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WILMON NEWELL, Director

VETCH AND AUSTRIAN PEAS FOR SOIL IMPROVEMENT

BY J. LEE SMITH

Courtesy Florida Dept. of Agriculture

Fig. 1.—A good crop of Austrian peas growing on the Experiment Station farm at Gainesville.

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VETCH AND AUSTRIAN PEAS FOR SOIL IMPROVEMENT

By J. Lee Smith

Slowly but no less certainly is the plant food in much of our cultivated land becoming exhausted. Much higher wages are now being paid in the industries than can be paid by the farmers. Economic pressure is becoming greater on the farmer as years go by. The result is that the farmers are drawing in their operations to their more fertile lands. The farms on the poorer soils are being abandoned.

The soils now being cultivated are no longer virgin. Virgin soils possessed characteristics that most of our long cultivated soils do not have. Because the woods have been so consistenly burned each year for a generation, a virgin soil of today does not mean what a virgin soil meant then. It is shallow and contains very little vegetable matter. In two or three years of cultivation it has lost its newness.

Then, there was a deeper soil well filled with vegetable matter. Trees were "deadened" and allowed to die and drop their bark and many small branches which were plowed into the land. The result was that the soil became better and better for eight or ten years. The soil did not bake and pack. After that, some land was "cowpenned" or had leaves and leaf mold composted and put on it. Fair crops were grown for many years without fertilizer.

But now yields are increased with commercial fertilizer. These soils can be rejuvenated and made new by adding vegetable matter to them. Probably the most economical way to add this vegetable matter now is by growing cover crops and turning them into the land.

WHAT A COVER CROP WILL DO

A winter cover and green manure crop will do five things: It will add much needed vegetable matter which serves as a home for friendly bacteria and increases the water-holding capacity of

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the soil; it will serve as a cover to the land and protect it from the heavy rains which cause packing and washing; it will remove water from the soil when there is an excess of it; it will act as a trap to catch the plant food that is made available by the effects of the rain, the sun, and the acids that are let loose in the soil by the action of the bacteria; it will trap nitrogen from the air and add it to the soil to be taken up and utilized by the following crops.

"MANURE GROWING"

It is often said that nothing has yet been found quite so good as stable manure or compost for putting land in the best mechanical condition for growing crops. There are certain winter and early spring legumes that are almost as good as stable or lot manure. Because of the scarcity and high cost of handling these manures, winter and spring green manure crops are more economical.

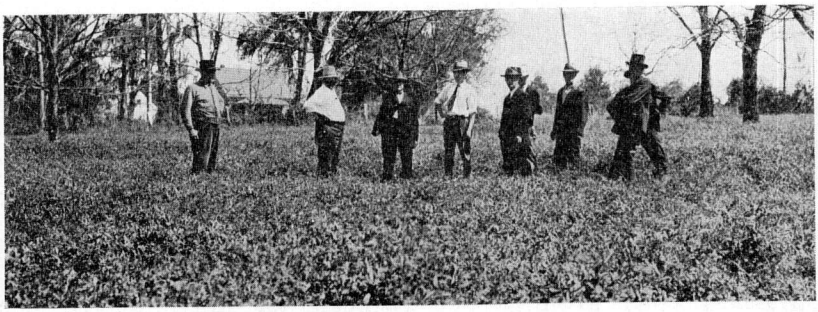

Fig. 2.—Hairy vetch and Austrian peas, planted October 25 and photographed March 25, which yielded at the rate of 24,829 pounds green top growth per acre. Grown from a mixture of 10 pounds vetch and 15 pounds pea seed.

Some of these manure crops are hairy vetch, monantha vetch, woolly-pod vetch, and Austrian gray winter peas. Neither these nor any other herbaceous plants turned into the soil will permanently improve it. To permanently improve the soil where there is as much rain and sunshine as there is in Florida is almost impossible. However, these crops temporarily improve the soil to such an extent that the yield of corn following them will very often be doubled. If these cover crops are grown each winter on the same soil for several years, the yields of summer or main crops on the same land will be increased.

Fig. 3.—Walton County growers hearing the story of Austrian peas from one of their own number. The nitrogen in the top growth equals that in 650 pounds nitrate of soda or calcium nitrate.

SOILS ON WHICH AUSTRIAN PEAS AND VETCH WILL GROW

On soils in Northwest Florida where general farming is successful vetch and peas have been successfully grown. During the spring of 1929 W. E. Stokes, agronomist for the Experiment Station, and the author made an inspection of 70 fields of North Florida on which vetch or Austrian peas were growing. These crops were found growing successfully on the following types of

Fig. 4.—A successful Madison County grower of Austrian peas discussing methods of growing with his county agent.

soils: Orangeburg, Tifton, Greenville, and all the heavier phases of the Norfolk series. All other heavy types of soils in Northwest Florida that are well drained apparently will grow these crops.

VARIETIES OF VETCH

Hairy vetch, the variety most commonly used, is more hardy than woolly-pod and monantha. It does less growing during the winter and is a little slower to get off in the spring. It is of a hairy, somewhat silvery herbage. The flowers are blue violet, borne in one-sided clusters of about 30 on a long stalk. The seed are small, globular, and nearly black.

Fig. 5.—Hairy vetch in the foreground and woolly-pod vetch in the background, Santa Rosa County.

The woolly-pod vetch is closely related to hairy, is not quite so hardy, but grows off better in winter and early spring. It has finer stems, nearly smooth leaves, and reddish purple instead of bluish purple flowers. When allowed to mature, it bears odorous flowers in great abundance. It will attract bees. It usually is of a dark green color. It has a more upright growth than hairy vetch. The seed are very similar to hairy vetch seed in color and size.

Monantha vetch is earlier than woolly-pod and is less hardy than hairy. It has finer leaves and stems than woolly-pod. It has a light green color. The seed, which are brown with black spots and markings, are larger than the seed of either of the other two varieties.

USES OF VETCH AND AUSTRIAN PEAS

These crops are used primarily as cover crops during the winter to prevent washing away of soil and leaching of plant food material and to trap the nitrogen of the air and fix it in the soil to be used by succeeding crops. During the spring of 1929 cuttings from areas of 100 square feet each were made from 70 fields of Northwest Florida. In this way it was determined that an average of 8,370 pounds of green top growth was grown per acre on these fields. Neither vetch nor peas had been grown on most of these fields before. The weight was at the rate of from 1,200 to 24,872 pounds per acre. Vetch analyzes approximately .6 percent nitrogen and the Austrian peas .5 percent. The nitrogen in the 8,370 pound average weight per acre equals the amount of nitrogen in approximately 300 pounds of nitrate of soda or calcium nitrate. In addition to the nitrogen, these crops add vegetable matter to the soil.

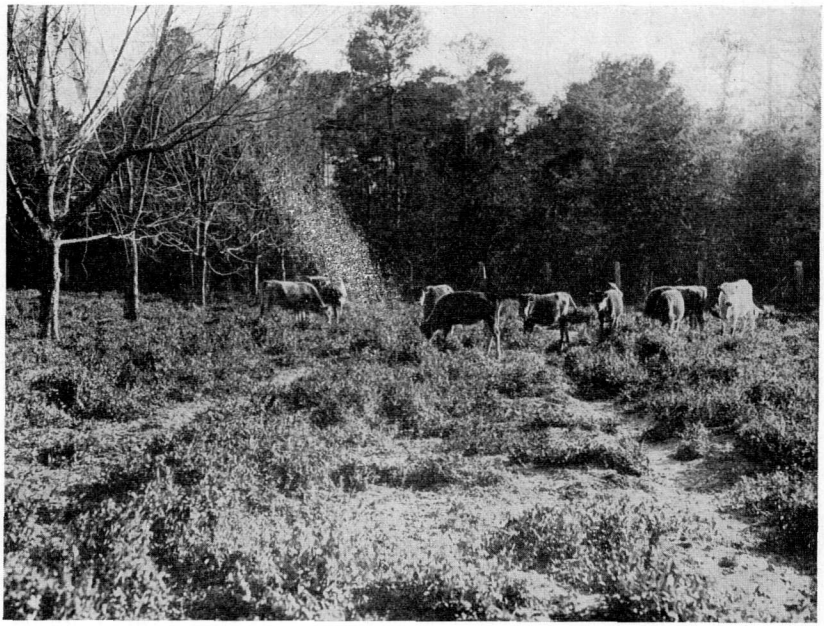

Fig. 6.—These Austrian peas are serving two purposes for a Jefferson County farmer—furnishing grazing for heifers and green manure for the pecan trees.

The vetches and the Austrian peas make excellent grazing—pigs, cows, and chickens relish them. If oats are in the same

field, cows and hogs will take to them first, but when they begin grazing the peas and vetch, they will graze them heavily. These crops may act as a laxative and stock should be allowed to graze them only a few hours at a time until the animals become used to them, and should be fed a little grain.

The carrying capacity of vetch and peas, of course, is determined by the growth made. Its value has been attested by many. A dairyman of Jefferson County grazed his crop during the spring of 1929. He says, "my milk check before turning cows on peas was $36 per week. I turned cows in for two or three hours per day and cut feed at night one third. Second week after I began grazing my check was $51.09. After taking cows off, I increased feed to amount being fed before grazing. I put in a fresh cow and took out a stripper and my milk check dropped back down to $45.56."

Fig. 7.—Pigs making hogs of themselves on a Jefferson County field of Austrian peas.

Another man from Taylor County reports, "I had my vetch close to the house and don't care if I get no other value from it. I have sold more high priced eggs this winter than ever before, all because the vetch afforded good picking for the chickens. Yes sir, I got all it cost and then some from the grazing alone."

The grazing, the fertilizing, and the cover crop values of these crops are such that nearly all growers interviewed in the spring of 1929 intend to plant again next season and most of them plan to increase their acreage.

HOW THE NITROGEN IS FIXED

Certain bacteria, too small to be seen by the unaided eye, called nitrogen-fixing bacteria, take the free nitrogen from the air into the soil and fix it in the plant. When these bacteria come into contact with a legume root, they enter it and multiply rapidly. In young thrifty plants, it takes only a few hours for the organisms to enter the fine root hairs. Here the bacteria find a suitable home, multiply rapidly, and soon push out the covering of the root and form what are known as tubercles or

Fig. 8.—Nodules on the roots of vetch (left) and peas. These nodules contain bacteria which take up nitrogen from the air and fix it for the use of the plants.

nodules. Each nodule contains millions of these nitrogen-fixing bacteria. Here in the nodule the bacteria feed upon the plant juice, and in return, furnish the plant with more nitrogen. As the plant grows, the bacteria multiply, and the nodules increase in size and number. The nitrogen of the air is taken by the bacteria and is combined in such a form that the plant is able to use it as food. It is seen that these bacteria are cooperative

bacteria; that is, the plant and bacteria live together, each working to help the other. The nitrogen trapped from the air is stored not only in the roots but throughout all parts of the plant. This makes these plants valuable for feed and fertilizer.

Fig. 9.—These Calhoun County farmers gathered on one of their farms to hear W. E. Stokes tell how he grows vetch on the Experiment Station farm.

When the plants begin to form seed or break down from any cause, these nodules or "homes of the bacteria" cease to grow, lose their plump appearance, begin to shrink and eventually decay and return the bacteria to the soil.

INOCULATION

The distribution of the legume bacteria so that they may come in contact with the roots of the legume, enter the roots and form nodules, is commonly called inoculation. The bacteria for inoculating all legumes are not the same. For instance, the bacteria that inoculate common legumes, like cowpeas, peanuts, velvet beans, etc., are usually present in abundance in the soil. These bacteria will not inoculate vetches and Austrian winter peas. The proper bacteria for inoculating these crops are not naturally present. Therefore, these crops must be inoculated when planted in a field the first time if good growth is to be expected. *More failures are probably attributable to the lack of inoculation than all other causes known.* Rich soil will grow

vetch or peas without inoculation, but growing the crop there will not introduce these bacteria and the crop must draw its nitrogen from the soil instead of from the air. The succeeding crop of vetch will do no better.

Fig. 10.—Vetch grown in Bay County. Foreground, not inoculated; background, inoculated.

HOW TO INOCULATE

The surest method of inoculation is by scattering soil from a field which has recently grown a well inoculated crop of vetch or peas. Such soil used for inoculating should be broadcast at the rate of 500 pounds per acre and harrowed or plowed in at once.

Another method that will give good results is to cover each seed with a coating of soil from a well-inoculated field. If the seeds are first moistened with a mixture of 2 parts syrup and 1 of water then mixed well with the soil, each seed will become thoroughly coated. Such seed should be well dried again in the shade or sown at once.

When suitable soil for inoculating is not obtainable commercial culture may be used. Some manufacturers of pure cultures for inoculating legumes are not as successful as others; therefore, one who desires to use pure culture should consult his county agent. When such culture is used, directions always come with it and these directions should be followed.

Regardless of method used in inoculating, the seed should be

covered immediately after sowing. Drying out in sun or on top of the soil apparently kills the inoculating bacteria.

TIME OF PLANTING

The last two weeks of September and the month of October apparently is the best time to sow vetch and Austrian peas in

Fig. 11.—These peas were planted too late (Dec. 20) for maximum growth, yet they are healthy and vigorous. Photographed March 28.

North Florida. Regardless of date of planting, seeding should be done when plenty of moisture is in the ground for germinating seed. Good crops have been made by later planting but usually only where planted on fertile soils.

AMOUNT OF SEED TO USE PER ACRE

A minimum of 20 pounds of vetch or 30 pounds of Austrian peas should be sown per acre. A little heavier seeding of each will pay. A safer and apparently better practice in seeding would be a mixture of a minimum of 10 pounds vetch and 15 pounds of peas per acre. If one should get bad seed of one kind it is not likely that he would get bad seed of the other. If some disease should affect one, probably it would not affect the other. And a mixed planting is not so easily grazed too closely as a planting of peas alone.

Fig. 12.—Austrian peas and a sprinkling of oats which were planted in November; 28 pounds of peas were planted per acre.

FERTILIZING

Austrian peas and vetch can be grown without a direct application of fertilizer. However, on land that has not been heavily fertilized for the preceding crop, an application of 400 pounds of super-phosphate per acre will usually give a better growth. Without an application of super-phosphate or basic slag, sometimes a complete failure is registered.

No nitrogenous fertilizer need be applied because these crops gather nitrogen from the air. Usually there is enough potash in the soil to grow a crop of peas or vetch.

PREPARATION OF LAND AND METHODS OF PLANTING

No special breaking or preparation of the soil is necessary for Austrian peas or vetch. They may be drilled or sown broadcast.

If drilled they may be put in with grain drill. There are two dangers encountered when the seed are drilled. Too often they are not put deep enough when planted. And when drilled apparently the winter and spring rains injure them more by water standing in the drill furrow. If sown broadcast, they can be sown and disked in or turned under with a plow or other implement. They may be sown broadcast in cotton or corn fields and covered by barring off the cotton and corn stalks.

The most important thing to be considered in the operation of planting is not whether one drills the seed, broadcasts them, disks them in or plows them in, but regardless of method used, *the seed should be put three or more inches under the soil. Three to five inches is a good depth on any North Florida soil. The sandier and lighter the soil, the deeper seed should be covered.*

October and particularly November are often dry months in North Florida. The inoculating bacteria need moisture to live, grow and multiply. The seed need moisture to germinate and the young seedlings need moisture to grow. Covering three to five inches deep practically assures this moisture during these months.

It is not wise to sow oats or rye with vetch and peas unless on soils that hold moisture well, like most flatwoods soils do. On high, dry, pine lands usually the oats or rye will exhaust the land of soil moisture in time of drouth and the peas and vetch will die.

TIME TO PLOW UNDER

Vetch and Austrian peas should be plowed in 10 days to three weeks before the succeeding crop is to be planted. Some inexperienced growers desire to let them grow till they make seed, believing they will reseed themselves. Very poor seed crops will be produced under most favorable conditions. Aphids and corn ear worms are likely to attack these crops if left standing too long. If corn ear worm attacks vetch it is likely to attack the crops following and other crops nearby. Therefore, the vetch should be turned under before it attempts to make seed.

Succeeding crops should be planted at regular planting time. It is usually better to plow in a small crop of peas or vetch at the proper time than to sacrifice the regular planting date of the succeeding crop for a heavier tonnage of vetch or Austrian peas. Eight to ten thousand pounds of green top growth will furnish all the nitrogen that a succeeding crop of corn or a similar crop

can use profitably; therefore, there is no need waiting for heavier growth if it interferes with the regular date of planting succeeding crops.

Fig. 13.—Austrian peas, plowed under, increase yields of succeeding crops. Corn, following the peas being plowed under in the Walton County field shown above, yielded 65 bushels to the acre.

Fig. 14.—Turning under peas in Jackson County. A chain attached to the plow for dragging down the vines would help in turning under the peas.

Fig. 15.—A good job of turning Austrian peas with a sulky plow is being done in this Jefferson County field.

Crops of vetch and Austrian peas when turned under should be allowed to rot before the succeeding crop is planted, because decaying vegetable matter in the soil may cause the seed to rot and result in a poor stand. If there is a good amount of moisture in the soil, only a few days is needed for this green matter to decay.

HOW TO PLOW UNDER

Implements commonly used in breaking land can be used in turning in peas and vetch. They may be turned under with a tractor disk where soil is light enough for such operation to make a good seedbed. Some farmers disk and then plow in with tractor drawn implements; others use a light disk and then a small moldboard plow with chain attached for dragging it down in the furrow under the soil; others use the moldboard plow with rolling colter attached. No benefit will be derived from plowing up subsoil in turning under these crops.

AS GROVE COVER CROPS

Vetch and Austrian peas deserve special mention as winter cover crops for pecan groves and grape vineyards of North Florida. They may also be used as a cover crop on satsuma and blueberry groves.