10-1-1944

Farm Science Reporter Vol. 5 No. 4

Iowa Agricultural Experiment Station

Iowa Agricultural Extension Service

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Recommended Citation

and (1944) "Farm Science Reporter Vol. 5 No. 4," Farm Science Reporter: Vol. 5 : No. 4 , Article 1.
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The Authors

Claude K. Shedd is an agricultural engineer of the United States Department of Agriculture who is stationed at Ames, Iowa. For the past year and a half he has been concerned with grain storage studies at Ames and for the 12 preceding years he was making a study of corn machinery, in cooperation with the Iowa Station.

Mr. Shedd was once a Nebraska “farm boy.” He graduated from the University of Nebraska in agriculture and later from Iowa State College in agricultural engineering. He has been a member of the agricultural engineering staffs of Iowa State College and the University of Nebraska, had charge of tractor testing for the University of Nebraska at one time and was in extension work for Kansas State College and the University of Missouri. He also operated a farm machinery business for 3 years. He has been with the USDA since 1930, first in charge of soil erosion and then at Ames.

Rex Beresford—one of our Iowa “farm boys.” Rex has been over Iowa for so many years in extension work that undoubtedly most of you know him, but perhaps some of you didn’t know that he was reared on a Benton County farm, or that he spent a year in editorial work with the late Clifford Gregory.

How long has Rex headed the Iowa State College animal husbandry extension work? Since 1916. But from 1912 to 1916 he was with the Iowa Beef Producers’ Association so that he became acquainted with many people during that period. He graduated from Iowa State College in 1911.

Horace B. Cheney is a Mills County “product.” He graduated from Iowa State College in agronomy in 1935, spent 2 years in soil conservation soil survey work in Missouri, Iowa and Wisconsin, 2½ years in graduate work at the University of Ohio where he received a Ph.D. degree in agronomy. While in Ohio his problem was soil fertility. Horace came to Iowa State in 1942, half-time Station and half-time Extension work. He is now doing full-time Extension work in agronomy.

Marshall Evans is research associate in agronomy at the Iowa Station, working on forage crops. He has been giving special attention to reed canary grass. “I take a special interest in reed canary grass,” he says, “for it is one of our important crops in northwestern Minnesota on my home farm.” In that area they have some boggy pastures that are of little value unless a crop such as reed canary can be found that will stand the wet land.

E. P. Sylwester is another Minnesota farm-reared “boy” who has drifted or perhaps “hiked” into Iowa. He comes from near Winthrop, Minnesota. He graduated from St. Olaf College at Northfield, Minn., and holds a master’s degree from Iowa State College.

“Dutch” Sylwester spent 3 years as seed analyst in the Iowa State College Seed laboratory, 3 years with C.C.C. camps as forest pathologist and has been with the Iowa State College Extension Service as plant pathologist and botanist since 1936.

Maurice L. Peterson—he’s from a Nebraska farm, graduated at the University of Nebraska and spent 2 years at Kansas State College in an alfalfa study. Then he spent some time in Oklahoma with the Bureau of Plant Industry at the Great Plains Field Station in grass breeding studies. Since January, 1943, he has been at Iowa State College as half-time Station and half-time Extension worker. His particular study is pastures and forage. Much of his time is spent at the Pasture Improvement Farm, Albia.

Belle Lowe is research professor of foods and nutrition at the Iowa Station. Miss Lowe is known far beyond the borders of Iowa for her research work and writings. She is the author of a textbook used in many of the home economics schools of the country. You can always find something of interest going on in her laboratories at Iowa State College.

If it hadn’t been for the fine work of H. D. Hughes, head of farm crops at the Iowa Station, you probably wouldn’t have had an October Farm Science Reporter. Professor Hughes, though many years off the farm, has never lost contact with the Iowa farmers and their crop problems. He knows what their problems are and how to discuss them with the farmers. Fortunately he has taken a very real interest in Farm Science Reporter from its “birth” in 1940.

THIS TO SOUTHERN IOWA

In this issue we have devoted much space to some crops that are coming into southern Iowa agriculture and promise to play a still more important part in the future. If you happen to live in that region of Iowa, perhaps you would like to show this issue to your neighbors who might be interested. We are anxious for all to have the benefit of these discussions who want them.

About That Corn Borer Story

In the July issue we promised that we were going to bring you an up-to-date picture of the corn borer situation in Iowa. We could not get a report for this issue on the amount of damage this year and so decided to wait until January. But we shall probably all be learning about corn borers and how to handle them for several years. If the worms would just stay “put” that would help. Instead, they started out as one-generation fellows and now they have “hopped” it up to two in a season, which makes some problems that were never faced in the East.

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FARM SCIENCE REPORTER

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Published in January, April, July and October by the Iowa Agri¬cultural Experiment Station and the Iowa Agricultural Extension Service. Address all communications to Farm Science Reporter, Ag. Annex, Iowa State College, Ames, Iowa.

If you fill up the driveway of your crib, you'd better make pretty sure that the corn is fully mature and dry or you are likely to have some spoiled corn. Instead of the two 8-foot cribs, you have one that's 26 feet.

By H. D. HUGHES, C. K. SHEDD AND REX BERESFORD

Many Iowa farms have a lot of soft corn, and most farms have corn with high moisture content to be taken care of this fall. The wet spring and the necessity of replanting many fields made this unavoidable. The problem now is how best to handle it.

Soft corn need not be a total loss. A pound of dry matter from soft corn that has not spoiled or molded is about equal in feeding value to that from sound corn. But it makes better feed for cattle than hogs because hogs can't hold enough of it to do their best. The most value can be obtained from immature corn by putting it in a silo or feeding it as fodder, but whatever could be done in handling in these ways has already been done.

There is still the possibility of snapping it and making ear corn silage out of it. Water may need to be added to insure that it is moist enough to keep. What we are chiefly concerned with now is how to handle soft corn which must be handled in the usual way —shucked or picked from the standing stalks in the field. The same things that apply to soft corn apply to mature corn with a high moisture content, but to a somewhat less degree.

Not a New Problem

Iowa farmers have had soft corn before and have found ways of handling it. The agricultural engineers, the agronomists and the animal husbandry men of the Experiment Station here at Ames also have worked on the problem from different angles.

Many farmers who have stored corn for years can tell when it is safe to crib, but the safest procedure is to take a representative sample to the AAA office or to the local elevator if it is equipped with one of the electric moisture testers.

In taking samples for a moisture test the best procedure is to use a screw driver to shell a couple of rows of kernels from each of 15 to 25 representative ears. Take the ears from those parts of the field where the corn is inclined to be late. When the corn in the bottomland is all right, there is no need to worry about the corn from other parts of the field.

Ear corn is not safe to go into the ordinary crib when it has over 20 percent of moisture in the grain. At this time the cob will contain from 30 to 40 percent of moisture. With narrow cribs and favorable drying conditions, corn with as much as 25 percent of grain moisture as it came out of the field has been cribbed with little spoilage. But for safety 20 percent should be the aim.

Most of us have had some first-hand experience in handling soft corn. In 1915 about two-thirds of the Iowa crop was reported as "soft" and in 1917, half the crop. The year 1924 was, if anything, worse. "Soft corn" is generally understood to mean corn which has been killed, usually by frost, before it has fully matured. When such corn is dry it is relatively light and chaffy.

Don't Crib as Usual

Corn with high moisture content will dry faster on the stalk in the field than in the crib. Such corn should be left until the very last to harvest. Get out the more mature fields first if there is any choice.

If some cribs are narrower than
Removable sections of ventilators can be set in between the bracing of a crib. If they extend clear to the top of the corn they permit more airing. High moisture corn requires lots of ventilation.

Others, put the soft corn in the narrowest cribs. If some cribs are better located than others to get good wind pressure, give the soft corn this advantage. Sort out the very soft ears at the elevator if you would do all you can to prevent spoilage in the crib.

See that as few husks and as little shelled corn as possible go into the crib. Put a screen on the elevator to get the shelled corn out. Move the delivery spout of the elevator frequently in order to avoid the accumulation of shelled corn and husks in certain spots. And adjust the picker to get off the maximum amount of husks and silks. Pickers equipped with a fan to blow out loose husks and silks have a distinct advantage in handling high moisture corn. It is impossible for any considerable amount of air to move through tightly packed corn that has a lot of shelled grain, silks and husks. To get the moisture out and keep the corn from heating and molding, air currents must move through the crib.

Need Special Ventilators

Of prime importance in handling soft corn is the use of special ventilators. A ventilator down the middle of the crib practically makes two narrow cribs out of one wide one.

The "A" type ventilator has been particularly popular throughout the Corn Belt. These ventilators, constructed in sections which are easy to handle in getting them in and out, provide good ventilation in that part of the crib where the corn is most likely to spoil—in the center at the bottom. The "A" type ventilators are usually made 2 to 3 feet wide at the bottom and 6 to 8 feet in height. They should be built narrow enough to go through the crib door. These are framed from 2x4's with 1-inch material for the slats.

Another type of ventilator that has given good results but which is more difficult to handle is made with slats on 2x4's or 2x6's set upright down the center of the crib and extending from the floor to the top of the corn. Ventilators built with 1x6 material, spaced 14" apart and covered with picket cribbing cost somewhat less, are lighter in weight and have proved satisfactory (see illustration at left). This type of ventilator has an advantage over the "A" ventilators in cribs in which the depth of the corn is greater than can be adequately ventilated with the "A" type.

Square box ventilators placed vertically in the crib at intervals of about 4 feet also have been used. These usually are made of 1x6 lumber with cracks 2 or 3 inches wide at each corner.

Forced Air Drying

No matter how wet corn may be it can be dried by forcing heated air through it. Air at 160° F. can carry 8 times as much water as the same amount of air at 80° F., or 15 times as much as air at 60° F.

In some cases the shelling trench built into the floor of modern cribs has been used successfully. One end of the trench is stopped up securely and air blown in at the other. The air moves up through the corn from the slatted covering of the shelling trench. In cribs not provided with shelling trenches the floor has been covered with building paper to make it airtight and ventilators placed down the center the full length of the crib, through which the air is blown. In some cases "A" type ventilators have been used and in others special air ducts have been built on the floor with spaced vents.
Trials with Heated Air

In the fall and winter of 1917-18 cribs of soft corn were dried in the vicinity of Ames using forced ventilation with heated air, at a cost for fuel and power of from 1 to 6 cents per bushel.

In a crib 48 feet in length, 8 feet wide, and 8 feet deep, on the farm of Carl Rosenfeld, corn carrying an average of 37 percent of moisture in the grain was reduced to 18 percent at a fuel and power cost of 6 cents per bushel. Another crib in which the moisture content of the grain was over 30 percent was reduced to 13 percent at a fuel and power cost of 2 cents per bushel. The temperatures during the drying period ranged from 8 to 23 above zero. A crib was dried in February, 1918, when the temperature averaged 10 below zero, at a cost of 6 ½ cents for fuel and power.

In the spring of 1918 a crib 36 feet long with corn 20 feet in depth was dried at a cost of fuel and power of 1 cent per bushel on the farm of Adam Middleton near Eagle Grove. This crib was equipped with a shelling trench in the concrete floor. Heated air was blown into this crib night and day for a week. The shelled corn from this crib was sold at a premium. The corn in the other side of this double crib, which was not dried, molded badly and was fed. A blower, such as is used on ensilage cutters or threshing machines, can be used satisfactorily though it is not as efficient as the so-called multi-vane fans, such as are used in seed corn drying plants or dwelling houses. The blower usually has been installed between the furnace and the crib.

Salting Soft Corn

The question of using salt on soft corn has had consideration and in some soft corn years in the past large amounts have been used. Tests at Ames a number of years ago indicated that the use of salt might be expected to reduce somewhat the spoilage of soft corn. About 1 pound of salt to 100 pounds of ear corn is as much as should be added to corn for feeding. It is recommended that special ventilators be used in cribs regardless of whether salt is used or not. Salt will not make good corn out of poor corn but along with proper ventilation apparently it will tend to reduce heating and molding. The salt should be well distributed through the ear corn.

Feed Soft Corn Early

In corn which is inclined to be soft there are likely to be some ears which are very immature and may be said to be wet. The greater the extent to which such ears can be picked from the elevator as the corn is on the way to the crib, the less the danger of spoilage. Such very soft ears should be fed as promptly as possible, together with the shelled corn screened out as the corn is being elevated.

Utilizing Soft Corn

In soft corn years with corn varying considerably in moisture the premium paid for the most mature, hard corn usually is rather large. Those who handle corn with a high moisture content must take considerable risk, and the price paid for “sample grade” corn is in proportion. When the moisture content of corn is excessively high it is well to shell in the frozen condition and get it to market before warm weather comes on. Following this procedure the loss from spoilage is likely to be kept at the minimum. Terminal elevators are equipped to dry shelled corn.

The most logical method of disposing of soft corn is in the feedlot. Probably soft corn should be fed up first while its quality is still good. It is well to leave soft corn in the field until cold weather, or to be picked as it is fed. It will keep and dry out better on the stalks than it will in any crib.
WE ARE IN NEED of a grass that is suitable for gully control and for growing in waterways. Reed canary grass seems to be the answer.

"Reed canary grass is the best grass we have found for controlling erosion in gullies and for grassed waterways," Paul Strickler and R. E. ("Bob") Bear, Appanoose County farmers living near Centerville recently told us when we visited their farms. And these men should be able to pass pretty good judgment on its value, for Paul Strickler got his start with reed canary grass 18 years ago and has been using it in gully control 9 years. Bob Bear likewise has had several years of experience in its use.

Other farmers who have given this grass a trial are coming to the same conclusion as Strickler and Bear. We believe that reed canary grass will be found of value on many Iowa farms, providing a means for controlling gullies with a minimum expenditure of labor. The grass fortunately has high value, too, for pasturage and hay.

The control of gullies has become one of the most important problems on many Iowa farms because no method of control has seemed to be economically feasible. Hundreds of Iowa farmers have seen one field after another thrown out of cultivation because of gullies forming. Any heavy rain may start forming gullies on the average sloping Iowa farm.

In one county in western Iowa over 3,800 major active gullies have been reported. This does not include hundreds of small gullies recently formed which are rapidly becoming larger. The large acreage of row cultivated crops in Iowa, which has been increased in the war emergency, has contributed to the seriousness of the situation. The high intensity rains which have occurred over most of the state within the past few months have added to our difficulties.

Grassed waterways are a necessary part of any good soil conserving program. They are essential to the success of contouring, strip cropping and terracing. They provide a means for disposing of excess run-off from fields without gully formation. But the establishment of a good sod cover in these waterways is often a difficult problem. Reed canary grass seems to be the answer.
Differs in Growth Habits

You may ask: “Why is this grass better for erosion control than some of the grasses we have been growing for hay and pastures, such as brome grass, timothy and Kentucky bluegrass? How are its habits of growth different?”

The vigorous growth of reed canary grass, its rapid root extension, the ease and rapidity with which a sod cover can be established from small root-stock portions and its ability to withstand silting and flooding make it a very valuable grass for gully control and for use in grassed waterways. This is not based on theory but on results obtained under practical conditions on Iowa farms.

Reed canary grass is a wet-land grass. It is native to Iowa. When growing wild it was always found in low, poorly drained areas. It will grow and thrive where water covers the surface through much of the year. On peat bogs and seemingly bottomless quagmires where animals bog down or do not dare to venture, the seeding of reed canary grass has resulted in a firm, strong sod over which horses and mowers and hay wagons pass with safety. Such is the strength of its sod.

But strange and almost unbelievable as it seems, we have found it to be one of our most drought-resistant grasses when planted on upland soils. In the heat and drouth years of 1934 and 1936 it was the only grass that remained green through the entire summer on our experimental fields.

So vigorous is its growth that a small portion of underground root-stock placed at intervals of 2½ feet apart has resulted in a solidly sodded surface at the end of the second year. This may make you wonder, “If I plant reed canary grass, is it likely to become a weed pest—hard to kill out?” Our answer is “No.” We have had many seedings of it under different soil conditions through a period of more than 20 years. We have always found that ordinary plowing and cultivation will completely eradicate it when this is what we want.

Reed canary grass makes an erect growth, often growing 4 to 6 feet high. The leaves are wide and seem to be rather coarse, causing one to wonder whether it has much value for pasture or hay. We have had it under observation as pasture for nearly 20 years, and records are available where it has continued under grazing for nearly 40 years. Grazing animals usually leave a stubble of 6 to 10 inches not consumed.

We have observed that horses eat the coarse appearing hay readily, preferring it to good timothy. The grass gives a large yield of hay in two cuttings per season. The second cutting is usually fine and leafy.

The grass produces seed rather abundantly, but seed prices have remained rather high. This is because the seed shatter as soon as they have ripened. If the seed is fully ripe today do not plan to harvest it tomorrow for by that time the seed will be on the ground.

Reed canary grass is not recommended generally for use for hay and pasture on well drained soils because under these conditions other grasses, such as brome grass, in combination with legumes, seem to be superior. After a few years, reed canary grass may become sod-bound and unproductive even when grown on a fertile soil. When grown in waterways and gullies, available nitrogen is added frequently in the runoff and this condition does not develop.

A Plan for Gully Control

A small area seeded to reed canary grass—perhaps only 1/10 of an acre—will provide an abundance of root material for gully control and establishing grassed waterways on almost any farm. But on most farms this grass can well be seeded on a larger area where it not only will be available to furnish root material but also can be used for pasture or hay or to be harvested as a seed crop.

We suggest that the grass be seeded on a fertile area so located that it can be protected from grazing and still be accessible for pasture or hay crops. Often low lying land over which considerable water drains will be suitable. Plenty of rootstock material should be available for beginning the gully control program a year after seeding.

Through the cooperation of the Soil Conservation Service, seed is being made available to soil conservation districts for the establishment of small plantings of reed canary grass in the different communities. Persons interested in making a trial with reed canary grass sods in controlling gullies
Paul Strickler standing in what was formerly a bothersome, costly gully that is now filled by planting reed canary grass rootstocks 9 years ago. The trees on the edge of the gully indicate how long it could not be crossed can secure material from these sources. It is recommended, however, that individual farmers make a small planting of this grass in order that the rootstock material may be more readily available to them.

Spade or plow a few furrows of the reed canary grass sod, depending upon the number and extent of gullies to be controlled. Cut or plow the sod only about 3 to 4 inches deep. It is the rootstocks in the top few inches that are used. We suggest that you start with the smaller gullies first. For one of these half a gunnysack of sod pieces may be enough. A chunky sod piece is not needed, only two or three stems are enough. A corn knife is a handy tool for cutting up a supply of sod pieces.

Using a spade open up a slit in the soil in the bottom of the gully for a piece of sod. Firm this in the soil with your heel. Continue planting these sod pieces a few feet apart in the bottom and on the sides up and down the gully. Be sure to extend the planting well above any over-falls in the gully. An hour's work may be all that will be required to take care of some of the smaller gullies.

Gullies with over-falls of as much as 4 feet have been controlled in this manner. We are not sure just how successful reed canary may be in controlling larger gullies but we will be making trials during the next several years.

In many cases it may be desirable to shape the channel of the waterway before planting the reed canary grass rootstocks. This involves the plowing, diskng or blading in of the gully to form a saucer or flat U-shape channel.

Plan for an adequate width to handle the drainage area involved. A useful rule in fields with ordinary slopes is to allow a width of 2 feet for every acre drained; the waterway should be not less than a rod wide.

We are not certain just what will prove to be the best method of establishing stands in shaped and prepared waterways. We would suggest on a trial basis that the rootstocks be distributed with a manure spreader and then thoroughly disked into the soil. Plow the reed canary sod at a shallow depth—about 4 inches or less. Cut it up with a disk for easier handling, then load it into a manure spreader for distributing in the waterway. Spreading manure at the same time is desirable. After disking in the manure and the rootstocks, firm the soil with a cultipacker or roller. The manure spreader has worked well in demonstrations on the Agronomy Farm at Ames.

Probably the best time to establish reed canary grass in gullies is in the late summer or early fall. Root portions put in place in moist soil in late August or early September will become well rooted before the ground freezes and be able to maintain themselves when heavy rains come in the spring. This grass has repeatedly been established at Ames from small pieces of sod placed in early September without a single failure. Establishment in gullies in the spring is also satisfactory except that the pressure of other work is usually great then.

**Seeding Reed Canary Grass**

This grass should preferably be seeded on moist, fertile soils. A good seedbed should be prepared as for alfalfa. Four to six pounds of seed per acre is the usual rate of seeding though in establishing small areas a somewhat larger amount of seed may well be used in order to hasten development of a good sod from which rootstocks can be obtained.

The seed may be broadcast or drilled. It should be covered about $\frac{1}{4}$ to $\frac{3}{8}$ inch deep. One of the most desirable methods of seeding is to go over the field with a cultipacker or harrow before seeding; broadcast the seed; then follow the seeding operation with the cultipacker or harrow again, to cover the seed and firm the soil. An application of manure following seeding is always desirable with any grass.

Seedings are best made in the early spring though late summer seedings also have been satisfactory. On poorly drained areas where it is difficult to get on early in the spring, the seedbed may be prepared in the fall and the seed sown just before the ground freezes. Seed will germinate and start very early the next spring.

**Farmer Experiences**

A survey was recently made in cooperation with county extension directors, Soil Conservation Service technicians and vocational Gullies formed when this land was undivorced can be controlled cheaply by planting...
Glen Birlingmair, Appanoose county extension director, observing reed canary grass on the Paul Strickler farm. This waterway was established by planting rootstocks with a spade about 2 to 3 ft. apart.

agriculture instructors to determine the extent to which reed canary grass has been used on Iowa farms.

Replies were obtained from 59 counties. The number of farmers listed as having had experience with reed canary grass for hay was 30; for pasture, 68; for erosion control, 50; and for seed, 5. Ninety-six had been growing it on poorly drained sites and 31 on well drained sites.

We have visited a number of these Iowa farmers who have been using reed canary grass and observed the results they were obtaining.

Paul Strickler of Centerville got his start with reed canary grass 18 years ago with rootstocks from College plantings at Ames. He has supplied roots to many neighbors and friends. He first used this grass to control a gully about 9 years ago. It was impossible to farm across this gully, which was 8 or 10 feet across and several feet in depth. Reed canary grass rootstocks were put in by hand according to the procedure already suggested. Now reed canary grass has thickened up and with its coarse rank growth has collected enough silt so that it is possible to farm across this area again. But, of course, the reed canary grass will never be plowed up. The waterway will be left in reed canary grass with the assurance that erosion is under control.

R. E. "Bob" Bear, who lives 8 miles northeast of Centerville, has been transplanting small clumps of reed canary grass rootstocks in his gullies and waterways for several years. He now has reed canary grass established in most of them and is an enthusiastic supporter for this grass.

On the Lucy Lawrence farm in Taylor County we observed reed canary grass which was seeded in December, 1942, on a well prepared seedbed in a waterway. An excellent stand of reed canary grass was obtained. This grass was doing well both in a small hillside gully and in the broad, low waterway at the base of the hill. It was converting a raw, actively cutting hillside gully and a low weedy waterway into a stable, productive grassed waterway.

"The stock reach through the fence around my pond to eat the reed canary grass," says Paul Flowers, soil conservation district commissioner in Adams County. He has an excellent stand of reed canary on the banks of the dam and on the hillside adjacent to the pond. This stand was started from seed after the pond was rebuilt in 1939. It has thickened up from rootstocks. Canary grass around the edge of the pond breaks up wave action and holds the soil on the pond banks in place.

Hay, Pasture, Seed Crop

This grass also can be seeded in grassed waterways in much the same way as any other grass. It has high value either for pasture or hay. Grass waterways should always be made wide enough so that they can be mowed satisfactorily and will have sufficient capacity to carry water and handle any silt that flows into them. Cutting for hay is a good practice in the maintenance of any waterway.

Although seed is not produced during the first year, it may be harvested during succeeding years. Yields of seed of from 40 to 100 pounds per acre may be obtained. Because the seed shatters and falls to the ground almost as soon as it is ripe, the crop should be cut for seed as soon as the ends of the spikes begin to show the least amount of shattering.

Seed can be obtained through established seed channels, especially from the seed houses of the northern states. A few years ago seed sold at around $1.00 a pound. Approved methods of seed harvest have now been developed with the result that seed has generally been available at from 30 to 40 cents a pound, or in some cases even less.
Its Role Seems to Be Keeping Down Weeds Around Trees, Shrubs, Fences, Buildings

Among the new chemicals for killing weeds which appeared on the market in 1940 and 1941 when war needs began to make it increasingly difficult to get sodium chlorate and Atlacide, was Ammate (the name is a contraction of its real chemical name—ammonium sulfate).

Ammate has received a lot of publicity, and we have been getting many inquiries about it at Iowa State College. Though much more experimental work needs to be done with it before we can properly evaluate it, our present opinion of it is as follows:

1. It holds much promise as a weed killer for use around lawns and yards where it can be used safely (if not in too large amounts) close to trees, shrubs, fences and buildings.

2. It harms the soil only very temporarily—does not make it sterile as does heavy use of sodium chlorate.

3. It cannot be safely used around newly planted trees or shrubs or around such plants as peonies, iris, chrysanthemum, bleeding heart and similar herbaceous perennials.

4. It is not inflammable and does not stain foundations or sidewalks and is not poisonous to livestock and humans.

5. One spraying in a narrow band in the spring at the time of the first cutting of grass is sufficient to keep down all major plant growth for the season so that the lawn mower can be run close enough to cut the grass around trees, posts, along sidewalks, the foundation of the house, etc.

6. Ammate does not seem to be as effective as sodium chlorate or Atlacide for killing European bindweed (creeping jennie), but it has been found to be effective on leafy spurge and poison ivy.

Some of the advantages which we have so far seen in this new weed-killing chemical are fairly obvious. Those who have done a lot of hand work trimming the grass and weeds away from trees, foundations and the like which they could not reach with their lawn mowers will appreciate finding an easy means of handling this problem—one spraying in the spring.

The other weed-killing chemicals which we have been using—sodium chlorate and Atlacide—could not be used in this manner because of the danger of killing valuable trees and shrubs. With Ammate there is not this danger.

Spraying a 6-inch strip with Ammate around buildings, sidewalks and older trees keeps down weed and grass growth, enables the lawn mower to cut all of the grass and eliminates much tedious hand work.
For killing noxious weed patches which are out in the open, we think that probably the best results will still be obtained by using sodium chlorate or Atlacide.

How to Use It

Ammate is used in the same way as sodium chlorate or Atlacide, usually as a spray. It should be mixed with water in the same proportion as sodium chlorate and Atlacide—at the rate of 1 pound to 1 gallon of water.

It should be sprayed on the plants to be killed with a pressure sprayer so that the foliage is thoroughly wetted. It is most effective when the soil moisture and humidity are high, in the evening or on a cool, cloudy, moist day when the plant is just coming into bloom. As with the chlorates, it is best to avoid spraying during long, hot, dry periods, or immediately before a rain.

Ammate is a finely granulated light gray powder which dissolves readily in water. The material is highly corrosive to metal both in the dry form and when mixed in spray solution. Consequently, all containers must be thoroughly cleaned after they are used, especially before the equipment is stored or before using it to spray valuable plants.

Its corrosive action makes it undesirable to use along valuable net wire fencing, but even so its corrosive action on fencing is less than that of sodium chlorate or Atlacide.

Cautions to Observe

Even though Ammate can be more safely used close to trees and shrubs than is possible with chlorates (sodium chlorate and Atlacide), this does not mean that it has no danger if used recklessly and in large quantities around all valuable trees and shrubs. Keeping it off the foliage is not sufficient protection.

We know of instances where newly planted weeping willow, golden willow, red and yellow dogwood, spirea, quince, honeysuckle and elm trees have been killed when weeds and grass were sprayed around them.

A quack grass-infested fence row sprayed with Ammate. Chlorates couldn’t be used because of nearby trees. Usually two sprayings are necessary for shallow-rooted weeds.

These instances of losses of valuable plants should be sufficient warning to one not to use the chemical recklessly. In none of the cases where these plants were killed by Ammate was it allowed to get on foliage, or above-ground parts. This shows clearly that the plants were killed by the roots absorbing the chemical.

Around or under well established trees, such as mulberry, apple, plum, pear, peach, elm, oak and hickory and under grape vines, it is possible to use Ammate without injury to the trees or grape vines providing it is kept off the foliage and bark. This is essential.

As an extra precaution during spraying operations under such trees or under grape vines, a collar made of cardboard should be tied around the trunks of the trees or vines. In these operations be sure that you do not spill or spray any large amount of the solution on the ground. Wet only the weeds that are to be killed.

Weed Chemicals Coming

Weeds are in for a lot of trouble in the near future. Chlorates will soon become more plentiful. Ammate is at least one of the products which will supplement the work of sodium chlorate and Atlacide. Further work needs to be done on this material before it can be properly evaluated.

Chemicals of any kind are too expensive to use for killing large areas of deep-rooted noxious weeds. Large areas of these weeds must be eradicated by special methods, especially smoother crops, which permit income from the land while the weeds are being killed.

Ammate may be a little less effective and more expensive than sodium chlorate or Atlacide, but there is less risk of injuring trees or shrubs when it is used around them. And around those buildings, fences, foundations and sidewalks where trimming grass and weeds has kept the "missus" busy in the past, spraying with Ammate is the answer.

Mowers do not cut the grass adjacent to fences, trees or foundations. Note the pictures on other page.
LESPEDEZA
Is Here To Stay

By MAURICE L. PETERSON and H. D. HUGHES

The legume lespedeza has made a place for itself in southern Iowa by establishing a stand and providing excellent pasture on poor soils where other legumes and grasses have failed. Because of this, in almost any community of southern Iowa lespedeza has come to stay on at least a few farms. Livestock have put their "O.K." on its value by choosing to graze in those parts of the pasture where it has made its best growth.

Thus far its extensive use is limited to the more southern counties because it is an annual, and in order to maintain itself from year to year it must mature a seed crop. The seed, which shatter readily, carry over on the soil surface and provide a volunteer crop the following spring. The ordinary Korean lespedeza, grown so extensively in Missouri and in other states to the south, requires a season a bit too long to be depended upon to mature its seed north of the southern part of Iowa.

We are convinced that lespedeza will come to have great value, especially for pasture, over most of the southern half of Iowa. But this cannot come until earlier maturing strains become generally available. Early maturing, vigorous, disease-resistant strains have been found and the seed supply is being increased.

Different Kinds

There are several different kinds or varieties of lespedeza. Success or failure may depend upon the use of the right variety or kind. Some are better suited to different conditions and localities than others.

Korean lespedeza (Lespedeza stipulacea). The ordinary Korean lespedeza is the one now generally available commercially in Iowa and other Corn Belt states. It is ideally suited to Missouri and southern Illinois. Missouri has about 8 million acres—almost as many acres of lespedeza as Iowa has of corn. Lespedeza has revolutionized the agriculture of Missouri in the few years since it was first available.

It can be recommended only for the southern two or three tiers of Iowa counties. It may be grown with some success a little farther north, but in general seedings fail to maintain themselves because the season is too short for seed to mature.

Early Korean (19604). Early Korean lespedeza may be expected to mature seed satisfactorily as far north as central Iowa. This is a selection from the Korean, tested through a period of years at Ames and at other state stations before it was released by the United States Department of Agriculture. Its seedlings make an early start in the spring and grow more vigorously than the ordinary Korean lespedeza.

Other Early Strains. The Iowa Station has been comparing and testing a rather large number of other early strains obtained in 1938. These can be expected to mature seed and carry over from year to year as far north as central Iowa. A number of these are as productive as the common Korean; they are early and disease-resistant. No seed of these strains is as yet available commercially.

A Legume Suited to Use With Bluegrass as Pasture Crop for Southern Iowa Thin Soils

Nodules on lespedeza roots. Inoculation is essential to grow the crop on most of the soils of Iowa.
Common Lespedeza (Lespedeza striata). Common lespedeza and Bermuda grass fill somewhat the same position in the far south that white Dutch clover and Kentucky bluegrass do in the Corn Belt. Accidentally introduced from eastern Asia sometime prior to 1850, this lespedeza is commonly called Jap clover. It is a different species from the Korean lespedeza. The Korean can be easily distinguished by the large, light colored stipules, borne in pairs at the base of each branch.

Sericea (Lespedeza se-icea). There are many different kinds of lespedeza, all of them perennial except for the two named above, Korean lespedeza and Jap clover. A number of these are found growing in Iowa. Only one perennial species has come into commercial use—the Sericea. This lespedeza has been grown with considerable success in some of the states farther south, providing relatively large acre yields of high protein hay on acid, infertile soils. We have made a considerable number of trial plantings in different parts of Iowa but when cut repeatedly for hay, the plants are likely to winter-kill. When other forage is available, animals are likely to avoid it for pasture because of its high tannic acid content, making it somewhat unpalatable.

Greatest Value in Pasture

Korean lespedeza is making its greatest contribution in southern Iowa when seeded on thin, unproductive bluegrass pastures. Many southern Iowa pastures have become thin and weedy. Often little is obtained from them except for a brief period in the spring and late fall. Numerous unpalatable weeds completely take over in mid-summer. Such pastures can be tremendously improved by seeding Korean lespedeza. This legume starts off slowly in the spring and early summer, but at this time bluegrass is at its best. Lespedeza does not provide much pasture until late June or early July. Peak production comes during July and August when bluegrass is dormant. It continues until frost. Experienced stockmen emphatically state that livestock continue to make good gains throughout the summer when lespedeza is in the pasture, whereas on bluegrass alone animals are likely to lose weight. Lespedeza seems to provide an ideal complement for Kentucky bluegrass.

Lespedeza not only provides a palatable protein pasture, but, being a legume, it can utilize the free nitrogen of the air making this available to the grass growing with it. The result is that in the end the growth of the grass itself is markedly increased.

The value of lespedeza for erosion control is not too good because it is an annual and tap-rooted. It does have the ability, however, to become well established on thin, bare slopes, and in such a situation has proved of value in erosion control. The growth of lespedeza in good bluegrass sod may be rather insignificant, especially in the year it is seeded. It is seldom possible to maintain a good stand and growth of lespedeza in a thick grass sod. Under such conditions the seeding of lespedeza is not recommended. There are few pastures in southern Iowa, however, in which certain areas would not be greatly improved in production by the seeding of this legume.

Lespedeza, Small Grain

The use of small grains for pasture in southern Iowa with lespedeza appears to have considerable merit. The small grain provides...
pasture in the early part of the season when the growth of lespedeza is rather insignificant. The lespedeza takes over as the growth of the small grain diminishes. A small grain and a lespedeza crop are produced each year. The seedbed for the small grain is prepared by surface tillage rather than by plowing. Reseeding of lespedeza each year is not necessary. This cropping plan provides a soil cover throughout almost the entire year, plowing is avoided and the crop is produced at a minimum of expense. Growing lespedeza on the same land year after year results in an increased vigor of growth and yield, both of the lespedeza and the grain.

Lespedeza may be sown with winter rye, winter wheat, or oats. When sown with oats, sow as early in the spring as possible. Lespedeza is broadcast after the small grain has been seeded. The oats may be grazed, cut for hay when in the milk stage, or harvested for grain. When grazed, lespedeza comes into production in time to take over by the time the oats are gone.

Preparing the seedbed for oats following the lespedeza crop is important. The land should not be plowed as this will cover the lespedeza seed so deeply that a poor stand will result. Usually a double disk and harrowing will provide a good seedbed for the oats and will leave the lespedeza seed near the surface to provide a thick volunteer stand.

If too much growth is left on the land in the fall and over the winter it may form such a mulch as to delay the drying of the soil until after normal seeding time for oats and until after the lespedeza seed begin to germinate. If trouble of this kind is anticipated late fall tillage may be helpful.

The continuous growing of Korean lespedeza and winter wheat or winter rye is another procedure used extensively in Missouri. After grazing or harvesting the winter grain the lespedeza comes on to provide pasture through the rest of the season. The rotation is started by seeding the lespedeza on the small grain very early in the spring, or preferably in the late winter. In order to allow for the full utilization of the lespedeza and the maturing of the lespedeza seed, the seeding of the winter grain the following fall is delayed. Because of the greater hardiness of winter rye it is preferable to winter wheat in Iowa.

Seeding and Management

When lespedeza seed is purchased it is well to insist on the hulled, or black seed, as this is more likely to be free of noxious weeds than seed sold in the hull. Lespedeza seed bought in the open market is likely to have been produced in Missouri or Tennessee where horsenettle and dodder are prevalent. Both of these are noxious weeds. The horsenettle is particularly troublesome in southern Iowa.

The law requires that all field seed be properly labeled as to germination and weed seed content. Always look for this information when purchasing seed.

Sow 20 pounds of lespedeza per acre to obtain a full stand. As little as 10 to 15 pounds per acre may be seeded when one is willing to wait a year for full returns. This appears to be poor economy. We have found it exceedingly important to inoculate lespedeza in Iowa. Many seedings have failed because the seed was not inoculated.

Very early seeding is recommended, possibly late February or early March on permanent grass pastures or on winter grains. It is not necessary to disk or cultivate before seeding on grass pastures especially if the seeding is...
made early. The seed is simply broadcast on the surface by any convenient method. The seed works into the surface by the freezing and thawing action, together with early spring rains. When seeded with oats, however, both crops should be seeded as early as the season permits. Lespedeza preferably should be broadcast after the oats have been seeded and covered. The use of the cultipacker or roller after seeding is always beneficial.

Korean lespedeza normally cannot be pastured so close that it is prevented from reseeding. Lespedeza should be grazed at nearly full capacity throughout the season. If a thick stand of lespedeza has been obtained and grazing is not begun until relatively late in the season the seed are likely to be consumed by the grazing animals with little or no reseeding.

When lespedeza is grown with bluegrass, close early grazing of the grass favors the establishment of the legume. This procedure weakens the bluegrass and favors the lespedeza. The lespedeza, in turn, by making nitrogen available to the grass stimulates its growth.

For Hay or Seed

It is doubtful whether lespedeza will have much value in Iowa for hay. We have other crops better suited to this use. When grown on rich bottomland soils with a thick stand, a yield of as much as 1 1/2 tons per acre may be obtained. It has about the same feeding value as alfalfa. But under these conditions red clover and alfalfa are likely to have considerably greater value.

A limited amount of lespedeza seed is harvested in Iowa. This consists largely of the early maturing variety called Early Korean, No. 19604, or Giant Lespedeza.

The lespedeza seed crop should not be harvested until fully mature, usually after the first frost and the leaves have turned brown. The most common method of harvesting seed is with a combine. If a combine is not available it may be mowed and windrowed when the crop is tough from dew or the high humidity of night. A buncher or windrower attachment may be used, or if not available, the crop should be raked into bunches very soon after cutting. Great care must be exercised in handling the harvested material when dry to prevent loss of much of the seed from shattering.

After mowing and bunching, two or three bright sunny days will dry it enough for threshing. For this job either a combine or a grain separator may be used, making proper adjustments to reduce the air blast. It is better to reclean the seed than to lose much of it in threshing.

Soil Considerations

Lespedeza has its greatest value as a legume that will make a stand and can be grown and used extensively on thin, acid soils without the use of lime or fertilizers. When seeded on such soils, however, the best results are obtained if lime and fertilizers are used. Lespedeza makes its best growth on fertile, moist, bottomland soils, not acid in reaction. Under these conditions, however, it is believed that seeding one of the clovers usually will give a greater production than can be expected from lespedeza. When it is seeded on the less fertile, acid soils, growth the first year is likely to be relatively insignificant. The second year, the growth will be noticeably better, with full vigor and growth usually the third or fourth year.
Waxy Corn In Puddings, Muffins

TAPIOCA PUDDING became mostly a “thing of the past” when the Japanese captured the East Indies. About 93 to 97 percent of our tapioca before the war came from the East Indies with the remainder from Brazil and the Dominican Republic.

We needed tapioca, not so much because we couldn’t get along without tapioca pudding as because we needed the tapioca starch for many industrial uses.

So with the war need for this kind of starch, plant breeders of the United States took the problem in hand and we now are producing a similar starch from waxy maize and waxy sorghum. Iowa is growing a considerable portion of the 15,000 acres of waxy corn which is being produced this year in the Midwest, so we Iowans are especially interested in its starch.

If the starch from waxy corn was similar to that from tapioca for industrial uses, we wondered whether it might not also take the place of tapioca in cooking.

Accordingly some of our students in foods here at Iowa State College have done some testing and comparing of the puddings and muffins made from waxy corn products with those similarly made from tapioca and with those made from regular corn products.

The waxy starch products which we used were not modified or treated and so the results which we obtained may not be similar to those which homemakers will obtain from the commercial waxy products when they are finally put on the market. They are not available at this time but some corn products companies are preparing to introduce certain ones.

Tests With Puddings

One student, Bonnie Kurtz, made some tests with starch puddings, using a regular commercial cornstarch, a commercial waxy starch and a waxy starch prepared by an alkali method.

The consistency of the puddings was determined by scores, penetrometer (a mechanical device which measures the resistance to penetration with a needle) and line spread. Experimental conditions were alike.

These tests showed the waxy starches less desirable for puddings than the regular cornstarch. The puddings from waxy starch were thin and gummy. The flavor scores for the regular cornstarch puddings averaged 9.6 (10 being the highest score). The waxy cornstarch and the waxy cornstarch prepared by the alkali method produced scores of 2.0 and 4.2 in comparison with the 9.6 score for the regular cornstarch.

So we conclude that for plain or chocolate cornstarch puddings, the regular cornstarch is preferable to the waxy starches.

Another student, Esther Dil-saver, compared tapioca, regular cornmeal, waxy cornmeal (40-mesh), and for a few tests fine (60-mesh) waxy cornmeal in two types of pudding, cream type (containing milk and eggs) and fruit type. In these tests, the waxy cornmeal seemed to be as desirable as tapioca for use in either of these types of puddings.

Apricots, cherries, orange juice, crushed pineapple and peaches were used in the fruit type puddings. The other type was made exactly the same except milk and eggs were substituted for the fruit.

The ingredients (starch, sugar, salt and liquid—with the exception of eggs) were weighed, combined and cooked 20 minutes in the upper part of a double boiler. Although the differences were small, the moisture loss for the waxy cornmeal was consistently less than from the regular cornmeal or the tapioca puddings.

The yellow color of the cornmeal (most of the waxy maize grown at present is yellow) was undesirable with cherries but was attractive in cream puddings or with yellow-colored fruit.

The puddings made from regular cornmeal were rated (by both the Foods and Chemistry staffs) below the puddings made from tapioca in both flavor and consistency. They were somewhat gritty and remained so, even if cooked a longer time. In contrast, the puddings made from waxy cornmeal rated practically the same in flavor and higher in consistency than puddings made from tapioca.

The addition of fruit decreased the stiffness of puddings made with all three starches. The viscosity was decreased more with the cherries (a sour, pie type) than with the other fruits.

Cornmeal in Muffins

A regular cornmeal and two waxy cornmeals, one coarse (30-40-mesh) and one fine (50-60-mesh), were used in muffins by a student, Shirley Like. The proportions of the ingredients were: 1 cup cornmeal, 1 cup all-purpose flour, 1 cup milk, one egg, 2 tablespoons of sugar, 2 tablespoons of corn oil, 3 teaspoons of baking powder and 1 ½ teaspoon of salt.

The coarse cornmeal imparted a grittier texture than the fine meal. The waxy cornmeals produced a slightly moister muffin than the regular cornmeal. In all other respects the two types of cornmeal could be used interchangeably with practically the same results. The scores for texture and tenderness were the same for both waxy and regular cornmeals and there was little difference in the scores for flavor.