Auburn, Black Belt Substation, and LaFayette, Prattville, and Aliceville Experiment Fields.
[3]Wiregrass and Gulf Coast Substations and Brewton and Monroeville Experiment Fields.
[4]1934 and 1935 averages only.
[5]1934 and 1936 averages only.

varieties of vetch recorded in Table 1 indicate the minimum and maximum yields of green matter that might be expected over a period of years. The variation was due largely to weather conditions.

Hairy vetch is the most generally adapted vetch for Alabama. It is sufficiently hardy and succeeds on most soil types, provided the land is well-drained. Hairy is one of the most drought - resistant vetches. A serious disadvantage of hairy vetch is its limited growth during the winter.

FIGURE 2.—A heavy crop of hairy vetch was turned under before this corn was planted. Almost 40 bushels of corn per acre were harvested from this field, located on a farm near the field pictured in Figure 1.

Smooth vetch (*Vicia villosa* var.) is similar to hairy vetch in most respects; even the seed of the two are indistinguishable. Its stems and leaves are smooth and its flowers are smaller and more reddish in color than those of hairy vetch. Considerable smooth vetch, largely foreign in origin, has been sold as hairy vetch in Alabama. However, since smooth vetch is so similar to hairy, even as far as adaptability and yield are concerned, farmers need not hesitate to plant it. Actually, it is felt that smooth is a superior seed producer to hairy vetch in Alabama.

Of the several vetches tested, monantha (*Vicia monantha* L. Desf.) has proved to be as good as, or better than any other variety for green manure purposes. In tests conducted at Auburn, Alexandria, and Prattville it has rather consistently outyielded all other varieties in seed production (Table 2). Monantha vetch has an added advantage in that it is one of our earliest vetches; it is approximately two weeks earlier in maturity than hairy vetch. Occasionally it is attacked by root rot, particularly when it has been planted on a poorly drained soil. It seems to succeed well on all soil types in Alabama, except those in the Black Belt where yields of all vetches are well below the State average.

FIGURE 3.—Comparison of spring growth of hairy vetch and Monala vetch, March, 1942; hairy vetch in foreground, Monala at rear.

Monantha vetch was formerly not considered hardy enough for Alabama conditions, but the LaFayette strain and others such as the Monala now in the process of development are evidently sufficiently cold resistant to survive Alabama winters. LaFayette monantha vetch was not visibly injured by temperatures as low as 3° F. at Auburn and as low as —12 °., under cover of snow at the Tennessee Valley Substation in 1940. A comparison of LaFayette and commercial monantha vetch conducted at 7 locations over the State in 1936 showed the former to be a superior green manure crop, particularly in the central and northern sections.

TABLE 2.—Seed yields of vetches tested at several stations — Pounds per acre.

Variety	Auburn 10-year average	Prattville 5-year average	Alexandria 4-year average
Hairy vetch	79	252	157
Hungarian vetch	69	154	600
Monantha vetch	178	269	1064
Common vetch[1]	28	172	494
Willamette vetch	73	248	225
Alba vetch[2]	164	94	325

[1]2 years in test.
[2]1 year in test.

The LaFayette variety, like commercial monantha vetch, is one of the most shatterproof vetches.

The yields of greenmatter produced by monantha vetch are sufficient to supply summer crops with adequate amounts of nitrogen (Table 3). Farmers are cautioned, however, that monantha vetch, like Austrian peas, must produce a greater volume of green matter per acre than hairy vetch in order to satisfy the nitrogen requirements of the summer crop. The studies of Bailey, Williamson, and Duggar (2) suggest that 6,000 pounds of green weight per acre of monantha vetch and Austrian peas are necessary to produce an adequate supply of nitrogen; whereas, only 5,000 pounds of hairy vetch are required. Monantha vetch and Austrian peas should be turned under when 14 pounds of green matter per hundred square feet can be cut; hairy vetch can be turned when 12 pounds are cut per hundred square feet.

Analyses made by these workers showed that monantha vetch and Austrian peas contained 0.76 and 0.79 per cent nitrogen, respectively, on a green matter basis, whereas the average nitrogen content of hairy vetch was 1.0 per cent. Despite this, monantha vetch can usually be turned earlier than hairy vetch largely because of its ability to grow during the short mild spells of mid-winter. Monantha vetch is too early in maturity to be planted in combination with small grains when seed is to be harvested.

Willamette vetch, a variety of common vetch (*Vicia sativa* L.) has recently become popular with farmers interested in producing their own vetch seed. Willamette vetch is more hardy than either domestic or imported commercial common vetch. They are, however, practically identical in appearance. Willamette vetch is earlier in maturity and produces more seed than hairy vetch (Table 2). On the better, heavier, well drained soils it produces at least as much vegetation as hairy vetch, but it has not proved satisfactory on poorer soils, especially those sandy in nature. (Fig. 4.) Such lands should first be built up with hairy or any other vetch more

TABLE 3.—Effect of certain winter legumes upon corn yields at four Experiment Fields.

Legume	Brewton 1932-40		Monroeville 1931-40		Gastonburg 1933-40[1]		Alexandria 1931-40	
	Winter[2] legumes Lbs.	Corn harvested[3] Bu.	Winter[2] legumes Lbs.	Corn harvested[3] Bu.	Winter[2] legumes Lbs.	Corn harvested[3] Bu.	Winter[2] legumes Lbs.	Corn harvested[3] Bu.
Hairy vetch	3031	23.8	8098	39.8	2103	11.7	7560	24.1
Monantha vetch	5099	26.1	9808	37.4	288	10.8	9692	25.3
Crimson clover	4127	20.1	5641	28.2	1016	7.7	12862	29.7
Austrian peas	5056	24.1	2998	26.8	524	9.7	7249	22.8
No legume	——	11.2	——	12.9	——	8.9	——	8.8

[1]Gastonburg Experiment Field is located on Lufkin clay, a Black Belt soil not suited for winter legumes because of its physical structure.

[2]Average pounds green matter of winter legume turned under.

[3]Average bushels shelled corn harvested from plots summer following turning of winter legume.

FIGURE 4.—Willamette and other common vetches frequently fail on poor soils, especially those sandy in nature.
Left and background, Willamette vetch; right, woollypod. Both were fertilized at the rate of 400 pounds of basic slag and 75 pounds of muriate potash per acre. Auburn, April 4, 1941.

adapted to less productive lands. Because of its resemblance to common vetch, only certified Willamette vetch seed should be purchased.

Alba vetch, like Willamette, is a variety developed by the United States Department of Agriculture. It is not as vigorous a grower as Willamette vetch (Table 1), nor is it generally as good a seed producer. Compared with hairy vetch, it is a superior seeder and is earlier in maturity, but it does not consistently produce as much green matter. Alba vetch is readily recognized by its white flowers, which is a distinct advantage from the standpoint of certification. Alba vetch, which is also a variety of *Vicia sativa,* is hardy enough for use in Alabama. Like Willamette vetch, it is likely to fail on soils of low fertility.

Hungarian vetch (*Vicia pannonica* Crantz.) is one of the most cold-resistant vetches tested by the Alabama Experiment Station, but it has never proved to be a consistently abundant producer of green matter. Hungarian vetch is a relatively non-aggressive grower, and is generally a poor seed producer in Alabama. Its use in preference to hairy, monantha, or Willamette vetch is not recommended even though in favorable years when planted on good land it is perfectly capable of producing adequate quantities of green matter.

Woollypod vetch (*Vicia dasycarpa* Ten.) has not been included in the winter legume variety tests in recent years because seed

has not been available. Tests conducted by Bailey, Williamson, and Duggar (2), however, indicate that woollypod vetch is sufficiently hardy for all sections of Alabama and that it generally produces more green matter than does hairy vetch. It is about one week earlier in maturity than hairy vetch, has the same range of adaptability, and closely resembles it in growth habit. The selection, Auburn woollypod vetch, now being multiplied by the Alabama Experiment Station shows considerable promise and it will soon be available to the Alabama farmer. It is earlier in maturity than the strain from which it was selected and is a good seed producer. Auburn woollypod vetch grows well during the winter and is outstanding in its ability to produce green matter on less productive soils.

Other vetches, such as purple (*Vicia atropurpurea* Desf.), Augusta (*Vicia angustifolia* Reich.) and various strains of common vetch (*Vicia sativa* L.) have been tested by the Alabama Experiment Station, but none are recommended for green manure purposes. Augusta, or native vetch, ordinarily will not produce as much vegetation as either hairy, Willamette, or monantha vetch, but certain strains are now available in commercial channels which are more productive than the native vetch commonly found growing in the wild state. These strains seed well, shatter excessively, and are excellent from the standpoint of their ability to volunteer. They are, therefore, used frequently as cover crops in orchards, or wherever a volunteering winter legume is needed. Another vetch, *Vicia grandiflora,* would be recommended more readily instead of Augusta vetch even for this purpose if seed were available. Grandiflora vetch is also an excellent seed producer, shatters severely, volunteers well, and produces larger quantities of green matter than does Augusta vetch even on poor lands.

Purple vetch and most strains of common vetch are generally not hardy enough to survive the more severe winters of Alabama. They are also very susceptible to injury by aphids. Common vetch produced in this country is preferred to that which has been imported because it is usually more hardy. As has been pointed out earlier, however, Willamette vetch is the only common vetch recommended for planting in Alabama.

METHODS OF PLANTING VETCH FOR SEED PRODUCTION

The Alabama Experiment Station has released several publications (Bailey, Williamson, and Duggar (2); Tidmore and Sturkie (5); Diseker (3)) giving recommendations for the handling of winter legumes for green manure purposes. These recommendations also apply when it is intended to save the vetch for seed, but certain adjustments should be made to assure maximum seed production.

First of all, lower rates of seeding should be used in order that the yield of green matter will be reduced; this is particularly important when conditions favoring dense growth prevail and long

periods of wet weather occur during the flowering period. Small seeded vetches, such as hairy vetch should be planted at rates of 10 to 15 pounds per acre, and the larger seeded varieties, such as common and monantha, should be planted at rates of 20 to 25 pounds per acre. These rates of seeding are particularly desirable when plants are grown without support. The rates of seeding recommended for vetch being grown for green manure purposes (20 lbs. per acre for the small seeded varieties and 30 pounds per acre the larger seeded) can be used if the vetch is grown with support. The seed should never be broadcast; plots planted in this manner have consistently failed as compared with those on which seed has been drilled.

Tests conducted with hairy vetch suggest that support provided by a small grain favors seed production particularly when heavy rates of seeding have been employed (Table 4). This is probably due to the fact that the grain minimizes the extent of lodging, thus holding the flowers in a drier, more favorable environment, and making it possible to harvest a greater portion of the plant. Wheat, barley, or rye is preferred to oats as a companion crop since oats have too great a tendency to lodge. It should be pointed out that small grain-vetch mixtures are very satisfactory combinations for use in winter grazing. Seed crops can be harvested from such fields if the livestock is removed by April, before the crops are due to flower.

When vetch and small grains are planted in association, the harvested seed must be separated if the vetch or small grain is to be sold as seed. Spiral and disc-type separators have proved satisfactory for this purpose when hairy vetch is to be separated from a small grain, but these devices are inadequate for the separation of the larger seeded varieties, like Willamette vetch, from grain. For this reason, it is not recommended that such vetches when planted for seed production be grown with a small grain. However, it is recommended that all varieties be planted in cotton middles so that the dead, erect stalks may lend the necessary support. The number of tests conducted to determine the benefit of support of plants by cotton stalks is limited, but plots on which such support

TABLE 4.—Influence of methods and rates of seeding on seed production of hairy vetch, Auburn, 1937.

Method	Rate of seeding Lbs.	Seed yield per acre, pounds[1]			Increase due to planting with rye
		Hairy vetch alone	Hairy vetch with rye[2]	Average	
Drilled	20	145	223	184	78
Broadcast	20	0	38	19	38
Drilled	10	184	177	181	—7
Broadcast	10	22	57	40	35
Drilled	7.5	133	125	129	—8
Broadcast	7.5	2	8	5	4

[1]Average of four 1/100 acre plots.
[2]Abruzzi rye planted at rate of 40 pounds per acre.

was provided to vetch have in every case produced substantially greater seed yields than have check plots on which no support was provided.

Rogers and Sturkie (5) found that inoculation of vetch seed and fertilization with phosphate, dolomite and potash were necessary for maximum yields of green matter on a very light, Norfolk sandy soil. They also found it advisable to mix superphosphate or triple superphosphate with the soil prior to planting in order to avoid injury to the inoculum by these fertilizers. The use of dolomite substantially counteracted the lethal effect of phosphatic fertilizers planted in contact with the seed, and it was also determined that basic slag, even when planted in contact with the seed did not injure the inoculum. These experiments were conducted in 1937. The next year, the same plots were again planted in the same manner, but the vetch was saved for seed. Although the seed yields in 1938 were relatively low, it was found that generally the same elements responsible for abundant production of green matter served to increase seed yields. The experiments indicated that potash particularly plays an important role in seed production of hairy vetch on light sandy soils. Tests conducted at Auburn suggest that some increase in seed yield of vetch can be expected when boron has been applied to a light, sandy Norfolk soil.

METHODS OF HARVESTING VETCH SEED

Vetch seed should be harvested as soon as the bulk of the seed crop is mature. Losses of seed accompanying harvest delays are due to excessive shattering of matured pods and to lodging of the crop, particularly during periods of heavy rains and wind.

Probably the most satisfactory method of harvesting vetch, whether it is grown alone or supported by cotton stalks or a small grain, is with a combine. (Fig. 5.) Proper adjustment and speed of the combine cylinder are necessary in order to minimize cracking of the seed. The cylinder should be spaced about $\frac{3}{8}$ to $\frac{1}{2}$ inch from the shelling plate and should not be run in excess of 1,000 R.P.M. On machines which have auxiliary engines, the cylinder speed can be reduced to as low as 800 R.P.M. To further insure against cracking of the seed, particularly when larger seeded varieties are being combined, it is advisable to replace the concaves with blanks. When vetch is planted with a support crop, such as wheat, barley, oats, or rye, it is often necessary to increase the cylinder speed above these rates to accommodate the enormous volume of straw that must pass through the machine.

The height of the cutter bar is determined by the condition of the field to be harvested. If the vetch has lodged, the cutter bar must be lowered almost to the ground, but if the vetch is supported either by cotton stalks or by a small grain, it can be run relatively high. The dead cotton stalks will not cause damage to the combine unless canvases are used. However, since higher yields of seed usually result when vetch is planted in cotton stalks, and

FIGURE 5.—Combining hairy vetch supported by dead cotton stalks. Madison County, Alabama. An average yield of 275 pounds of seed per acre was harvested from this field.

since the canvasses will last through a season of harvesting even with such drastic usage, the practice of planting vetch for seed production in cotton stalks should not be abandoned.

If it is impractical to combine the vetch directly from the field, it can be mowed, raked into windrows, and if necessary, allowed to cure. The vetch can either be combined from the windrows, or it can be hauled to a thresher. Occasionally when such conditions prevail that the vetch can largely mature in the field without excessive shattering, it can be raked from the field without cutting and threshed either by combine or by thresher. Operators are reminded that this method of harvesting vetch seed is not preferred to combining directly from the field because it necessitates excessive handling of the crop, which, of course, results in shattering.

Large acreages of vetch should not be saved for seed unless a combine or a threshing machine is available. However, small operators who have neither available can harvest vetch seed satisfactorily by flailing the material after it has been mowed, raked into windrows, and cured. Here again, if there is no mower available and if the vines are mature enough, they can be raked directly from the field. The cured vines should be flailed either on a tight floor or over a strong screen placed over a tight wagon box. Such seed can then be cleaned by winnowing or with a small seed cleaner. The seed should be allowed to dry thoroughly before storage or it may heat and spoil.

INSECTS AND DISEASES ATTACKING VETCH

A number of insects may attack vetch from the seedling stage in the fall to maturity in early summer. Vetch saved for seed is subject to more severe damage than that turned under as a green manure crop. Control measures, such as dusting with various insecticides or use of a poisoned bait, are often impractical, particularly when severe damage has resulted from insect attack. Such fields should be turned under for their green manure value and to prevent as much as possible migrating of insects to other fields.

Grasshoppers, principally the red-legged grasshopper, *Melanoplus femur-rubrum* Deg., attack vetch seedlings in the fall and occasionally are responsible for complete destruction of stands. Replanting after such attacks is often impractical, particularly if the season is well advanced, but poisoned bran can be used successfully to control grasshoppers if stands have not been too severely damaged.

The corn ear-worm (*Heliothis obsoleta* F.) also called the boll worm and the tomato fruit worm, is probably the most destructive of the many insects which feed upon vetch. It feeds heavily upon leaves and pods, particularly in late seasons or upon vetch which is being saved for seed. Heavily infested stands should be plowed under for their soil improvement value since seed yields would be very low and the worms would migrate to other crops after the vetch has been destroyed. The corn ear-worm will migrate to other legumes, corn, cotton, and small grains. Dusting with calcium arsenate at intervals will control the insect, but is not recommended when stands have become heavily infested. Migration of the corn ear-worm can be halted by plowing a deep furrow around the infested field. Post holes about 1½ feet in depth should be dug in the furrow at 1 rod intervals. Larvae trapped in the post holes can be destroyed with kerosene.

Cutworms, such as the granulated cutworm, *Feltia annexa* Treit., which occasionally injure cotton severely, also feed heavily upon the vetches, particularly when maturity of the vetch has been delayed due to environmental conditions. This insect is seldom as destructive as the corn ear-worm. Poisoned bran is effective in controlling the insect.

Larvae of the Southern corn root-worm, *Diabrotica duodecimpunctata* F., feed upon vetch roots in early spring but cause no significant injury to vetch. The insect, however, increases in numbers as it feeds upon the vetch and later, when corn is planted following plowing under of the vetch, the corn is frequently destroyed by the insect. The adult stage of this insect is commonly called the spotted cucumber beetle.

Aphids, or plant lice, frequently attack vetch during warm spells of winter and in the spring. They often become numerous enough to destroy the plants, killing them before seed production can be accomplished. Certain vetches, such as hairy, woollypod, native, grandiflora, and some strains of common vetch are quite resistant

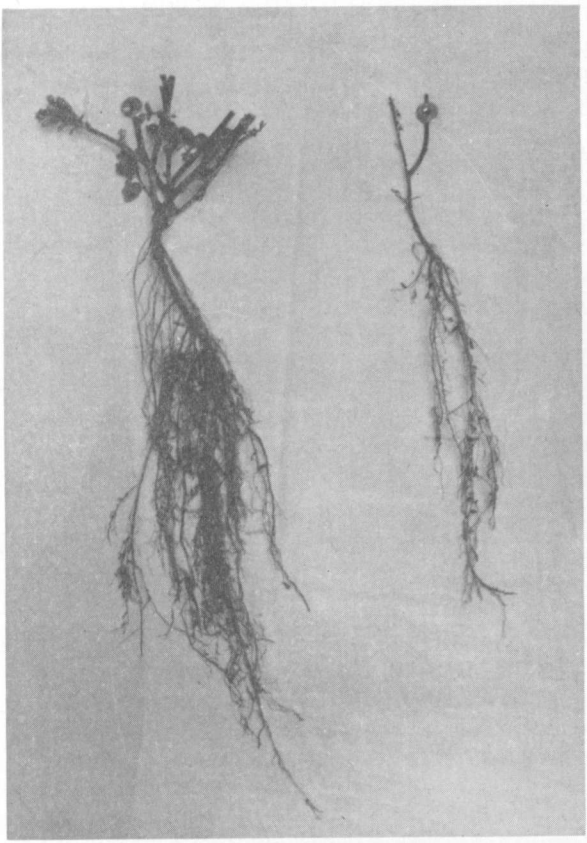

FIGURE 6.—Certain species of vetch are highly susceptible to root rot. Left, a highly resistant selection out of Willamette. Right, severely diseased common vetch. Both plants same age—March, 1938.

to injury by aphids, but purple, monantha, and most common vetches, including Willamette and Alba are, in certain years, almost completely destroyed by aphids. Monantha vetch is early enough to escape injury when infestations are late. Experiments conducted at Auburn show that the flowers and young pods of even the vetches considered resistant to aphids are readily attacked by the insects (1). It is thought for this reason, that plant lice are responsible for substantial seed yield reductions in the vetches in Alabama. The pea aphid, *Illinoia pisi* Kalt., is the most common of the several aphids which feed upon vetch. Aphids are readily killed by nicotine sulfate, but it must be applied before the insects become numerous if seed production is not to be affected.

Tarnished plant bugs, *Lygus sp.*, as well as other *Miridae*, occur commonly on vetches. They do not damage vegetative portions of the plants beyond causing some blasting of young stem tips, but it appears likely that they are responsible for significant reductions in seed yields. Experiments conducted at Auburn with caged plants show that tarnished plant bugs cause stem tip and bud blasting, flower drop, and death of young pods.

Leaf spot and black stem, diseases caused by two fungi, *Aschochyta pinodella* Jones and *Mycosphaerella pinodes* (Berk. and Blox.) Stone often are responsible for failures of Austrian winter peas, but the vetches with the exception of hairy and purple vetch,

are highly resistant to these pea diseases according to Weimer (6). Hairy and purple vetch are not as susceptible as Austrian peas; however, since rotation is recommended as a control measure against these diseases, hairy and purple vetch should not be included in a rotation with Austrian peas. Instead, crimson clover or a highly resistant vetch, such as monantha, should be grown.

Root rots (Fig. 6) commonly attack vetches, particularly on low-lying, poorly drained areas. A number of soil-borne organisms are responsible for root rot of vetch. The roots decay gradually and finally the entire root-system is affected. Tops of plants are stunted and the plant dies after the root-system has been destroyed. Monantha, common and Hungarian vetch are susceptible to root rot, whereas hairy, smooth and woollypod vetch are relatively resistant.

Nematodes sometimes cause failures of vetch, particularly of seedling stands. Land upon which vetch has failed due to nematode infestation should not be replanted to vetch until it has been determined that the nematode population has been at least significantly reduced. Crop rotation is the only practical control for nematodes. Crotalaria, a summer legume, or small grains can be grown with safety on nematode-infested soils.

Vetches, like Austrian winter peas, are attacked by downy mildew, but the organism seldom causes significant damage to either of these winter legumes. No control measures are required to combat the disease. Downy mildew, according to Weimer (6), may contribute indirectly to the failure of vetch and Austrian winter peas in that tissue infested by the organism may serve as a portal of entry for the black stem fungi.

Powdery mildew, responsible for vetch failures in certain years in the Pacific Northwest, has never assumed economic importance in Alabama.

SUMMARY

Several varieties of vetch are recommended for use in Alabama. These include hairy (*Vicia villosa* L.); smooth (*V. villosa var.*); Willamette, an improved strain of *V. sativa* L.; LaFayette and other hardy strains of monantha (*V. monantha* (L.) Desf.); woollypod (*V. dasycarpa* Ten.); and grandiflora (*V. grandiflora*). All are well adapted to most sections of the State except Willamette, which has not proved satisfactory on poorer soils, especially those sandy in nature.

Monantha has proved to be the best seed producer of the recommended vetches. This is largely due to its high resistance to shatter. It is an earlier vetch than hairy and has produced excellent yields of green matter throughout the history of winter legume variety trials in Alabama. The LaFayette variety and other strains of monantha vetch now in the process of development by the Ala-

bama Agricultural Experiment Station are amply hardy for use in the State.

Willamette vetch is earlier and generally produces more seed than hairy vetch. It is indistinguishable from common vetch, but is considered more hardy. It is a more vigorous vetch than Alba, a white-flowered strain of common vetch, but like the latter, it should be planted only on the better, well-drained soils.

Woollypod vetch closely resembles hairy vetch in growth habit and has approximately the same general adaptation. The strain, Auburn woollypod, now being multiplied by the Alabama Agricultural Experiment Station is earlier than hairy vetch, and is also a superior seed producer.

Hungarian (*V. pannonica* Crantz.), purple (*V. atropurpurea* Desf.), Augusta (*V. angustifolia* Reich.) and most strains of common vetch are not recommended for use as green manure crops in Alabama. Augusta vetch is useful whenever a volunteering vetch is required, but grandiflora vetch would be recommended in its stead were more seed available.

Vetch grown for seed should be fertilized and inoculated, but rates of seeding should be less than when the vetch is planted for green manure purposes. Small seeded vetches, such as hairy, should be planted at rates of 10 to 15 pounds per acre and the larger seeded varieties, such as common or monantha vetch, should be planted at 20 to 25 pounds per acre. These rates are recommended if the vetch is grown without support; up to 20 pounds of seed of the smaller seeded varieties and 30 pounds of seed of the larger seeded vetches can be used if support is provided. Results of small plot tests indicate that seed production of vetches supported by a small grain or by dead cotton stalks is generally greater than when the vetch has been given no support. A support crop is particularly of value when growth of the vetch is extremely heavy. Small grains are not preferred to cotton stalks as a means of support because of the difficulties encountered in separating the mixed seed harvested. Recommendations for harvesting vetch seed are given.

Vetches being grown for seed are subject to more insect and disease injury than are those turned under in early spring for their soil improvement value. Insecticides are occasionally of value in controlling insects, but are generally impractical when fields are heavily infested and severely damaged. A number of insects attacking vetches in Alabama are listed.

Leaf spot and black stem, caused by two related fungi, and root rot, caused by a number of soil-borne organisms, are probably the most serious diseases attacking vetches in Alabama. Hairy vetch, like Austrian peas, is susceptible to leaf spot and black stem, whereas monantha, common, and Hungarian vetch are quite resistant. The latter vetches are, however, susceptible to root rot. No practical measures of control of vetch diseases, other than crop rotations, are known.

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