

# An All-Year Pasture System for Missouri

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Fig. 1.—Bluegrass has long been a foundation crop of Missouri agriculture. It holds the key position in the all-year pasture system.

*Good pasture the year round is now within the reach of every Missouri farmer.*

This is an important development in Missouri agriculture. Our pasture season has been mainly the season of bluegrass—the six or seven months from spring to fall. Grain crops grazed sparingly so that grain yields would not be much reduced, and the low grade pasturage from corn stalks, have not greatly added to the feed supply from our normal

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six months of grass. Only within the last two or three years have we fully discovered the abundant pasturage from grain crops grazed through the fall, winter and spring to the limit of their carrying capacity. And only within recent years have we found forage crops that could be heavily pastured for long periods within the bluegrass season. These forages are principally Korean lespedeza on a great scale and sweet clover and Sudan grass each on a minor scale. They can fill the wide and wasteful gap in our pasture supply, caused by the seasonal shortage of bluegrass in July and August, when stored feeds are running low and plenty of pasturage is necessary to maintain a good flow of milk or to increase the gains of meat animals. They are, therefore, the means of overcoming one of the most serious deficiencies in our whole system of farm production.

*We can now practically double the length of our former pasture season, and treble the amount of feed which it produced, by the correct combination, the accurate adjustment of acreage, and the orderly seasonal use of bluegrass, Korean lespedeza, and early fall grain crops—mainly winter barley.*

#### How the Combination Is Made

These three main crops of the all-year pasture system—bluegrass, lespedeza and barley—may be grazed in seasonal progression as follows:

*Bluegrass* from April until late June or early July—60 to 90 days. Then the grass, being in its semi-dormant midsummer stage, which produces very little growth, should be allowed to rest through July and August. Its September-October growth should be saved for winter.

*Korean lespedeza* from late June or early July until late September or early October. These 90 to 100 days of grazing will finish the lespedeza but the stand will not fail to reseed itself for a thick new growth in the following spring.

*Winter barley* from late September or early October until the first or middle of December. Heavy fall grazing for 60-75 days will be as much as the barley can stand before it renews growth in the spring.

*Bluegrass* again, from the first or middle of December until the middle of March. This will be the grass left by the fall growth and saved for winter. It of course is to be supplemented with stalk pasture and hay. The winter period of approximately 100 days will bring the least pasturage of the whole year, but if a good stand of grass has been saved from late summer and early fall growth, it may then become more valuable than in any other season, because of the high price of winter feed.

*Winter barley* again, from late March or early April until the bluegrass is ready in late April or early May—a final period of 30 to 50

days. The barley may be grazed out in May or left to ripen a small yield of grain. Naturally the grain yield will be much reduced if the crop is heavily pastured in the spring, especially after May 1 in north Missouri or April 20 in south Missouri.

The seasonal periods stated here for the grazing of the three crops are only approximate and will be found to range earlier or later according to the section of the State and the variable nature of the seasons themselves. The system can be outlined even more simply by saying that it is composed of (1) bluegrass pasture in late spring, early summer and winter; (2) lespedeza pasture in midsummer and late summer; and (3) barley or other grain pasture through the whole fall and early spring. Thus the whole year may be filled with good pastures, even abundant pastures by comparison with those we have formerly known. And the system is so closely connected that intervals of time between the end of one pasture and the beginning of the next will be short, or the pastures may overlap—a new one being ready before the last is finished.

### Bluegrass Pasture

Bluegrass, though long a foundation crop of Missouri agriculture, is the only part of our 3-crop pasture system that still requires studied management for its best use and continuing productivity. Our native method of grazing has unwisely treated the bluegrass pasture as an inexhaustible product. Year after year for a long time established stands of Missouri bluegrass have been subjected to continuous and excessive grazing from their early stages in the spring until the grass eaten down to the sod had ceased growth in late fall. The resulting broad degeneration of these pastures now forces us to realize the error of this procedure. Seasoned observers know that the amount of feed produced in recent years by the average piece of bluegrass in Missouri is much less than the same pasture could yield twenty to forty years ago. We simply have impoverished our bluegrass sod in the same way, if not to the same degree, that we have exhausted some other natural resources. And having done this we find ourselves compelled to maintain or fatten our live stock with harvested feeds at prices which leave a smaller margin of profit than could be obtained if good grass were again plentiful.

Such practice, however, has not been entirely avoidable. Bluegrass has been over-grazed under the necessity of exacting immediately the largest returns from the land, in order to keep pace with advancing costs of farm production and farm living. The means of saving it from gradual exhaustion have not until recently appeared in practical form. For we have only recently found new crops that could easily

and extensively carry a large part of the pasture load previously borne by bluegrass alone. And only lately we have begun the development of a new scheme of seasonal use which seems capable of deriving higher annual values from an acre of permanent grass pasture while improving the vigor of the plant itself.

From studies conducted jointly by the Missouri Agricultural Experiment Station, the United States Department of Agriculture, and Sni-A-Bar Farms, it appears that the development of bluegrass pastures to a state of higher vigor and larger yield may be found in the all-year system herein outlined. Korean lespedeza by furnishing an abundance of other pasturage in midsummer relieves the grass from grazing and destructive trampling while it is weakened by heat and drought. The heavy fall pasturage from winter barley or rye not only saves the September-October growth of bluegrass for winter use, but also allows the grass roots a period of recuperation and food storage for a better growth in the next spring and early summer.

*The long period of rest thus afforded by the interposition of Korean lespedeza and the early fall-sown grain crop, is a key to bluegrass improvement.*

Other effective and economical means for aiding the growth of bluegrass and thickening the stand of useful herbage in a run-down bluegrass pasture, are (1) mowing the pasture weeds in June and August to prevent the formation of weed seeds that ripen in these months; (2) early spring seeding of scanty places in the grass sod with Korean lespedeza or white clover, or with bluegrass or redtop or orchard grass; and (3) superphosphate fertilizer thoroughly worked into the sod.

It is further indicated that if the future productivity of the bluegrass itself is rightly regarded, the highest returns are to be obtained where the pasture is grazed in late spring, early summer and winter, instead of being used continuously through the whole season of late spring to late fall. Our studies have found that where beef cattle grazed bluegrass for this 6-month period, about 60 per cent of their total gains in weight were made in the first 60 days.\* Or stated differently about two-thirds of the total gains were made in the first one-third of the whole pasture season. Bluegrass in young growth is at the peak of its productivity in animal gains, and it should therefore be grazed to its full capacity in the early part of the season. It is then more palatable and more nutritious than at later stages.

Bluegrass saved for winter, from the September-October growth, is then particularly valuable by reason of the scarcity of other pasturage and the high seasonal price of stored feeds.

\*See Missouri Agricultural Experiment Station Circular 175, The Management of Bluegrass Pastures in Missouri, by E. Marion Brown and James E. Comfort.

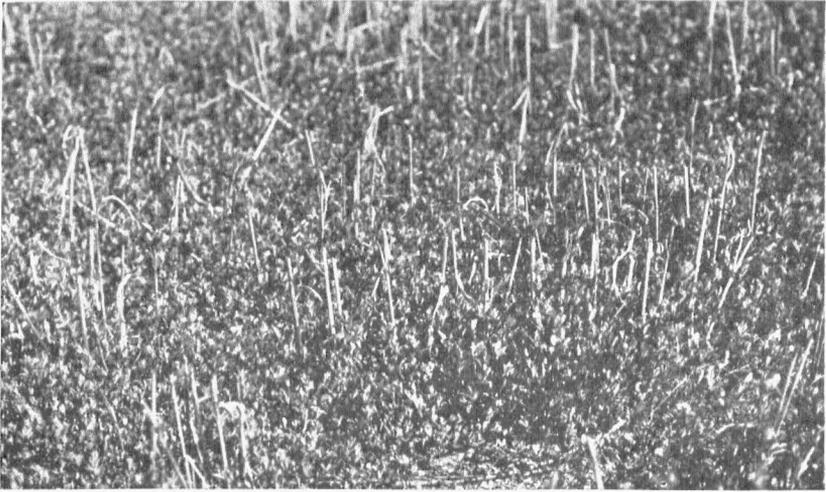


Fig. 2.—Korean lespedeza, where once established, will come up thickly in the grain crops every spring. The picture shows a heavy volunteer stand ready for grazing soon after the oats crop was harvested.

### Korean Lespedeza Pasture

*Korean lespedeza is a highly nutritious pasture plant that can be grown anywhere in Missouri. Even on medium or poor soil it does not require special treatment as most other legumes do. It is exceedingly durable under grazing and will survive a drought that may injure or ruin many other crops. In fact, the great popularity of this lespedeza is mainly due to its ability to give a flourishing pasturage through the heat of midsummer when bluegrass has been reduced to its lowest and least useful stage.*

Korean lespedeza is now being grown on 2 to 3 million acres of Missouri farm land ranging from the best to the poorest. This acreage is much larger than that of all other Missouri legume crops combined.

A simple way of starting lespedeza is by sowing in late winter or early spring. Fifteen to twenty pounds of seed to the acre will produce a good stand the first summer. The next spring a thick stand will come up from the abundance of seed shattered to the ground the fall before. Every fall there will be this plentiful natural reseeding, even though the stand has been grazed down to the ground. The dense volunteer growth, coming year after year, is a highly reliable feature of this crop. Therefore a stand of lespedeza once established is not expected to run out, though it may easily be subdued for a season by putting the land in corn. If the corn land, however, is next plowed for oats, so as to bring

the buried lespedeza seed back to the surface, there will be a volunteer stand of lespedeza in the oats crop.

*Lespedeza is most economically produced in association with wheat, oats, barley, or rye, just as red clover is grown with any of these grains. Within a week or two after the grain crop has been harvested the lespedeza will usually be ready for grazing.*

An annual rotation of lespedeza with any grain crop may be carried on as long as it is desired. The yearly lespedeza-wheat rotation requires only the following simple steps: (1) Sow lespedeza in the wheat; (2) Pasture out the lespedeza after the wheat is harvested; and (3) In October, as soon as the lespedeza seed is ripe, disk the lespedeza sod thoroughly, and on this good but inexpensive seedbed sow the wheat. This procedure may be repeated year after year, except that the lespedeza will not need to be sown after the first spring, for in this rotation it will not fail to volunteer every season in the wheat. This method is equally effective for the combination of lespedeza with oats, barley or rye, except that in the case of oats the lespedeza sod is to be disked in the spring instead of the fall.

It is to be noted, however, that the rotation of volunteer lespedeza with winter barley or rye cannot be perfectly timed in Missouri, if the longest fall grazing of the barley or rye is primarily desired. Either of these grains to yield its maximum fall pasturage must be in the ground by late August or early September, and this time will be from four to six weeks before the lespedeza seed have ripened. If these seed are still quite green when they are disked under in preparing the lespedeza sod for the grain crop, there will be a poor stand of lespedeza in the grain next spring, or possibly none at all. But if the barley or rye is grown primarily for grain, and therefore sown as late as the time of seeding wheat, it will fit as well as wheat or oats in the annual rotation with lespedeza. Also if lespedeza is newly seeded in the grain crop every spring, it of course can rotate with barley or rye fall-sown early on lespedeza sod.

In the lespedeza-oats rotation, an early maturing variety of oats should be sown at a medium rate. In good seasons the oats should be allowed to ripen; in poor seasons, cut for hay. In either case there will be a valuable feed crop in June, followed by maximum returns from the lespedeza pasture for the rest of the season. Volunteer lespedeza alone becomes weedy. Oats sown on the lespedeza sod keeps down the weeds, thereby increasing pasture returns after they are harvested.

All things considered, the most efficient and most economical means of producing lespedeza pasture is by the lespedeza-wheat or lespedeza-oats rotation. Either of these can be carried on as long as it may be

wanted. Land so used will be receiving every year a heavy addition of nitrogen through the grazing down of the lespedeza. The grain crop grown in rotation with the lespedeza is to be normally treated with phosphate fertilizer every other year or lightly treated with this material every year. As a result of these benefits the fertility of the soil will be maintained or even increased.

If it is desired to end a lespedeza-grain rotation, pasture out in the spring the wheat, oats, barley or rye, as the case may be, and turn the land to a cultivated crop.

The yield of feed in terms of pasturage from Korean lespedeza is remarkably high. An acre of lespedeza fully utilized for its 3-month season will produce larger gains in beef cattle than will an acre of bluegrass for its 6-month season. This result for the two crops was found on good bluegrass land at Sni-A-Bar Farms. If the comparison were made on less productive land, we should reasonably expect it to be even more favorable to lespedeza, for lespedeza will grow on land that is too poor to support a useful stand of bluegrass.

#### Fall and Spring Grain Pastures

Fall-sown grain crops fully utilized for pasture in both fall and spring can yield a large amount of highly nutritious feed. For pasture purposes they should be sown early and thick. The maximum pasturage will be obtained if grazing starts very early in the fall and proceeds until winter at an even rate that finally will leave just enough growth (about 3 inches) to stand cold weather. Spring grazing may be regulated according to the immediate need for pasturage and the future need for threshed grain. If the greater necessity is for pasturage, the crop may be grazed out completely; if threshed grain is the main requirement, the spring growth must be spared from heavy grazing in order that the crop may develop its grain yield.

*Under Missouri conditions winter barley is generally the best pasture crop among the grains. It exceeds the others in earliness, vigor and abundance of fall growth.*

In comparison with barley, wheat sown in late August for pasture and grazed as long and as heavily as barley sown at the same time, would become so exhausted by this intensive use and by the attack of the Hessian fly that it would be extensively winter-killed.

Winter barley is also more productive than rye on medium to good land. Rye, however, has the special ability to grow at a low level of fertility and therefore should be preferred to barley on poor land.

Oats, being spring-sown in Missouri, are not comparable on a pasture basis with the other grain crops, except as spring pasture. Even as spring pasture oats are much less productive than a full growth of



Fig. 3.—The vigorous, leafy growth of winter barley comes quickly from early sowing, and furnishes abundant pasturage through a long fall period.

barley, wheat or rye. Oats lack the rugged ability of the other grains to stand trampling and to continue growth after being partly eaten down. Winter barley, for example, can be grazed at least moderately in the fall and by its vigorous renewal of growth still yield more pasturage in the following spring than oats sown in that season. An acre of land that is to be used for grain pasture will be found far more productive if fall-sown in winter barley, wheat or rye than if spring-sown in oats.

Winter barley to give its largest, best distributed and most useful pasturage, should be sown at two bushels per acre right after the rains in late August or early September. In favorable seasons it will be ready for grazing in late September or early October and from then until the first or middle of December it will furnish abundant pasturage. Spring grazing, beginning March 15 to April 15, may run for 30 to 50 days, the length and intensity of such grazing being regulated according to the individual need for pasturage or a yield of threshed grain. Thus the combined fall and spring grazing periods of winter barley may range from 100 to 125 days, and the total amount of pasture feed thereby produced per acre will exceed the feed from an acre of bluegrass or Korean lespedeza in the full seasons of these crops, on the same grade of land.

A crop of barley intended primarily for grain, however, should not be sown before late September or early October. During November it can be grazed much more than a crop of wheat also intended for grain; but it can not stand without a loss in future growth and grain

yield the extremely heavy grazing given the barley that is being grown and used primarily for pasture purposes.

There are many varieties of winter barley, and their comparative merits under Missouri conditions are not yet fully known. The bearded varieties, as represented by Kentucky Winter, seem somewhat more resistant than others to winter and somewhat more durable under grazing. The beardless or hooded varieties may be preferred in the production of grain because of the several advantages that result from the absence of the stiff, harsh beard. The Missouri Agricultural Experiment Station is improving a discovered strain of "beardless" winter barley that ripens in the last few days of May or the first few days of June.

The difficulty of annual rotation between winter barley sown mainly for pasturage and volunteer Korean lespedeza has already been explained. But winter barley fits perfectly in annual rotation with soybeans. The steps are as follows: (1) Sow and use the barley for pasturage or grain or a combination of both, as desired; (2) After the barley has been grazed out or harvested in late May or early June, thoroughly disk or plow the barley stubble and sow soybeans; (3) Harvest the soybeans for hay in August; and (4) Sow barley again, with little or no preparation of the soybean land. This rotation will give at very low cost a large annual yield of highly nutritious feed in pasturage and hay, and will practically control soil erosion.

### Sweet Clover Pasture

Sweet clover is an excellent pasture crop in feeding value and carrying capacity. Its use in Missouri is limited to a comparatively small acreage, however, by the difficulty of producing and maintaining a crop for pasture every year. It grows vigorously on productive, well drained soils that are naturally rich in lime. It may grow also on poorly drained soils low in fertility, if lime is heavily applied.

Successful stands of spring-sown sweet clover will make good pasturage in late summer and early fall, and heavy pasturage during April to July in the following year.

Though sweet clover produces plenty of seed, if not grazed too heavily during June and July, attempts to renew a stand by natural reseeding are not usually successful. This failure to maintain sweet clover on the same land year after year, together with its high requirement for lime, are the chief practical disadvantages of the crop. Where sweet clover is to be regularly used as a pasture it must be newly seeded every year in order to have in each season a field of second-year growth.

### Sudan Grass Pasture

Sudan grass sown on average land in late May or early June will make good pasturage for 90 to 100 days beginning about July 1. It is also one of the best crops for pasturage or hay on poor land. It is nutritious, palatable, durable under grazing, and drought resistant. Altogether Sudan grass is one of the most reliable and productive crops for a summer pasture.

The ground for Sudan grass should be well prepared and the seed drilled or broadcast at 30 to 40 pounds per acre. Grazing may begin when the grass has grown to 6 or 8 inches, and be regulated to maintain that height through the season.

There are occasional reports of livestock poisoning by Sudan grass, similar to the poisoning by other sorghums, particularly sweet sorghum (cane). Such cases occur at the height of a drought. Sudan grass is less likely than the other sorghums to form this poison (hydrocyanic acid) in a killing quantity. Therefore the purity of Sudan grass seed is a matter of special importance. This seed should be entirely free from mixture with the seed of any other kind of sorghum.

### Winter Vetch and Crimson Clover

Winter vetch is a useful legume for late spring and early summer pasture on fertile, well drained land throughout the State. For a pasture it should be sown with barley or rye, at the rate of 20 to 30 pounds per acre in late August or early September. Inoculation is important for this crop.

A good stand of vetch will extend the pasture season in early summer, beyond the period of pasturing wheat, rye, or barley alone. If the vetch is not grazed too close and the animals are removed in early July, the crop will usually continue growth and produce enough seed to renew its stand on the same land in the fall. By disking to cover the seed, and reseeding the fall grain on the vetch sod, the vetch can be made to renew its stand annually, improve its growth, and add considerable fall pasturage to the grain pasture with which it is combined.

Crimson clover, a winter annual, is a valuable pasture legume for late fall, winter, and spring. In Missouri the practical use of crimson clover is limited generally to the southern half of the State and the plant is there adapted only to warm and well drained soils of average to good fertility. The crop should be sown in late August or early September at the acre rate of 12 to 15 pounds of seed in combination with 5 to 6 pecks of barley or rye. Crimson clover should not be sown alone for a pasture, except where it is known to grow vigorously on soil well suited to its

needs. Nor is it to be recommended for any purpose on soils low in fertility, poorly drained, or acid.

Crimson clover, though a good seed producer in Missouri, cannot be depended upon here to reseed itself as vetch and lespedeza do.

#### **Suitable Soils for the Bluegrass-Lespedeza-Barley Combination**

The all-year sequence of bluegrass, Korean lespedeza, and winter barley will give its best results on the more productive soil types, and elsewhere on farm land of average to good fertility. The major soil types best suited to this system are the Marshall, Knox, Summit, Hagerstown, well drained Wabash, Grundy, Lindley and Shelby, or other types on which bluegrass now grows well or can be improved by reasonable means.

#### **A Different Combination for Other Soils**

Bluegrass is not generally adapted to the Putnam soils of Northeast Missouri, the Oswego or Gerald soils of the Southwest section, or the uplands of the Ozark region. In such areas redtop or orchard grass is the best pasture grass in natural adaptation, carrying capacity, and ability to withstand hard grazing, and either of these grasses should there replace bluegrass in the general scheme of pasture production.

Since winter barley grows best only where drainage and fertility are above the average, the crop cannot be expected to give good returns in these less fertile areas, except on farms which have been kept so well that their productivity is comparatively high. In the majority of cases winter rye should be substituted here for winter barley.

In the areas of medium to low fertility here named, the combination of redtop or orchard grass, lespedeza, and rye, will generally be found more practicable than any other for the year-round pasture plan.

### **BENEFITS FROM ALL-YEAR PASTURES**

*An abundant supply of good feed well distributed through the year and produced at low cost, will be the first great return from the year-round pasture system. This of course is a major factor in the profitable production of meat and milk.*

Feed production by means of pastures is much less costly in mechanical operations than the type of production which includes the tillage and harvesting of crops. It is economical also in a broader sense. It is, for one thing, safer from crop hazards. The crops in the pasture system here outlined are either (1) drought resistant, as lespedeza, Sudan grass and sweet clover, or (2) as fall and spring grain pastures they do not come in the drought period, or (3) as bluegrass or redtop

they need not be used in the drought period. Altogether this system will largely insure us against heavy feed losses from drought. Also the insect injury to these pastures will be small by comparison with that which often ruins corn or some other heavy cultivated feed. Even the chinch bug, though a voracious pest of a barley crop that stands until ripe, is avoided by the grazing out of the barley pasture in spring before the bug reaches the height of its activity.

The relation of an extensive system of productive pastures to the more efficient use of land and the preservation of its fertility, is an exceedingly important question requiring broad special treatment. It may be said briefly here that pasture grasses and legumes by reason of their natural economy in the use of soil fertility can be more widely grown than grain crops. Selected species of these plants, besides using their allotted acreage, can fill infertile places on a farm, where grain crops, including corn, could scarcely produce a harvestable yield. Finally it is certain that such a system is the best natural means for the maintenance or improvement of soil fertility, and the most practicable means for the control of soil erosion.

*In a word the all-year pasture system is highly productive and from every viewpoint economical.*