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CONNECTICUT
AGRICULTURAL EXPERIMENT STATION

NEW HAVEN, CONN.

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A New and Valuable Cover-Crop for
Tobacco Fields.



A RUSSIAN VETCH PLANT.

Seed sowed at Hockanum, Conn., in October, 1904. Photographed
April 22, 1905.

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A New and Valuable Cover-Crop for Tobacco Fields.

BY A. D. SHAMEL,

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coöperation with the Connecticut Agricultural Station, New Haven.*

A suitable cover-crop which can be sowed immediately after the tobacco crop has been harvested, so as to protect the soil from washing or loss of fertility in other ways, is of special importance to tobacco growers. After tobacco has been harvested, in August or thereabouts in New England, there is a considerable loss of plant food from the soil—lying bare for nearly nine months—by leaching and drifting of the surface soil, and the heavy fall and spring rains on sloping land may badly wash and gully the fields.

Rye is frequently used as a cover crop, but is not wholly desirable. It will, to be sure, gather up and hold the soluble plant food in the soil where it grows, but adds nothing to what was already there. On some lands it winter-kills badly, and on others, if allowed to get too high in the spring, it dries out the soil too much. Moreover, it does not decay quickly when turned under, particularly if it makes a large growth in the spring, but impairs the capillary action of the soil, leaving it too dry and loose for the young tobacco plants, and yielding up its plant food to them too slowly.

Many kinds of clover and other legumes have been tried, without much success. In some cases these crops have been winter-killed after a good stand was secured, while in most instances it has been impossible, in this region, to get a good stand in the fall. Not only is this true, but, owing to the fact that most of these crops require two seasons to reach their full development, they would seem unsuited to our needs. Our recent experiments indicate, however, that the Russian vetch is admirably adapted for a cover-crop for tobacco fields.

Description of the Hairy or Russian Vetch.

Hairy vetch, sand vetch, or Russian vetch (*Vicia villosa*), as it is variously known, is an annual leguminous plant, introduced from Europe about 1847, but not grown extensively in this country until a few years ago. It has a peculiar habit of growth, and when sowed alone the plants spread out on the surface of the ground, covering it completely with a dense matted growth. The appearance and habit of the young plant is shown on the first page of this Bulletin.

It is a "nitrogen-gathering crop." When the soil, either naturally or after inoculation, contains the bacteria adapted to this plant, these organisms fasten themselves to the fibrous roots, usually in small nodules or tubercles, plainly visible when the roots are carefully taken up and the soil gently worked from them. These organisms have the faculty of taking free nitrogen from the air and fixing it in combination. The plants on which these microbes grow can then appropriate this combined nitrogen for their own growth. This "assimilation of free nitrogen" takes place most actively in poor soils, which are deficient in combined nitrogen, and the growth of a leguminous crop on such poor soils enriches them.

This makes the vetch of special value. Our tobacco soils are relatively very poor in nitrogen, the most costly element of plant food, for which we pay sixteen cents or more per pound in fertilizers. The tobacco crop is wholly unable to gather the free nitrogen which forms four-fifths of the atmosphere about it, but vetches and other legumes are able to gather more or less of it and enrich the soil and the following crop with it.

Russian vetch, according to the analysis of Conden, reported by F. Lamson-Scribner (Circular No. 2 of the Division of Agronomy of the Department of Agriculture), contains in every 100 parts of dry matter, 22.78 per cent. of nitrogenous matter or protein,—equivalent to 3.64 per cent. of nitrogen,—2.61 to 3 per cent. of fats, 23.25 per cent. of cellulose or crude fiber, and 39 per cent. of nitrogen-free extract. Every ton of dry hay contains 45 pounds of nitrogen, 19 pounds of phosphoric acid and 62 pounds of potash. The yield amounts to 6 to 10, and sometimes, on very rich soil, to 12 to 15 tons, of green forage per acre. The yield of dry hay, taken on this basis, would be from 1½ to 4 tons per acre, the yield depending on the fer-

tility of the soil. The fertilizer elements gathered by the vetch are in the best form for use by the succeeding crop, and a crop of vetch plowed under by the first of May might, under favorable conditions, release in the ground plant food that would cost from \$16 to \$40 per acre if purchased in the form of commercial fertilizers. In addition to this fact, the vetch has a high nutritive ratio and is one of the most valuable forage crops known.

Russian vetch requires moisture during the first few weeks of growth, but after it becomes established is one of the best drought-resistant forage plants grown. The plant withstands cold, heat, and drought, but does not do well where water stands in the soil or covers the land. It has very fine, small roots, which penetrate the soil in every direction, and when the plants are turned under they rapidly decay and give up their plant food to the succeeding crop.

Experiments with Russian Vetch.

In October of 1904, a month later than was desirable, several fields in this state on which the tobacco had been harvested were sowed to Russian vetch. In some cases the fields were plowed, and the vetch sowed with the usual rye seeding, while in others the vetch was sowed alone. In some instances the vetch was sowed on plowed ground and harrowed in with a common smoothing harrow; while in others it was sowed on the surface of the ground, immediately after the tobacco plants had been harvested, and disked in with an ordinary disk or wheel harrow. In some parts of the fields inoculated seed was used, and in others seed that had not been inoculated.

The results of these experiments have been of so much promise and importance, and are of such general interest to tobacco growers, that they are presented at this time in the hope that many growers may be sufficiently interested to try a small patch for themselves this season.

Because of the small amount of seed available, the seeding was usually thinner than was desirable. The facts of importance are, however, that a good catch was obtained, the plants grew thriftily in the fall, and bore the very severe winter equally well and apparently much better than rye sowed at the same time. For when sowed together, the vetch survived and

grew well this spring in spots where rye completely winter-killed. In one portion of a field which was covered with ice for several weeks the vetch survived.

The roots of plants from inoculated seed bore many tubercles, some aggregations of them being as large as corn kernels. When the seed was not inoculated the roots bore few, if any, nodules and the growth of the plants was much less vigorous.

When plowed under in May, the plants were from four to eight inches high and, where the seeding was sufficient, completely covered the ground.

Directions for Planting Russian Vetch.

Owing to the large size of the seed, about the size of a small pea, a stand is easily secured in the fall, and when sowed at this time the plants will cover the ground before cold weather. The best way of seeding is probably to plow the land and broadcast, harrowing in the seed with a light smoothing harrow. If it is to be sowed with the greatest possible economy of seed, it should be planted in drills 2 to 4 feet apart and cultivated several times until the plants cover the ground. The seed should be sowed as soon as possible after the tobacco is cut, and at the rate of about $1\frac{1}{2}$ bushels of seed per acre broadcast. When sowed in drills, probably from $\frac{3}{4}$ to 1 bushel per acre will suffice. The best time for sowing is probably between August 1 and September 15.

When planted on land which has not borne this crop before, the seed should be inoculated before sowing, according to the directions given by Moore and Robinson in Farmers' Bulletin No. 214 of the U. S. Department of Agriculture, or the soil may be inoculated by sowing on it, with the seed, surface soil from a field where this vetch has been recently and successfully grown.

The seed may be bought of reliable seed houses, but is at present very expensive, costing about \$6.00 to \$6.50 per bushel of 60 pounds.

It is reported from the far West, where the Russian vetch has been grown, that when planted about the middle of April on poor land it will mature seed in the same season and improve the land at the same time. We are this year trying to get a seed crop from land sowed in the spring in Connecticut, and

shall be able to report on the matter next fall. If successful, the vetch may be, for a time, a valuable cash crop on lands which are naturally infertile.

Russian Vetch for Forage.

As the plant does not stand clear of the ground, but is recumbent in its habit, it cannot profitably be mowed and cured for hay.

It is said to make excellent pasture. Cattle should not be turned on it till it is in full bloom, and they should not eat much of it at a time until accustomed to it.

The Vetch for Green Manuring Other Crops.

There are large areas of land in the Connecticut valley, hardly farming land at present, on which sweet corn, Indian corn or other crops might profitably be grown if some way can be found to bring the soil into proper condition for the growth of these crops without any great expense. It is probable that by growing a legume like vetch, and either plowing it under or pasturing it off in the fields, these lands might be brought into condition for growing other crops successfully.

Inasmuch as the Russian vetch is a northern crop, naturally adapted to conditions like those in the Connecticut valley, there is reason to urge farmers to experiment with this crop on such farms. It will take some time to find the best and most economical means of growing and utilizing the crop, and any one rule or method will hardly apply to all the variety of soils and other conditions found on different farms.

We recommend to tobacco growers the careful sowing, this summer, of from a quarter of an acre to an acre of Russian vetch, as soon as the tobacco crop is harvested, at the rate of one and a half bushels per acre. The seed should be got of a reliable seedsman and inoculated before sowing.

If this experimental crop proves to be a success, the culture of it can safely be extended next year.





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