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Practices in Seeding Meadow and Pasture Crops

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CONTENTS

Choice of pasture and meadow crops	3
Time of seeding	7
Fall seeding	7
Spring seeding	8
Summer seeding	9
Reseeding old meadows and pastures	10
Nurse crops	10
Sowing the seed	11
Rate of seeding when sown separately	14
Pasture and meadow mixtures and rate of seeding	15

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Practices in Seeding Meadow and Pasture Crops

E. J. KINNEY, RALPH KENNEY, E. N. FERGUS

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7
7
8
9
10
10
11
14
15

Frequent failures in seeding pasture and meadow crops are extremely discouraging. These crops are expensive to seed, and the money loss, in the event of failure, is an item of importance. Even more serious, however, in many instances, are the losses which result because of shortage of pasture or hay, soil erosion, and decreased soil productivity. While the chances of failure are greater in seeding pasture and meadow grasses and legumes than with most other farm crops, it is unquestionably true that many of the failures which occur can be attributed to poor judgment in seeding or an unwise choice of seeding practices, rather than to unavoidable causes. It may prove highly profitable, therefore, where failures are a common occurrence, to give the question of seeding practices careful consideration. Only in this way can the best choice of practices be made.

CHOICE OF PASTURE AND MEADOW CROPS

The choice of crops for pastures and meadows in Kentucky depends upon a number of factors. The most important of these are: (1) soil conditions, (2) length of time the pasture or meadow is to stand, (3) kind of livestock for which the forage is to be used, and (4) the frequency with which certain diseases occur. Cost of seeding also determines the choice of crop in many instances, but this consideration should not have as much weight as is often given it.

Kentucky bluegrass is perhaps the most desirable pasture crop, under many conditions, that can be grown in Kentucky. The only part of the State where it is sufficiently productive to be profitable without soil treatment is in the limestone region of central and northern Kentucky, known to all the country as the "Bluegrass

Region." Experiments on some of the soil experiment fields outside this area have shown that excellent bluegrass can be grown by the liberal use of limestone and phosphate fertilizers. Bluegrass in connection with white clover, or other legumes, gives practically permanent pastures; and wherever the control of soil erosion necessitates keeping rolling and steep land in pasture more or less permanently, no other pasture crop is so valuable as vigorous bluegrass.

Orchard grass is not so lasting as bluegrass, but is fully as productive on good land and much more productive on soils of moderate fertility. It should be regarded primarily as a pasture crop, but it is also a fair hay crop. A mixture of orchard grass and lespedeza produces more pasture under average soil conditions outside the Bluegrass area than any other combination.

Redtop is not so long-lived as orchard grass, except on wet, heavy soil. For soil of this character the best pasture mixture is redtop and lespedeza. On uplands, redtop is valuable chiefly to furnish pasturage while slower-growing crops are becoming established, as it usually disappears in a few years. It is excellent to sow with bluegrass.

Timothy is the best hay grass for Kentucky, except on wet land, where redtop is superior. Timothy is also perhaps the best grass for short-time pastures. The cost of seeding timothy is small, and getting a stand is easy. Timothy is not a good poor-land grass, however.

A grass that may prove of much value on wet land is reed canary grass, which is not injured even when flooded for quite long periods. It is adapted for both pasture and hay. Farmers who have wet bottom land should give this grass a trial.

There is much difference of opinion among farmers in Kentucky as to the relative merits of various legumes, both for hay and pasture. Certainly no other legume produces so large an amount of hay of the highest quality as alfalfa, where soil conditions are favorable. This is generally admitted. It is often argued, however, that it is not a practical crop because of the cost of preparing land for its growth, particularly the cost of liming, and the difficulty of establishing it. It is not more difficult to establish than any other meadow

crop, as any experienced grower will testify. The use of lime and phosphate is expensive but, at the same time, highly profitable on most Kentucky soils outside the Bluegrass region, whatever the crop grown.

Lespedeza is perhaps the most productive legume that can be grown in the State without soil treatment; yet liming and the use of phosphate usually increase the yield of hay — and of course of pasture also — sufficiently to pay for the cost of treatment in a short time. This has been proved conclusively on the soil experiment fields of the Kentucky Experiment Station.

The annual lespedezas are by far the most extensively grown legumes in Kentucky, which is indicative of their usefulness. Their introduction has greatly simplified the problem of producing good pastures, because of their ability to grow well on worn land that has had an application of lime and phosphate. Alone, they are not an entirely satisfactory pasture crop because they furnish pasturage for a short time only; hence they should always be sown with one or more grasses. The natural period of growth of the lespedezas is when grasses are more or less dormant, and they furnish the nitrogen necessary for a good growth of the latter during spring and fall. They reseed themselves almost indefinitely, and the forage is palatable to all kinds of livestock. In Kentucky, where pastures ought to occupy a large part of the area of farm land, there is justification in ranking the lespedezas as highly valuable legumes.

Korean and Kobe lespedeza produce excellent crops of hay on good land, and a large acreage is used for hay production, particularly in western Kentucky. The hay is easily cured and of very good quality if cut at the proper stage. It is not equal to good alfalfa hay, however, according to feeding tests conducted at the Kentucky Experiment Station. Whether or not the popularity of the lespedezas for hay production will continue is not certain. They are more susceptible to drouth than alfalfa. A dry July may prevent Korean — the most extensively grown variety — from getting tall enough to mow, and a dry August may similarly affect Kobe. Weeds are often troublesome because of the slow growth of lespedeza. However, the lespedezas have many advantages, the two most important of which are cheapness of seeding and the certainty of

getting a stand. Korean lespedeza occupies a very large proportion of the lespedeza acreage in the State, but there are enthusiastic supporters of Kobe, particularly in southwestern counties. The Korean matures much earlier than the Kobe, and produces enormous crops of seed. There is thus little danger of its not reseeding itself in pastures. The seed yield is so much larger than that of Kobe that seed can be sold profitably at a lower cost. It seems likely that Korean is preferable for hay production, both because it can be seeded cheaper and because its early maturity is an advantage in curing the hay. However, its early maturity is a disadvantage from the standpoint of pasture production. On the other hand, the Kobe remains green until frost and furnishes pasture two or three weeks longer than the Korean. It is possible that the latter may be used widely for pasture wherever it reseeds itself regularly.

Common lespedeza, or Japan clover, is now seldom sown in Kentucky, but appears as a volunteer crop in many parts of the State. It probably is almost as valuable for pasture as the larger varieties. Tennessee 76 is much like Kobe; both are giant varieties of the common.

Too little is known regarding *Lespedeza sericea*, the perennial species, to estimate its value for either hay or pasture.

Red clover is not surpassed as a hay and pasture crop in short rotations, and the fact that much land must be limed and phosphated to grow it successfully, does not make it less desirable, for, as has been said, this treatment is necessary to profitable production of any crops on most Kentucky soils. Poor soil is not the only cause of failure of this crop, however. It has been proved experimentally that many failures are caused by sowing kinds of red clover that are unadapted to Kentucky conditions. Varieties grown in or near Kentucky for a long time, on the other hand, are well adapted.

A small-growing annual clover known as hop clover (*Trifolium procumbens*) has become very abundant in Kentucky in recent years. It has small, yellow blossoms which appear in June. The mature heads resemble a small hop — whence the name. The extremely small seeds ripen in June and July. The plant is a winter annual, that is, the seeds germinate in the fall and the winter is passed in the seedling stage. This small clover provides

pasture for only a short time and cannot be regarded as of much importance as a pasture crop. It may be of considerable value, however, in adding to the supply of available nitrogen for use of the grasses with which it grows.

Another annual legume — yellow trefoil, or black medic — is abundant on limestone soils in Kentucky. This has small, yellow blooms which appear at the same time as those of hop clover. It does not grow so upright as the latter. The seeds are much like alfalfa seed in size and shape. Yellow trefoil has been recognized as a valuable constituent of pastures for many years. For some reason, it has proved difficult to get stands of this crop, and it has never been extensively grown.

Common white, or Dutch, clover is a pasture legume of great value, particularly for growing with bluegrass. The continued productivity of old bluegrass pastures is undoubtedly due to the growth which white clover makes in the pastures, thus renewing the supply of available nitrogen.

TIME OF SEEDING

Seeds of pasture and meadow crops must be covered very shallow or the delicate seedlings will be unable to force their way to the surface. If the surface soil dries even slightly, the germinating seeds may be destroyed. Evidently the chances of getting good stands depend greatly, therefore, upon seeding when moisture conditions are favorable.

Fall Seeding. Fall is a particularly good time for seeding crops not easily injured by cold weather, because the soil does not dry rapidly during this season. Practically all the grasses except orchard grass may be sown early in the fall; and this practice is so generally successful that it ought to be followed whenever possible. Young orchard grass is not so winter-hardy as the other grasses and, unless the seed is sown by the first of October, it is better to wait until late winter. Not only is the chance of getting a stand* much better if the grasses are sown in the fall, but the danger of losing the stand the following season is lessened. The plants become well established and are thus better able to withstand the competition of weeds and

* In the sense that a stand is obtained when germination is completed, as indicated by the appearance of the plants above ground.

nurse crop the following season. Fall seeding of Kentucky bluegrass is particularly advisable; as a matter of fact, it is usually a waste of seed to sow the grass at any other time, under field conditions. In Kentucky, the period when grass may be sown successfully in the fall extends from September 1 to October 15. September 10 to 20 may be regarded as the most favorable time. Good stands may be obtained, as a rule, by sowing as late as November 1; but the plants make such a small growth before freezing weather that they may be lifted out of the ground during the winter.

Few of the legumes are sufficiently winter-hardy in the early stages of growth to be sown safely in the fall. Alfalfa is a very rapid-growing legume and, if sown early in September, usually becomes large enough to survive a moderate winter, especially in the southern part of the State. Summer seeding, to be discussed later, is much better, however. Hop clover seed germinates naturally in the fall and, apparently, the small seedlings are seldom winter-killed. Probably fall seeding is necessary for the development of the plants of this legume. Yellow trefoil, or black medic, is similar to hop clover in ability to withstand cold weather in the seedling stage.

Spring Seeding. When it is impossible to sow in the fall, grasses should be sown in late winter or very early spring. Good stands of all the grasses except bluegrass may often be obtained by sowing in oats, provided the oats are sown in late March or early April and not seeded too heavily. It should be emphasized that most of the grasses are very cold-resistant and are able to withstand freezing weather and heavy frosts much better than hot, dry weather. Even the sprouted seeds are not often injured by freezing weather.

There is considerable difference of opinion, even among very experienced farmers, as to what time in the spring is best for seeding any particular legume. Getting a good stand is not the only consideration, and the use of a practice very successful in producing good stands may often be responsible for the loss of the stand later. For example, the chances of getting a good stand of Korean lespedeza are probably better from seeding in early spring than from later seedings; but lespedeza is easily killed by heavy frosts and there is danger, in early seeding, of losing the stand from this cause. Many experienced growers therefore prefer to wait until late March or

early April rather than to run the risk of losing the stand. On the Experiment Station farm, rather early spring seeding in a fall-sown nurse crop, or on an unprepared seed bed when sown alone, proved more reliable than later seedings, but not better where the lespedeza was sown in spring oats or on a loose seed bed.

The young plants of red and alsike clover are not easily injured by cold, but the sprouted seeds often are killed by freezing weather if exposed on the surface of the ground. The old and widely followed practice of seeding clover in late winter or early spring is usually successful if the seeds become well covered. This fails so often, however, that a larger percentage of good stands is possibly obtained from later seeding.

The sweet clovers, or melilots, are similar to red and alsike clovers in cold resistance. In many lots of sweet clover seed a large percentage of the seeds are hard. Some hard seeds will lie in the ground for a year or more without germinating. In most instances a few weeks' exposure softens the seed coats sufficiently to permit germination. The poor germination of sweet clover seed led to the invention and use of a scarifying machine which scratches the seed coats. This treatment ensures prompt germination. It has been found, however, that scarification injures seed to some extent and impairs its keeping quality. Scarified seed should therefore not be kept long in storage. Some growers think that scarified seeds produce weak plants, and prefer unhulled seed. By sowing in winter, so the seed coats have time to soften, good stands usually are obtained. For spring seeding, the seed should be scarified, unless germination tests have shown it to be unnecessary.

Alfalfa probably should not be sown until danger of severe freezing weather is past. Apparently the young plants are not easily killed by freezing, but seem to be stunted and are slow in recovering. Late March or early April seedings may be regarded as safest.

Summer Seeding. For summer seeding, land should be plowed and worked down as long as possible before seeding time. The field must be harrowed at intervals, to keep down weeds. This method of handling gives a mellow seed bed which absorbs the rainfall for the use of the crop. Seeding by the 20th of August is advisable if moisture conditions become favorable. In late summer,

soil does not pack so hard as in the spring, and crusts very little. It is possible, therefore, to cover the small seeds deep enough that good stands of some pasture and meadow crops can be obtained on well-prepared seed beds, with limited rainfall. Perhaps only alfalfa, timothy and orchard grass can be sown to advantage in late summer, altho fair success can be had with the clovers. When seedings are made in August without a nurse crop, alfalfa, timothy, and clovers give good crops of clean hay the following season, and orchard grass makes excellent pasture.

Summer seeding of alfalfa has been practiced in Kentucky for many years, and many growers think it is the best way to get a good, clean field of this legume. It affords almost perfect control of weeds, which is an important feature in sowing on weedy land.

Probably it is not practical to sow timothy and orchard grass in the summer except where failure from fall or spring seeding has occurred, because of the greater expense.

RESEEDING OLD PASTURES AND MEADOWS

Reseeding old meadows and pastures is seldom profitable, because a depleted soil is usually the cause of the poor stand. If the sod is fairly good, it may be top-dressed with lime or a phosphate fertilizer, or both, and reseeded. Occasionally, however, pasture or meadow sods on good soil may be thin or lacking in a desirable plant. Under such conditions, reseeded usually is satisfactory if done during late winter, on a short sod.

NURSE CROPS

Sowing pasture and meadow crops with one of the small grains, usually called a nurse crop, is the common practice in Kentucky and, as a rule, it is a wise one. The chief advantage of the nurse crop is that it checks development of weeds. In many seasons it is practically impossible to prevent weeds from destroying stands of young grasses and legumes sown alone in fall or spring. It is true that the nurse crop checks the growth of the grasses and legumes and is often responsible for the loss of stand during periods of dry weather. However, the competition of the nurse crop is not usually so dangerous as the competition of weeds. Lodging of the grain crop is another cause of loss of stands, but this may be avoided by

pasturing fields where growth is too rank. Pasturing in such instances usually benefits the grain crop also. Besides checking the development of weeds, the nurse crop affords protection against erosion, and in Kentucky this is extremely important. Erosion may be very serious on even slightly rolling land where pasture and meadow crops are sown alone on a specially prepared seed bed.

The amount of hay or pasturage furnished the first year by most grasses and legumes is little larger, as a rule, where sown alone than where a nurse crop is used. When grain brings a fair price, the nurse crop adds to the return from the land. Low price of grain makes it more profitable to pasture the grain crop. Many Kentucky farmers, particularly in the Bluegrass region, sow rye as early as possible and get good returns from both fall and spring pasturage. Pasturing the small-grain crop largely avoids the danger of losing the stand of grasses and legumes in the event of dry weather. There is no more certain way of establishing pastures or meadows than this. It is especially valuable in establishing bluegrass pastures.

The advantage of a nurse crop for alfalfa, and possibly for sweet clover, is doubtful. Both these legumes grow very rapidly under favorable conditions, and a good stand usually survives weed competition successfully. On the farm of the Kentucky Experiment Station, results in seeding alfalfa with a fall-sown nurse crop have not been very satisfactory. Better stands were obtained by seeding with spring oats or by seeding alone, either in spring or summer.

For Kentucky, wheat is probably a better nurse crop than rye, unless the rye is pastured. Winter barley, if not too thick or if pastured, is very satisfactory. Unpastured barley on very fertile soil often makes such a rank growth as to smother the crops sown with it. Spring oats are rated as a poor nurse crop in the North. In Kentucky, oats do not often grow very rank, particularly the early varieties best adapted to the climate. A light seeding of one of these early varieties makes an excellent nurse crop, especially for lespedeza and alfalfa.

SOWING THE SEED

One of the most important factors in successful seeding is to get the seed covered thoroly at the proper depth. Perhaps more failures

to get stands, particularly in spring seeding of legumes, are due to imperfect covering than to any other cause. Uncovered seeds are likely to be injured by alternate wetting and drying or by freezing after they have absorbed water. If there is sufficient moisture to sprout the seeds, either freezing or drying may destroy them. Heavy rains may cause serious damage. The chief disadvantage of sowing legume seeds in late winter or early spring is the difficulty of getting an adequate covering. On heavy soil where the surface "honeycombs" in freezing, it is not so difficult. A honeycomb freeze lasting long enough for much seeding to be done is comparatively rare in Kentucky, however. Usually a better covering can be obtained by waiting to sow until the ground is dry enough to permit using a clover seed drill or some implement to stir the surface lightly after seeding. A spike-tooth harrow is excellent for this purpose on land free from trash. On trashy land, a disk harrow with the disks set almost straight or a grain drill may be used. A rotary hoe is good. The ground should be worked only sufficiently to loosen a small amount of soil. Very little seed will be covered directly, but even a light shower settles this loose soil, resulting in an excellent covering of the seed. At the Kentucky Experiment Station, this method of seeding gives a larger percentage of stands and thicker stands than seeding on frozen ground. If the ground is dry enough to stir, there is little danger of the seed sprouting until a rain occurs. Harrowing fields that have been sown to grasses in the fall causes little or no injury to the stand. If the soil cannot be stirred, it is better to seed early, as alternate freezing and thawing and rains may accomplish some covering. Seeding should be done either on frozen or dry ground, rather than on a wet surface.

In spring or fall seeding of either grasses or legumes on a loose seed bed, rains cover the seed sufficiently and it is unnecessary to use an implement; in fact, it is unsafe, as the seeds are likely to be covered too deeply, especially in the spring. At the Kentucky Experiment Station it has been found a good practice, where the soil is quite loose, to use a culti-packer before sowing the seed. Under average conditions, however, the seed is sown with the grass-seeding attachment of the drill, when the nurse crop is sown. The seeds should fall behind the disks or among them, rather than in

front. Orchard grass and bluegrass seed cannot be sown with the grass-seeding attachment unless the seeding is to be very light.

A desirable practice in summer seeding is to use the culti-packer before sowing the seed and to cover with a light harrow. If the soil is very loose, a plank or brush is better than a harrow. The clover seed drill gives effective covering if the seed bed is fairly firm; otherwise it is difficult to regulate the depth of the covering.

In sowing alfalfa or other crops in late summer, the seeding should be made either when there is sufficient moisture in the soil to bring the plants up or so little that the seeds will not sprout until a rain occurs. Perhaps the latter practice is safer. A fairly good shower furnishes enough moisture to bring up the plants, as a rule. In sowing after a shower, however, the moisture evaporates very rapidly from the stirred soil and may all be gone before germination is completed. In such instances the sprouted seed usually is destroyed. Rolling the field after the seeding is done may prevent the surface soil from drying so rapidly.

The horn seeder is the device most extensively used in Kentucky for sowing pasture and meadow crops, probably because it costs so little. After considerable experience, it is possible to sow most of the heavier seeds quite evenly with this seeder. It is much easier to get uniform distribution with one of the rotary seeders, however, and the amount of seed sown can be regulated more accurately. The wheelbarrow seeder is decidedly the most satisfactory of all hand broadcast seeders on fairly level land. It sows evenly, and any desired amount of seed can be sown with accuracy. It can be used on windy days also, which is a great advantage. Since it sows a strip 14 feet wide, from 25 to 30 acres can be seeded per day. Double-hopper wheelbarrow seeders are adapted for sowing light, chaffy seeds, such as orchard grass and bluegrass, as well as clover, timothy, and other heavy seeds. There is no other satisfactory seeder for sowing these chaffy seeds, so far as the writers are aware, and hand broadcasting is slow and difficult. Wheelbarrow seeders cost about \$18.00 to \$20.00, but if properly cared for, they last a lifetime and are a profitable investment on the average farm.

The clover-seed drill is an excellent implement for sowing heavy seeds. It is constructed on the same principle as a grain drill, and

the feed is the same as on the grass-seeding attachment of the latter. On a good seed bed the seeds are covered, but on hard ground the disks merely cut a shallow channel in which the seeds are deposited. However, even a light shower covers the seed very effectively. The clover-seed drill is costly and is not made strong enough to stand long usage on rough land. Only about 15 acres per day can be sown with the drill. A rotary hoe with a grass-seeding attachment is just as satisfactory as the drill, costs little more, and is valuable for other uses.

A grass-seeding attachment on the grain drill is worth several times the added cost where timothy and redtop are sown with grain in the fall, or any of the heavy seeds with oats in the spring. Orchard grass and bluegrass cannot be sown thru the attachment, however. Where rather heavy seedings of the latter are to be made, the seeds can be put into the grain box and sown the same as grain. To prevent bridging, the agitator provided for sowing oats should be used, or cracked corn may be mixed with the grass seed to give more weight. This is not necessary, usually, if clover or other heavy seeds are sown with the grass seed. To get a uniform distribution of the seeds, the drill tubes are removed. A drill setting of 3 pecks on the wheat scale usually sows about 15 pounds of orchard grass seed per acre, and a setting of 2 pecks sows a bushel of bluegrass seed. This applies to well-cleaned, full-weight seed. If the seeds are trashy, the drill must be set to sow at a higher rate.

Rate of Seeding When Sown Separately

	POUNDS
Red clover	8 to 12
Alsike clover	6 to 8
Alfalfa	10 to 15
Sweet clover (unhulled)	12 to 15
Sweet clover (hulled)	8 to 10
Timothy	8 to 10
Orchard grass (pasture or hay)	15 to 20
Orchard grass (seed production)	8 to 12
Redtop (recleaned seed)	5 to 6
Redtop (chaff seed)	10 to 12
Kentucky bluegrass	12 to 15
Lespedeza	10 to 20

PASTURE AND MEADOW MIXTURES FOR KENTUCKY AND RATE OF SEEDING

Pasture Mixtures—Per Acre

	POUNDS	
1. Orchard grass	12	{ Generally useful outside the Bluegrass region where considerable permanence is desired. Useful in the Bluegrass region for semi-permanent pastures. On limed land, 3 lbs. of sweet clover seed may be added to the mixture.
Lespedeza	3-5	
Redtop (re-cleaned)	2	
2. Bluegrass	12-15	{ This is a common mixture sown in starting a bluegrass pasture. Sweet clover may be substituted for the red on limed land or a mixture of the two may be used.
Adapted red clover	5	
White clover	1/2	
3. Timothy	8	{ A low-cost temporary pasture for good land. On limed land, sweet clover may be substituted for the red and alsike or used in addition to them. Lespedeza may be used in place of the clovers.
Adapted red clover	3	
Alsike clover	2	
4. Redtop (re-cleaned)	5	{ For low, wet land.
Lespedeza	3-5	

Meadow Mixtures—Per Acre

1. Timothy	5	{ If it is desired to use the field for pasture later, bluegrass may be included in the mixture and lespedeza added when the field is to be given over to grazing.
Adapted red clover	4	
Alsike clover	1	
2. Timothy	4	{ Orchard grass may be used in place of timothy. By adding a little bluegrass seed, the field can be converted to a bluegrass pasture in a few years.
Alfalfa	8	

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