

PASTURES *in* OKLAHOMA

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EXTENSION SERVICE

Oklahoma A. and M. College

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COMBINATION RECOMMENDATIONS

The various combinations of grasses and legumes suggested in this circular are generally adapted as follows:

- No. 1 Northeast Oklahoma counties — with exception of Kentucky bluegrass, this mixture has a wide range of adaptation in the eastern half of the state.
- No. 2 Approximately ten southeastern Oklahoma counties.
- No. 3 In the limestone areas extending from McCurtain county to parts of Choctaw, Pushmataha, Marshall, Bryan, Atoka, Coal, Johnston and Pontotoc counties.
- No. 4 Can be used to improve soil anywhere Bermuda grows. Most practical in central Oklahoma, west of the pasture clover area.
- No. 5 More practical in southwest Oklahoma where soil is low in organic matter but not low in minerals.
- No. 6 Particularly adapted to northeast Oklahoma, and is successfully grown over most of the eastern half of the state.
- No. 7 Wide range of adaptation — is being used extensively throughout central Oklahoma.
- No. 8 The extreme northeastern counties for brome grass. Rye grass can be used in almost any area where alfalfa is grown.
- No. 9 Used in oat growing sections of the state, particularly in the eastern half.
- No. 10 The bluestem sections of eastern Oklahoma.
- No. 11 The tight lands of western Oklahoma.
- No. 12 The sandy lands of western Oklahoma, particularly away from Bermuda grass area.

(The above recommendations are very general. Since there is a great variation in soils even within a community, it is suggested that you discuss your pasture program with your county agent for specific recommendations suited to your own farm.)

PASTURES IN OKLAHOMA

By SAM B. DURHAM

Extension Pasture Specialist

To outline a pasture program for the state, pasture must be considered a crop, and as a crop only those combinations of legumes and grasses that are adapted to your soils and climate can be counted on for maximum production.

Variation in moisture supply is an important factor. Shallow rooting clovers and grasses which thrive in areas of heaviest rainfall are replaced by deep-rooted, drouth-resisting native species of grass in the High Plains regions. Climate, therefore, is responsible for an overlapping of plant composition in pasture. For example, in central Oklahoma buffalo grass and blue grama, the best plants in western Oklahoma oftentimes share space in pastures with the "bluestem" combination. It is also possible to find the cool weather Kentucky bluegrass and the semitropical Dallis grass in the same pasture.

Where adapted pasture crops are grown, production yields in food for livestock are commonly greater and always cheaper than for any other crop. For instance, on the Coleman ranch at Miami, four pounds of beef per animal, per day, were reported on 40 head for 97 consecutive days. Further, at the Southeast Oklahoma Pasture Fertility Research Station, Coalgate, retired farm land was converted into pasture that produced from 125 pounds of meat per acre on upland to 200 pounds per acre on bottom land the second year. Yes, pasture should be considered as a crop — one that may produce from 50 pounds to as much as 400 pounds of meat per acre, or from 500 pounds to as much as 4,000 pounds of milk per acre here in this state. In terms of corn equivalent a good pasture may be looked upon as a crop that produces food for livestock equal in value to that contained in from 9 bushels to as much as 70 bushels of corn per acre.

Other factors should not be overlooked. Generally speaking, man-made pasture is the only crop that, in so far as organic matter and nitrogen are concerned, builds fertility of soil while it makes such production records. Furthermore, pasture is a natural food, a nutritious food, one high in minerals and essential vitamins. It enables livestock to get exercise while gathering food in open air and sunshine under conditions that promote health, vigor, and quick maturity.

Yes, to get this kind of results emphasis must be placed upon the use of the right pasture combinations for your own county and, in fact, for each individual soil type on your farm. Soil variation alone

may be responsible for pastures on the same farm with entirely different plant composition. A "wonder crop" grown by your brother-in-law on the opposite side of the state or in some other states does not mean that you will get the same result with that crop on your farm. Your brother-in-law would lack results, too, if he were to try a cotton crop such as you can grow with success. Try the "wonder crop" if you wish, but do not consider it as a "sure" pasture but rather as an experiment on your part.

Any one grass or legume is good for only certain seasons, so pasture land can be much more productive if combinations are selected. Plants make their lush or tender growth at different times; hence, a combination furnishes variety, increases palatability, total forage yield and extends the grazing period.

A pasture program for the state must, therefore, be considered as a program of different pasture combinations each adapted within certain areas of the state. In an effort to show which pasture combinations are "tailor-made" within a county or group of counties, the list on Page 2 indicates where various mixtures of grasses and legumes have been most successful. It must be remembered that just because one grass such as Bermuda can be grown over most of the state, other plants which grow with Bermuda in one county will not necessarily adapt themselves to all areas where Bermuda is grown.

BERMUDA BASED PASTURES

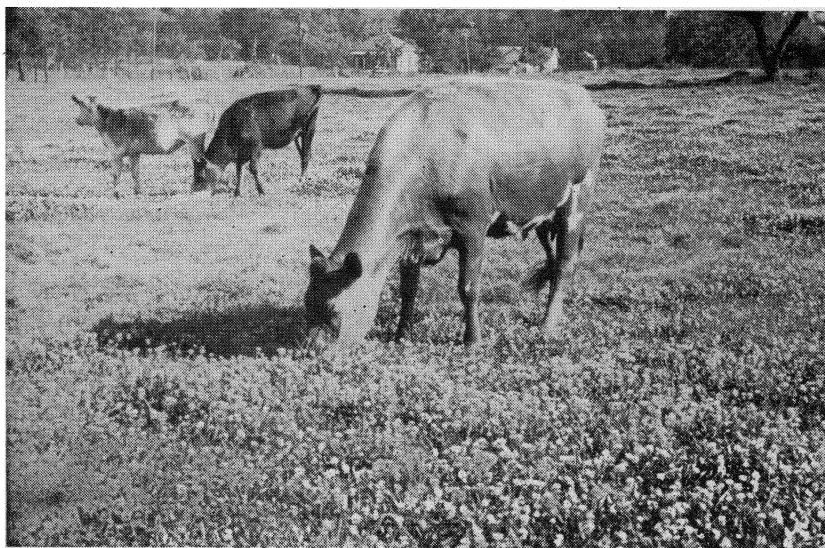
COMBINATION No. 1

*Bermuda Grass, the Yellow Hop Clovers, White Dutch Clover,
Ladino Clover, Korean Lespedeza, Kentucky Bluegrass*

Pasture combination Number 1 is adapted to Ottawa, Craig, Nowata, Delaware, Adair, Cherokee, Wagoner, Rogers, Mayes and Washington counties. There can, however, be no definite boundary beyond which one species will thrive and another fail. This same combination may be found to a lesser degree in all bordering counties, but in no case is it found growing successfully on poor land.

The steps required in establishing such a pasture on retired farm land consist of testing soils, adding limestone and phosphate when needed, and the growing of soil building plants such as vetch, sweet clover, and Korean lespedeza.

Bermuda grass is a very high producer of tasty feed when grown on fertile soil. It is a milk producer and a meat producer. On the other hand, it is a very unsatisfactory pasture plant on poor, run-down soils. Wide spaced sods, if fertilized, will spread to a stand by



A Bermuda based pasture containing yellow hop, white Dutch clover, Ladino, Korean lespedeza and Kentucky blue grass.

the time soil can be made fertile enough to produce good Bermuda. Plant Bermuda sods at 10- or as much as 25-foot intervals directly in lespedeza, sweet clover, or in vetch.

The clovers and bluegrass can be started by adding small quantities of seed to the phosphate which is applied when vetch, lespedeza, or sweet clover is planted. Time and money may be saved by spot planting this expensive seed on the Bermuda sods after they start to spread. Expense is not always the only objection to close sodding. There may be less advantage gained than is ordinarily believed. In the first place, too much is usually expected after this one job is done. Anyone who looks forward to having a good Bermuda pasture, with a stand of clovers in it, before the soil has been definitely improved is sure to be disappointed. Just remember that green,

tender Bermuda is not produced on poor land — instead, it is always the coarse, yellow kind. Too often, after sodding is completed, the soil building job is neglected.

On certain soil types the process of sodding leaves soil uneven and too loose for the successful establishment of the soil building plants. Thus good stands are not obtained and a year is lost. This is especially true under conditions where farm equipment is limited.

Think how folks fight scattered bunches of Bermuda in a garden or on fertile cropland. Visit farmers who now have hundreds of acres of good Bermuda based pasture most of which has spread from small patches already on the farm. Then think of the thousands of acres of poor producing Bermuda that has been planted for ten or more years. Certainly time and experience should have shown the way.

Certain farmers in southern sections get Bermuda started by mixing a few ounces of seed with phosphates and Korean seed when spring plantings are made. Such method, however, is not desirable where there is a potash deficiency.

It should be remembered that the valuable Korean lespedeza is not permanent in Bermuda sod. However, a heavy producing pasture like the above must, if it is to maintain high production, be treated with phosphorus at three- or four-year intervals. When phosphorus or other minerals are applied, lespedeza can usually be planted in the Bermuda, without the item of labor expense, by mixing seed with fertilizer. A farmer in Hughes county was heard to say, "Keep phosphorus in the surface inch of soil, in excess of the requirements of the Bermuda, so Korean seedlings will not starve immediately after germination takes place. Then your Korean will stay in the Bermuda just like it stays here in my pasture."

Ordinary hop clover should be planted by the "spot" method directly in Bermuda.

Big hop, on the other hand, may be planted by mixing a small amount of seed with phosphate when other fall plantings are made.

Both species of hop clover are usually found in pastures in this area. Both are valuable pasture plants. The big hop is not an "improved" strain. It grows taller, matures a week or two later, and can be established more quickly than the ordinary hop clover. Cattle prefer the ordinary hop, and it gives Bermuda and Korean lespedeza the best chance to start growth. There is very little, if any, difference in yield of forage. There is an advantage in the fact that big hop may be grown with oats or ryegrass. There is further possibility that big hop may be more dependable during backward spring months.

The Dutch and Ladino clovers very rarely thrive in all parts of the pasture they occupy the most fertile spots, then after a mulch of plant material and herd droppings accumulate on the surface, these clover plants may spread to other parts of the pasture. These clovers spread slowly until a mold starts decay of the surface mulch.

Dutch clover, and more especially the hop clovers, sometimes disappear from Bermuda after having been productive for years. The Bermuda itself may get coarse and have a yellow tinge. In such instance, Bermuda did not drive out the clovers — they starved out. The phosphorus and possibly the lime became exhausted in the surface soil. Then the Bermuda starved for nitrogen. Remember that "starvation" is a better word than "sod bound" to use in connection with such Bermuda.

COMBINATION No. 2

Bermuda Grass, Dallis Grass, the Hop Clovers, White Dutch Clover, Korean Lespedeza, Other Lespedezas

Pasture combination Number 2, is adapted to localities in south-eastern Oklahoma. Pastures with good Dallis grass included may be found as far north as Sequoyah county, and as far west in the region as Pittsburg and Marshall counties. This is probably the highest yielding combination grown in the state. It is established essentially in the same manner as Number 1. Where climate is most favorable, small amounts of Dallis grass seed may be mixed with phosphate and planted along with lespedeza. Dallis spreads slowly but will in time give a good account of itself, especially in protected places, after soils have been made fertile.

COMBINATION No. 3

Bermuda Grass, Bur Clover, Black Medic, White Dutch Clover, the Lespedezas, Hop Clover

Number 3 is recommended for soils in the limestone area which extends through McCurtain, Choctaw, Bryan, and Marshall counties and north into Murray, Coal, and bordering counties. Bur and medic are likely to be the dominant clovers in this assortment, and unless they are kept pastured down in May and June, they may damage the stand of lespedeza and sometimes Bermuda. However, when given a chance the hop and the white Dutch clover usually account for themselves somewhere in the pasture. There is an advantage in planting all species. Some years weather is favorable for one species and unfavorable for others.

Dallis grass might well be included here, but it should be planted only on the low, protected and most fertile soils.

Bur clover is often ready to pasture in February. It is a valuable plant, but is usually established most economically by spreading burs mixed with manure on the Bermuda sod. Bur clover and black medic are due to account for themselves in Bermuda in localities farther west in southern Oklahoma where a mulch is allowed to accumulate on the surface and where minerals in excess of the needs of Bermuda are kept in the surface inch of soil.

COMBINATION No. 4

Bermuda Grass and Vetch

The growing of Bermuda grass and vetch together has become popular in central Oklahoma at points where the winter annual clovers and white Dutch clover have not become generally established. This practice should become widespread. Bermuda growing on lands low in minerals anywhere in the state can be changed into valuable pasture by adding limestone and phosphate and growing vetch to improve the nitrogen content of the soil.

The ordinary procedure is to use a disc or a one-way to prepare the soil for planting. Vetch seed is mixed with phosphate and planted with a drill or by other available methods. Twenty pounds of vetch per acre is usually seeded. In a part of this region Korean lespedeza has done well in Bermuda after the vetch stand has thinned out.

It has been fairly well determined on the Wentz farm in Kay county, on the Carter farm in Payne county, on the Rogers farm in Logan county, and on many other farms in central Oklahoma, that attention toward building a surface mulch, and in keeping minerals in the surface inch of soil are more important factors in relation to the successful growth of this great summer legume than the relatively small difference in the natural moisture supply between this section and points farther east. As a matter of fact, there is evidence supporting the idea that management, along with the naturally deeper and more fertile soil in the central section, may more than compensate for the difference in annual rainfall.

COMBINATION No. 5

Bermuda Grass and Sweet Clover

The thousands of acres of poor producing Bermuda in southwestern Oklahoma have few friends among the cattlemen and the dairymen. This is with little wonder when one realizes that folks hold prejudice against Bermuda. They admit it is good to hold the soil to the earth, that it will grow, after a fashion, on soil that is too low in fertility for the successful growth of any farm crop. But these critics say, livestock do not like its tough, stemmy forage. This complaint should be made against the soil, not against the plant.

Remember, most grasses won't grow at all on such poor soil. Bermuda gives you a chance to get forage started, thus keeping this land from being a dust bowl. When considered as a plant to

hold the soil while fertility is being built, and then judged for its forage palatability only when grown on good soil, Bermuda is hard to beat.

Farmers working in cooperation with county agents in Greer, Jackson, and other counties are successfully converting these poor Bermuda lands into valuable pasture. The procedure is simple and cheap. Sweet clover, at the rate of 8-10 pounds per acre, is planted in the spring or any time after November either directly in the Bermuda or after the Bermuda has been turned with a disc or a plow. The second year crop is then turned under with the Bermuda. The



A luxuriant growth of rye grass and lespedeza.

grass promptly benefits from the improved water holding power of the soil and from the added nitrogen. Growth of the forage remains green and tender throughout most of the summer. In the same counties farmers are also beginning to utilize combination Number 4. They plant part of the area in vetch in the fall and part in sweet clover in spring. After the second or third year, some demonstrators have added alfalfa and pastured it with hogs.

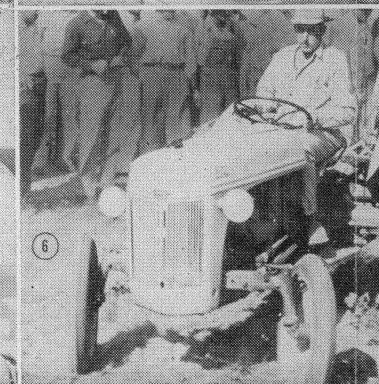
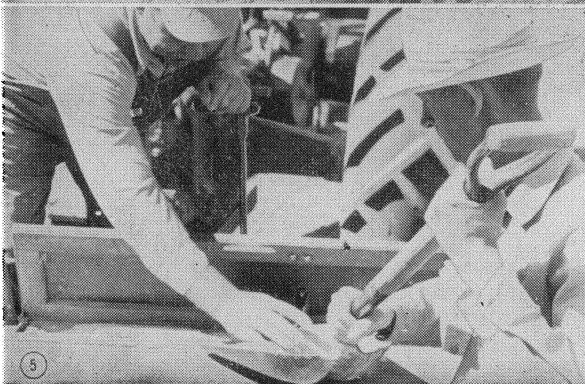
Special mention should be made of Madrid sweet clover. Here again, by keeping a supply of mineral on the surface inch of soil, farmers are learning how to keep this valuable sweet clover in Bermuda grass. Because it matures earlier and does not form so dense a shade, it is more practical to grow this yellow sweet clover in a combination of pasture plants.

COMBINATION No. 6
Korean Lespedeza and Rye Grass

A long-time pasture period and high production is being obtained from rye grass and Korean lespedeza grown together on fertile lands in Tulsa, Washington, Okmulgee, and other counties in the surrounding area. The usual method is to seed twenty pounds per acre of Korean lespedeza on thin land, and add limestone and phosphorus. Seed rye grass on the more fertile lands. After the Korean has become

SEVEN STEPS IN BUILDING

- Step 1—Applying limestone is the first step in building pastures when soil tests show a deficiency of this element.
- Step 2—The limestone should be well mixed with the soil.
- Step 3—All legumes should be in the pasture (such as vetch, etc.)

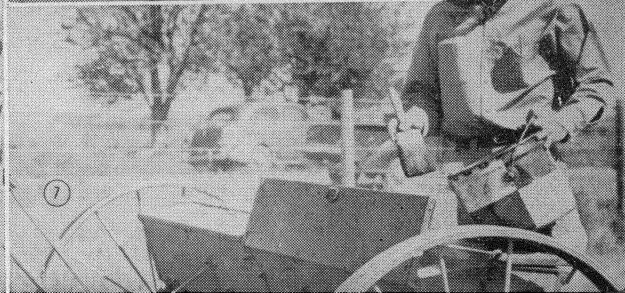
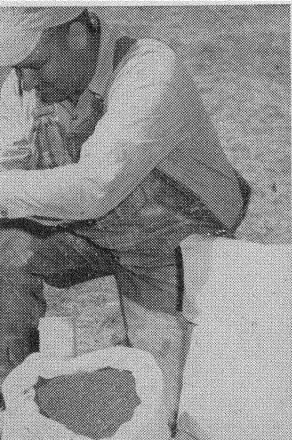


productive and the land has been improved, twenty to twenty-five pounds of rye grass is planted in the lespedeza. This has been a more satisfactory practice than to plant lespedeza in the rye grass in the spring. This program is used by farmers who want pasture quickly. Some do not want Bermuda on land that they may in the future wish to use for cultivated crops. The program requires careful management. The rye grass must be kept grazed off enough to allow the lespedeza to thrive. Yet the rye grass must be allowed to seed. A common practice has been to cover rye grass seed by light discing

NG A GOOD PASTURE

first step in building pas-
y need.
worked into the surface soil.
inoculated (clovers, alfalfa,

- Step 4—Mixing vetch with phosphate before planting.
- Step 5—A combination drill is a good tool. The grain box can be used for fertilizer without damage.
- Step 6—Seeding the mixture.
- Step 7—The drill should be carefully cleaned before using.



in August or early September. This practice is being followed without materially damaging the Korean lespedeza.

COMBINATION No. 7

Vetch and Rye Grass, or Rye, or Winter Oats

The growing of rye grass and vetch together for winter and spring pasture has become popular in central Oklahoma. Some very outstanding demonstrations have been established in Kingfisher county,



Vetch and rye grass grow well together.

and the practice has spread from the Kansas border to Jefferson county. By utilizing Sudan grass and buffalo grass during the summer months, some of the demonstrators have good pasture available ten months during the year. The practice is to plant rye with vetch on the sandy land. A limited number of stock are carried the first year, and rye is allowed to seed along with the vetch.

It has become the practice to add rye grass or rye grass and winter oats to the vetch the second or third year.

COMBINATION No. 8

Ryegrass or Brome and Alfalfa

Much attention has been given in Oklahoma to rye grass or brome with alfalfa. Most of the discussion has been on brome while most of the results have been with the rye grass and alfalfa combination. Brome grass is grown in Kansas and Nebraska with good results, which has interested many farmers along the northern Oklahoma border. Although some success has been had in good years, the

facts still stand that brome is a northern grass, sensitive to hot winds, dry air, and intense heat.

On the other hand, those who have used rye grass with the alfalfa have obtained excellent results. The Coleman ranch in Ottawa county and farms in Tulsa county have carried cattle throughout the winter without any trouble being reported. In the summer both crops are allowed to seed and a disc can be used to re-establish the rye grass stand.

COMBINATION No. 9

Korean Lespedeza and Spring Planted Oats

The growing of Korean lespedeza with spring planted oats has become an established practice in the oat growing sections of north-eastern Oklahoma. Where phosphate is used, oat yields have increased and the lespedeza growth is more luxuriant year after year. Tillage for seedbed preparation is handled in a way that lespedeza seed is left on or near the surface of the soil. On one demonstration in Nowata county, a good stand of lespedeza has been maintained in oats, on the same land, for eleven years.

Demonstrators' statements of satisfactory results from lespedeza pasture after oats have been harvested are in line with actual results obtained at the Missouri Experiment Station where from 60 to 85 pounds of meat have been produced per acre. This is an especially good practice in northeast Oklahoma. After the lush growth of the bluestem is past, breeding herds can be turned on lespedeza and kept there throughout the dry summer months. Farmers claim that cattle gain, rather than lose, weight during the hot, dry period.

COMBINATION No. 10

Little Bluestem, Big Bluestem, Indian Grass, Switchgrass

The above "bluestem" combination won early historical fame for Oklahoma as a cattle country. Today it is largely responsible for cattle production in "The Osage" and "Hereford Heaven" sections of the state. Thousands of acres of timbered lands would be almost worthless if they were deprived of this grass. Three of these species grow with blue grama in pastures in western Oklahoma where they supply an early growth of green forage before grammas and most other western grasses begin their growth.

Officials in charge of the Red Plains Conservation Experiment Station at Guthrie made a study of their regrassed lands in that immediate locality and elsewhere. One seven-year-old regrassed area had been developed on worn-out wheat land. They also made a study of the pastures growing on uplands. They determined that for year after year cattle left bunches of little bluestem untouched. Then by using a complete fertilizer they increased the production of meat per acre from 41 to 85 pounds.

Results obtained on the farm of the late L. H. Wentz showed little or no benefit to bluestem, either in yield or in palatability,

from the addition of liberal amounts of nitrogen either in the form of ammonium nitrate or ammonium sulphate. These same results have been reported and published by D. A. Savage, U. S. Southern Great Plains Field Station, Woodward, with bluestem farther west and with the different native grasses.

It should be noted that bluestem following vetch or sweet clover on the Wentz farm was grazed close to the ground, while grass on adjoining regrassed farm land was untouched. The dark green color characterizing bluestem was present only where legumes preceded bluestem.

Why should bluestem be considered a poor land crop? It was the crop that grew on virgin soil. If experience is to be a guide, it is evident that regrassing of farm lands with bluestem combinations has been a failure in the great majority of instances unless legumes have been grown and mineral deficiencies corrected before plantings were made. There is usually promise and encouragement for a time. Then the stock show their indifference for the grass. Finally, the better grass begins to fade away and is replaced by such grasses as silverbeard and other less valuable species. It might be well to keep in mind the fact that the eastern strain and the western strain of little bluestem are very different in appearance and type. The western strain has been grown successfully in meadows on the good pasture lands of Craig county. On the other hand, it is a very rare instance that the eastern strain is found growing farther west than the eastern half of the state.

Fire control, mowing and proper grazing are good practices, but will not entirely solve this problem. In this connection those who believe that the native grasses can obtain plant food deep in the earth would do well to think about the real network of roots that must have held the surface soil. And furthermore, those who now believe that the bluestem requires little nitrogen should just take time to note that the bluestem now growing on retired farm land will not hide a rabbit nearly so well as the old time grass hid a deer or a cow.

Naturally, the questions arise: Should retired farm land low in mineral content be reseeded to bluestem in areas where Bermuda grass will grow? Should an attempt be made to replenish the mineral supply and plant more native grass on depleted bluestem pastures where Korean lespedeza will grow?

Under good management the very best bluestem pastures carry no more than one animal on six acres. If a steer gains 300 pounds during the grazing season, that is 50 pounds of meat per acre.

At the Coalgate Station two-year-old Bermuda based pasture produced 125 to 200 pounds of gain on steers per acre.

Korean lespedeza grown alone has produced as much as 200 pounds of meat per acre in the bordering state of Missouri.

Therefore, as a part of the pasture program, instead of trying to go back to native grass the following recommendations are made:

1. For permanent pasture — establish some kind of Bermuda based pasture instead of native grass on all mineral deficient, retired farm land in areas where Bermuda will grow.
2. Correct mineral deficiencies by adding limestone and phosphate and plant Korean lespedeza together with other adaptable clovers in depleted bluestem pastures and meadows of the Eastern Prairie section. This might be considered a method of restoring bluestem.

COMBINATION No. 11

Buffalo Grass and Blue Grama

The above listed grasses are said by D. A. Savage, Station Superintendent, Southern Great Plains Field Station, Woodward, to be responsible for at least three fourths of all beef production in the western half of Oklahoma. They are suited for tight soils. They are perennials, and can be re-established on such retired farm lands anywhere in western Oklahoma.

Judging from past experiences and past results, there is abundant evidence that in most localities soil improvement — the addition of minerals and the growing of legumes — is as much an essential factor in connection with successful re-establishing these grasses as it is with the bluestem combinations. For example, on the Ferris farm in Dewey county yellow sweet clover was grown on one pasture for three years before native grasses were seeded. Several hundred acres of adjoining land were regrassed later with the same combination — buffalo grass, blue grama, side-oats grama and some of the bluestems — without soil improvement. For a time there was no very great difference in results of the two areas. Today, livestock show very definite preference for the grass where clover was grown and on the other area the buffalo and blue grama are gradually yielding to less valuable grasses.

COMBINATION No. 12

Blue Grama, Side-Oats Grama, Sand Lovegrass, Little Bluestem, Indian Grass, Sand Bluestem

This combination of grasses is prominent in pastures located in the sandy soil areas of western Oklahoma counties. Sandy land pastures are sometimes reinforced in this region by Canada wild-rye and Texas bluegrass, to supply green forage and protein during winter months.

Regrassing of retired farm lands in this section is practical. A wealth of information is available in published reports of work done at the Southern Great Plains Field Station at Woodward. Detailed information on regrassing with various native grass combinations can be had from your county agent.

OTHER PLANTS

The above combinations include the highest yielding, most recognized plants included in a pasture program adapted to each locality

of the state. Yet, other plants must be considered briefly because in certain limited localities they are playing a big part.

Wheat can be utilized for cool weather pastures anywhere in the state, as can sweet clover. Johnson grass can be utilized to insure summer pasture. Johnson grass supplies a lot of warm weather pasture in certain sections of the state.

Orchard grass on loose soils has a place in timbered areas of northeastern counties. Timothy, crimson clover, and red clover grow to a limited extent in the northeast section of the state.

Redtop and alsike clover are grown together on poorly drained lands to a very limited extent. In most instances after mineral deficiencies are corrected, ladino or white Dutch clover and rye grass will be more profitable on many farms where redtop and alsike are now being grown.

It is hard to consider the "Japanese type" lespedezas — Kobe, common, or Tennessee 76 — without stressing mineral deficient soil. It is fortunate, for the present, that this species and its different strains will thrive on soils too low in minerals for the successful growth of Korean lespedeza. It takes time to lime the soil. Like Bermuda, these lespedezas will grow on deficient soils. The mineral content of the soil, however, may be such that slow maturity and other ailments show up in livestock kept on such pasture. Trouble of this nature usually disappears when lime and phosphorus are supplied. These lespedezas mature later in the season than Korean and because they are more likely to be green in October may well be included along with Korean in pasture combinations in several southeastern Oklahoma counties.

HELPFUL HINTS IN DEVELOPING PASTURES

Don't waste time and money by planting seed of any of the permanent pasture plants on loosely tilled soil. An ordinary alfalfa seedbed is entirely too loose for pasture clovers and grasses.

Leave dead plants on the surface. Don't use a plow. Disc lightly. Make use of the cover and the organic matter left by wire-grass. Seedbed preparation may well consist of covering lime with a disc several weeks before planting, or, in many cases, a drill run on the contour is all the soil preparation advisable. Use a drill if one is available. Follow the drill with a packer or a homemade roller when a disc has been used. Best stands, best growth, and the least amount of damage from freeze or drouth are likely to be where fall plantings are made with a drill on a very firm seedbed.

Note the delicate fibrous roots of day-old plants. Compare them with those of an oat seedling. Learn why young pasture plants die. Tilled soil is not a natural seedbed for permanent pasture plants.

Don't expect a stand of all plants in a combination for two or three years. Pastures are not developed overnight. Be patient. Let permanent pasture plants spread as soil building progresses.

Plant sweet clover or Korean lespedeza in the spring. Then on the same land go ahead with the vetch, rye grass, and clovers in

September. Or, choose the other way — plant the lespedeza directly in the fall planted combination. Use judgment, but don't be afraid of damage resulting from a drill.

Save money. The ordinary two pounds of big hop clover may cost three dollars. This two pounds means about 80 seeds per square foot. It is just about the same thing with white Dutch, Ladino, Bermuda, and Dallis grass.

Cut the cost. Plant one-fourth pound and distribute ten seeds per square foot. No matter how much seed is used, these plants take hold in scattered patches or bunches and apparently "bide their time" in spreading.

Do several jobs at one time. Get an even distribution of Kentucky bluegrass, white Dutch clover, big hop clover, Ladino clover, vetch, and rye grass by mixing seed with phosphate no matter how it is to be applied. Don't waste seed. Don't use the words "broadcasting" or "sowing." Use one of the following methods — the one most practical for you:

1. A combination drill.
2. Most types of an ordinary drill can be used if certain precautions are taken to prevent damage to working parts. See your county agent.
3. Box spreader (with seed and fertilizer mixed), followed by a weighted disc run straight.
4. Any kind of spreader followed by disc run straight, an "A" harrow and a brush drag.

Study the pictures shown on pages 10 and 11.

Plant Bermuda sod at wide spaced intervals, fertilize, and then "spot" plant them with little hop in September.

Feed the young plant, get "stands" when you plant. For example, if sweet clover is to be a part of the plant combination on thin land, the addition of 2 pounds of nitrogen (7 pounds of ammonium nitrate) to the other fertilizer will oftentimes insure a good stand where lime has been applied. Without such precaution stands are not dependable, particularly in eastern Oklahoma.

Korean lespedeza is more likely to withstand competition in early summer and hold on and seed through drouth, if seed is mixed with phosphorus in a form immediately available and with other phosphorus that becomes available month by month as the plant uses it. Example, 50 pounds of superphosphate mixed with 300 pounds of rock phosphate.

Make better use of Bermuda seed. Note growth of Bermuda seedlings in places where a tree has been burned and how such plants usually live through the first winter. Then on thin land low in potash, note how the addition of 15 to 20 pounds of muriate of potash will increase the number of permanent Bermuda plants when one-quarter pound of Bermuda seed is planted along with Korean lespedeza.

Phosphorus is essential in the surface inch of soil, if seedlings of clovers, or other legumes like lespedeza or sweet clover, are to

germinate and form volunteer stands year after year. It is more practical to use a slowly available form of phosphorus, like rock phosphate, in keeping this supply on the surface than it is to make frequent applications of the immediate soluble form. It is quite possible that this one factor should receive more attention in central Oklahoma than in the eastern section where iron phosphate, aluminum phosphate, and other so-called "coarse" forms of this mineral may be used by some of these plants.

Again, don't forget the value of a mulch. Remember that row crops are tilled again and again throughout summer mainly for the purpose of furnishing a soil mulch on the surface to save moisture. This cannot be done in the case of pasture crops. Instead, a surface mulch must be allowed to form, if moisture is to be conserved.

After a *highly productive bermuda based pasture has once been established* — one that will carry a cow per acre — farmers will find that then is the time when it is practical and when it *really pays* to use from two hundred to four hundred pounds of *mixed fertilizer each year* and carry from two to three cows per acre.

Then and only then can we boast of really high productions comparable to that obtained in other states and countries.

INOCULATION PAYS ANYWHERE

Vetch fails unless inoculation becomes effective, as does lespedeza in central or western areas. All clover seedlings show a darker, more vigorous, early growth when their particular bacteria is plastered (stuck) to the seed. Be sure to inoculate all legume seed.



Farmers studying a pasture demonstration in eastern Oklahoma.

Buy the correct inoculant for each clover. Don't try to get "small-pox" with the "typhoid" germ.

The germ is alive. It can be quickly killed by sunshine. In applying inoculant use water containing library paste or an ordinary starch

solution to stick the germ to the seed. Plant as soon as possible after inoculation.

It should be noted that this circular has not attempted to set forth more than a few general principles that have been successfully used by farmers in building pastures. Further information on plant character, methods of planting, management as pertains to proper grazing, mowing, brush eradication, harvesting and cleaning seed and soil building can be had by contacting your county agent.

THE COVER

It pays to grow sweet clover, vetch or Korean lespedeza with rye grass to build the soil before Bermuda and other permanent pasture grasses are planted. The pasture will usually pay its way.



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