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LESPEDEZA IN KENTUCKY

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1. Lespedeza is one of the most valuable leguminous crops for Kentucky because of its wide soil adaptation. It is the one leguminous pasture crop that will grow on very thin and acid soils in the State.
2. Lespedeza when present in pastures greatly increases the amount of pasture produced because of its ability to continue growth during hot weather. It is also quite drouth-resistant. There are few instances where the addition of Lespedeza seed to the pasture mixture will not prove profitable.
3. On good land, Lespedeza gives very good yields of high-quality hay. On thin upland soils the Kentucky Experiment Station has found that good hay yields can be obtained by the use of acid phosphate alone. The crop has therefore great possibilities for the production of hay in regions of thin soils where liming is for any reason impracticable.
4. The seed of Lespedeza can be easily saved on the farm by the "seed pan" method. Good yields are obtained by this method of collecting and the cost is light. Many farmers in the western and southern parts of the State will find the saving of seed for market a profitable enterprise.

EXTENSION CIRCULAR NO. 179

Lespedeza in Kentucky

By E. J. KINNEY and RALPH KENNEY

Lespedeza, or Japan clover, has been established in Kentucky for perhaps 30 years but its usefulness has just begun to be appreciated. As a matter of fact, it has not been many years since farmers regarded it as an undesirable weed, chiefly because it was supposed to cause horses pastured on it to slobber badly. Opinion has changed rapidly in recent years, however, and now Lespedeza is not only welcomed where it appears naturally, but to an increasing extent the seed is being included in pasture mixtures for all types of soil, and in some cases it is being grown for hay and seed production.

DESCRIPTION

Lespedeza is a native of eastern Asia. It was first noticed growing in this country in 1846 near Monticello, Ga. Just how or when it was introduced is not known. Undoubtedly it had spread to various sections of the South prior to the Civil War, and during that conflict a very general spread all over the South occurred. Lespedeza is a summer annual with rather slender, wiry stems. In thin stands the plants branch freely, but sparingly where the stand is thick. The height of the plants varies from 4 or 5 inches to 2 feet or more, depending upon the productivity of the soil.

Apparently the seeds germinate at as low temperature as those of red clover but the plants appear later in the spring because germination requires a much longer period. This probably accounts for the fact that the young plants are seldom in-

jured by frost altho quite tender. The flowers are purple and inconspicuous. They appear in the late summer and the seed ripens in September and October in Kentucky. Lespedeza is a legume, but is not a member of the clover group, as might be inferred from the name Japan clover. The species so widely distributed in this country is *Lespedeza striata*, or common Lespedeza. There are apparently numerous species, and one, *Lespedeza stipulacea*, or Korean Lespedeza recently introduced by the United States Department of Agriculture, promises to be of superior value under certain conditions. It matures seed considerably earlier than the common sort, which makes it adapted to latitudes where the common will not reseed itself before frost.

At the Tennessee Experiment Station it has been found that the common species is quite variable and some strains which seem to have much merit have been isolated. All, or practically all, commercial seed available at the present time, however, is of the common type.

In sections where farmers are not familiar with Lespedeza, hop clover is sometimes mistaken for it. The two have few points of resemblance, however. Hop clover is a winter annual, the plants appearing in the fall and living over winter. In the spring a rapid growth occurs, the plants blooming in early summer.* The yellow blossoms are borne on long flower-stalks and are very prominent. Hop clover ripens its seed and the plants die at wheat harvest time or by the time Lespedeza has fairly started its growth. It is the hop clover that in some bluegrass seed fields is almost as high as the bluegrass seed stalks. Some growers think that it will interfere with seed harvest. The seeds of hop clover are much smaller than those of Lespedeza which are perhaps three-fourths as large as those of red clover, and always remain in the hull.

THE USEFULNESS OF LESPEDEZA

Lespedeza has certain characteristics which give it particular value as a forage and soil improving crop. The most important of these is its ability to grow on thin soils, acid soils,

*Tenn. Experiment Station Bulletin No. 123.

and other soils where the usual leguminous pasture crops cannot be grown. Probably there is no soil in Kentucky so poor and worn that *Lespedeza* will not grow and maintain itself on it. To be convinced of this, one has only to visit a section where the crop is well established naturally, and note how it has possessed abandoned fields, waste places, and even gullies. Of course on very thin land the growth is short, but even so it furnishes as much pasturage as any other crop that could be grown, or more, and at the same time improves the soil. There is little doubt that *Lespedeza* can be considered the best of all leguminous



Fig. 1. A good volunteer crop, 14 inches high, in Hickman County.

crops for the improvement of cheap lands in need of lime where expensive soil treatment is impracticable.

The drouth and heat resistance of *Lespedeza* makes it of particular value as one of the components of pastures of all kinds and in all sections where the crop can be grown. *Lespedeza* alone, however, can scarcely be regarded as a practical pasture plant on lands of fair quality because of the late season of pasturage provided. The plants grow rather slowly for some time and furnish little pasture until midsummer. They are killed by the first heavy frost of fall. Grasses thrive best dur-

ing the spring and late fall and furnish little forage during summer. Since it is at this period that Lespedeza thrives best, it is obvious that its presence in pastures adds greatly to the amount of forage produced during the year. While Lespedeza is an annual plant, its habit of reseeding itself almost invariably, even when pastured rather closely, makes it as permanent as the perennial grasses; in fact, in many cases more so. Lespedeza maintains itself successfully in pastures with redtop, orchard grass, timothy and Bermuda grass. Just how it will stand the competition of bluegrass on lands particularly adapted to the latter grass, has not been definitely determined as yet. In a good many instances, Lespedeza is growing successfully in bluegrass pastures in the Bluegrass region of Kentucky, but it has not spread to any extent to the most fertile sections of this region. Last year seed was sown on an old bluegrass pasture on the Experiment Station farm at Lexington and a fair stand obtained. The clover made quite a good growth. Some farmers in the Central Bluegrass region have tried it during the last year or so, and definite information in regard to its behavior on bluegrass pastures will soon be available.

Lespedeza makes hay of excellent quality and on the rich alluvial lands of Mississippi and Louisiana a great deal is harvested for hay. It is only on soils in a productive condition, however, that the plants grow tall enough to cut for hay. While it probably cannot compete successfully with alfalfa, red clover and other clovers as a hay crop on first class land in Kentucky, there are many instances where it will prove the most practical leguminous hay crop to grow. Since it is not sensitive to acidity, a good crop may be obtained on soils too acid for red clover or alfalfa by using phosphatic fertilizers only. Lespedeza can be sown in small grains in the spring and in favorable seasons may give a good crop of hay after the grain is harvested. This system of cropping is practised quite extensively in parts of the South and would undoubtedly give satisfactory results on good lands in Kentucky.

CULTURAL METHODS WITH LESPEDEZA

Seeding

Lespedeza grows naturally over most of Kentucky and, like bluegrass in Central Kentucky, it becomes naturally established in pastures, meadows, or other lands not cultivated for a few years. It is not often satisfactory, however, to depend entirely upon natural seeding since a full stand is not obtained for some three to five years. Furthermore volunteer stands are always irregular. Especially is this liable to be true where fields have been planted to cultivated crops for two years or



Fig. 2. Lespedeza holding gullies in Carlisle County.

more after the previous crop of Lespedeza. Seed can be easily and cheaply saved on the farm, and Lespedeza will give much more satisfactory returns if seeding is practised wherever it is desired to establish the crop. In establishing pastures, a rather light seeding, say 3 to 5 pounds per acre, usually will insure a fair stand the first year and a good stand the second year unless the field is pastured very closely the first year. In seeding on old pastures, particularly where there is considerable turf, a moderately heavy seeding of 10 to 15 pounds per acre is advisable, if a quick stand is wanted. If a hay crop is desired the

first year, a full seeding—about 25 pounds per acre—should be made. As already stated, Lespedeza, once established in pastures, is permanent as long as the field is not cultivated. When cut for hay, however, the crop, if harvested early, may not reseed itself. Piper states that if the crop is cut when in full bloom the aftermath will ripen seed before frost, but it is doubtful if this is true in Kentucky. Piper also suggests that narrow strips be left uncut between the swaths in order to reseed the ground. The quality of the hay is not injured, apparently, by deferring harvesting until some seeds have ripened, and probably this is the most practical plan of handling to insure reseeding in meadows.

The methods generally used in seeding other spring-sown meadow and pasture crops are applicable with Lespedeza. Natural seeding occurs in late fall, which indicates that seed may be sown at almost any time during the winter and early spring. As a matter of fact, however, in natural seeding, several times as much seed is left on the ground, in most cases, as would be sown by the farmer, so that a stand is insured even if a large percentage of the seed is destroyed. Most of the seeding in Kentucky has been done in February and March with good average results. Where possible, it is perhaps safest to defer seeding until the seed can be covered by artificial means, as by using a clover seed drill or by covering with a harrow after seeding. It is not strictly accurate to state that the seed is covered, even when the clover seed drill is used. What is actually accomplished is that the seeds are left in the shallow marks made by the drill or harrow and some loose soil left on the surface of the ground. The first shower washes enough loose earth over the seeds to cover them sufficiently. If a harrow is used, it is best to harrow both before and after sowing the seed. If impracticable to cover the seed in this way, it probably is best to sow on frozen ground in February, as the alternate freezing and thawing will accomplish some covering. The all-important point in the seeding of any kind of clover and most grasses is to get the seed covered to the proper depth.

In seeding on old pastures a light disking before seeding will insure a better stand of plants.

Commercial *Lespedeza* seed is always in the hull and weighs about 25 pounds per bushel. The seed does not retain its vitality long and even two-year-old seed is likely to give a low percentage of germination. It is evident that only seed guaranteed to have been harvested the previous season should be bought. Even then it is well to obtain samples and to make, or have made, a germination test before buying the seed.



Fig. 3. A good crop of *lespedeza* growing in a Carlisle County field where the second cutting of red clover failed to make much growth.

INOCULATION

Lespedeza is so widely distributed over Kentucky that undoubtedly the soils in most sections have become inoculated with the nodule-producing organisms of this legume. In addition the cowpea nodule bacteria are probably the same as those of *Lespedeza*;^{*} hence the growing of cowpeas has inoculated the soil for both crops. In the Bluegrass region of Kentucky, however, neither *Lespedeza* nor cowpeas has been grown to any considerable extent, so that artificial inoculation of the seed on poor

^{*}Illinois Experiment Station, Bulletin 202.

soils is advisable. The commercial cultures are reliable and are decidedly the most convenient way of securing inoculation.

LESPEDEZA IN PASTURE MIXTURES

As stated previously, Lespedeza should seldom be sown alone for pasture. Six to eight pounds of orchard grass, 3 to 5 pounds redtop, and 5 to 10 pounds Lespedeza make a good pasture mixture for most conditions and soils in Kentucky. On rather wet land the orchard grass may be omitted. In bluegrass regions some bluegrass seed may be added. On lands where the clovers thrive, these may be included. Timothy and Lespedeza should give a good pasture on good land for a few years at a slight cost for seed. Eight to ten pounds of timothy and 5 pounds of Lespedeza should give about the right amounts.

HAY PRODUCTION

Lespedeza, when intended primarily for hay, should be sown on fairly good land or the land should be fertilized. Alluvial bottom lands are excellently adapted for hay production and often yields of two tons or more of hay per acre are secured on such lands. Fertilizer tests on the thin upland soils of western Kentucky have shown that these soils can be made to produce good yields of hay by the use of acid phosphate alone. On the Mayfield, Kentucky, soil experiment field Lespedeza grown in a 3-year rotation of (1) tobacco, (2) wheat, (3) Lespedeza, has given an average yield for eight years of 2,613 pounds of hay per acre, on very thin land. Yields of over 2 tons per acre have been obtained in some years. The fertilizer used amounted to 200 pounds of acid phosphate per acre per year for the first 5 years and 100 pounds for the last three years.

On the Greenville soil experiment field an average of 4,160 pounds of hay per acre for two years was produced on thin land fertilized with acid phosphate. There are certainly few hay crops that would give equally as good results as this on thin land, at as small a cost. There would seem to be no limit to the length of time a Lespedeza meadow could be maintained without reseeding provided care was taken not to harvest before some

seed had ripened. Of course the fertilizer treatment must be continued.

No doubt the use of lime in addition to acid phosphate would result in still further increases of yield in most cases. The man able to lime his land, however, has a wider choice of forage crops and perhaps would find others more profitable for hay after land is limed. In growing *Lespedeza* for hay in Kentucky it has not been definitely determined whether or not a good yield of hay can be obtained the first year when the crop is seeded



Fig. 4. A plot of Korean lespedeza on the Experiment Station farm at Lexington.

with small grains. This is the most practical method of seeding, as weeds are likely to give trouble if *Lespedeza* is seeded alone, particularly where the soil has been freshly stirred. Since seed is high, it is probably more practical to sow only enough seed in the grain crop to give a stand of plants thick enough to seed the land thoroly for the next year. On very productive soils, particularly bottom lands, it is likely that a good hay crop can be produced the first year and in such cases a full seeding doubtless will pay.

Lespedeza grows rather slowly for a time and often tall-growing weeds, grasses, etc., get a start. Mowing over the fields once or twice during the summer usually will keep the weeds in check until the Lespedeza becomes large and thick enough to control them. The principal trouble with weeds seems to be in lower quality of hay or difficulty with seed crops, as Lespedeza grows right along amid the weeds.

It is estimated that, when the stand of Lespedeza is good, a yield of one ton per acre will be obtained when the height of the plants is 8 or 9 inches; two tons when 12 to 14 inches, and 4 tons when over two feet in height. This is a suprisingly large yield for such heights, but the stems are very numerous and solid so that it weighs very heavy. It probably does not pay to cut the crop for hay when the plants are less than 5 to 6 inches tall, as the mower blade will slip over the growth to such an extent in cutting that little hay will be obtained, but good seed crops are frequently obtained from the shorter growth. Lespedeza cures more readily than any other leguminous hay because of the slender stems and smaller content of water. As with any leguminous hay the best quality is made where the hay is allowed to wilt well in the swath and this curing completed in windrow or shock. In many cases Lespedeza hay cut in the morning may be raked into windrows the following afternoon. Since the sun is not usually very hot at the time Lespedeza is cut for hay a very good product usually may be made by curing in the swath. The chief objection to this method is that it results in a heavy loss of leaves. This can be overcome partially by raking into windrows when slightly damp with dew. It can be baled in the field just as alfalfa hay is baled by our larger growers.

SEED PRODUCTION

Lespedeza seeds quite freely, yields of from 5 to 12 bushels per acre being obtained in Louisiana where most of the commercial seed is produced. In Kentucky, from 2 to 10 bushels per acre were harvested last fall. Perhaps the heaviest yields of seed are obtained on land of moderate fertility where the growth is not too thick and rank. In fact, a crop just large

enough to cut usually will give a satisfactory yield of seed. To secure the largest yield of seed, harvesting should be deferred until about the middle of October in Kentucky or about the time of the first killing frost.

Two methods of saving seed are practised. The crop may be cut and, after drying thoroly, threshed with a grain separator with a *Lespedeza* attachment. Since the seeds shatter very readily, the crop must be handled very carefully; therefore it is commonly dried in small piles such as are made by the bunching attachment on a mower, or a self-rake reaper. In hauling



Fig. 5. A *lespedeza* hay crop in Hickman County.

to the thresher or to storage, a tight wagon box should be used or the hay frame should be covered with a tarpaulin to catch any seed that is shattered in handling.

The other method of saving seed is known as the "seed pan" method. Most commercial seed is saved by this method, and for the average farmer in Kentucky it is the most practical way of saving seed either for home use or for market. A pan made either of wood or galvanized iron is bolted to the cutter bar of the mower. This pan is as long as the cutter bar and about 30 inches wide. The top of the pan is covered with a slotted lid, in

case of a wooden pan, or a perforated metal lid, in case of the sheet iron pan. As the Lespedeza is cut, it falls upon the pan and a good proportion of the ripe seed falls into the pan. Usually a man has to follow the mower to keep the hay raked off the pan, and to empty the pan when it becomes full of seed. The pan can be used to save seed when the crop is cut for hay also, altho, of course, the quantity of seed obtained will be small in such cases. Pan-saved seed is of the finest quality. It can be used for seeding on the farm without recleaning, but for market should be run thru a fanning mill. The sheet iron pans are somewhat more satisfactory than the homemade wooden pans and are not expensive. The cost is around \$12.00. A large number of these pans were purchased in Kentucky in 1924 and considerable seed was saved both for home use and for market. The Experiment Station will furnish for 10 cents each blueprints for constructing the wooden pans, or will furnish, free, addresses of manufacturers or firms selling the metal pans.

The Lespedeza seed crop promises to become an important cash crop in southern and western Kentucky. Several thousand bushels were saved in the Purchase section in 1924. Prospects are good for building the industry to the extent of saving 100,000 bushels or more per year.

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Acres of Legumes on Each 100 Acres of Improved Land in Farms

U. S. Census, 1919

State	5	10	15	20	25	30	35	40
Vermont	*****	*****	*****	*****	*****	*****	*****	*****
Maine	*****	*****	*****	*****	*****	*****	*****	*****
N. Hampshire	*****	*****	*****	*****	*****	*****	*****	*****
New York	*****	*****	*****	*****	*****	*****	*****	*****
Utah	*****	*****	*****	*****	*****	*****	*****	*****
Nevada	*****	*****	*****	*****	*****	*****	*****	*****
Wisconsin	*****	*****	*****	*****	*****	*****	*****	*****
Michigan	*****	*****	*****	*****	*****	*****	*****	*****
Massachusetts	*****	*****	*****	*****	*****	*****	*****	*****
Idaho	*****	*****	*****	*****	*****	*****	*****	*****
Ariaona	*****	*****	*****	*****	*****	*****	*****	*****
Wyoming	*****	*****	*****	*****	*****	*****	*****	*****
Pennsylvania	*****	*****	*****	*****	*****	*****	*****	*****
Rhode Island	*****	*****	*****	*****	*****	*****	*****	*****
Connecticut	*****	*****	*****	*****	*****	*****	*****	*****
New Mexico	*****	*****	*****	*****	*****	*****	*****	*****
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Florida	*****	*****	*****	*****	*****	*****	*****	*****
Alabama	*****	*****	*****	*****	*****	*****	*****	*****
New Jersey	*****	*****	*****	*****	*****	*****	*****	*****
California	*****	*****	*****	*****	*****	*****	*****	*****
Georgia	*****	*****	*****	*****	*****	*****	*****	*****
Maryland	*****	*****	*****	*****	*****	*****	*****	*****
Delaware	*****	*****	*****	*****	*****	*****	*****	*****
Virginia	*****	*****	*****	*****	*****	*****	*****	*****
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Tennessee	*****	*****	*****	*****	*****	*****	*****	*****
Iowa	*****	*****	*****	*****	*****	*****	*****	*****
Ohio	*****	*****	*****	*****	*****	*****	*****	*****
Indiana	*****	*****	*****	*****	*****	*****	*****	*****
Washington	*****	*****	*****	*****	*****	*****	*****	*****
W. Virginia	*****	*****	*****	*****	*****	*****	*****	*****
Nebraska	*****	*****	*****	*****	*****	*****	*****	*****
S. Carolina	*****	*****	*****	*****	*****	*****	*****	*****
N. Carolina	*****	*****	*****	*****	*****	*****	*****	*****
Minnesota	*****	*****	*****	*****	*****	*****	*****	*****
Montana	*****	*****	*****	*****	*****	*****	*****	*****
Missouri	*****	*****	*****	*****	*****	*****	*****	*****
Illinois	*****	*****	*****	*****	*****	*****	*****	*****
Kansas	*****	*****	*****	*****	*****	*****	*****	*****
Mississippi	***	*****	*****	*****	*****	*****	*****	*****
Louisiana	***	*****	*****	*****	*****	*****	*****	*****
Arkansas	***	*****	*****	*****	*****	*****	*****	*****
S. Dakota	***	*****	*****	*****	*****	*****	*****	*****
<u>KENTUCKY</u>	**	Only 3.3 acres	in 100					
Oklahoma	**	*****	*****	*****	*****	*****	*****	*****
Texas	*	*****	*****	*****	*****	*****	*****	*****
N. Dakota	*	*****	*****	*****	*****	*****	*****	*****

Fig. 6. Kentucky ranks 45th among the states in the percentage of improved land devoted to legumes.

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