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EC100 Crop Varieties in Nebraska

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Crop Varieties in Nebraska

Perennial Grasses
Small Grain
Buckwheat
Hybrid Corn
Soybeans

Sorghums
Sudan Grass
Alfalfa
Sweetclover
Flax

Cooperative Extension Work in Agriculture and Home Economics
University of Nebraska College of Agriculture, and the United States
Department of Agriculture cooperating. W. H. Brokaw, Director, Lincoln.
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The material for this publication was prepared by E. F. Frolik and D. L. Gross of the Agricultural Extension Service; K. S. Quisenberry, L. C. Howell, O. J. Webster, Bliss H. Crandall, John Slatensek, and Samuel Garver, of the Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture; C. E. Claassen, University of Nebraska Chemistry Project; and John Lonaquist of the Nebraska Agricultural Experiment Station.
PERENNIAL GRASSES

During the period since the drouth of the thirties, attention has been focused on the necessity of conserving and improving our existing grasslands and of establishing new acreages of perennial grasses for pasture and erosion control. This need is likely to continue in the future, with more attention being placed on the uses of grass for soil reclamation and in crop rotations. The selection of the proper grass species and variety is the most important initial consideration in establishing new stands of grasses. Information on the adaptation of the most promising perennial grasses has been brought together by the Agricultural Conservation and Resource Planning Committee on Grasses, composed of the following membership:

L. C. Newell, Chairman, Associate Agronomist, Bureau of Plant Industry
E. T. Frolik, Secretary, Assistant Extension Agronomist, College of Agriculture
K. Howard, Director of the State Department of Agriculture and Inspection
J. E. Weaver, Professor of Ecology, University of Nebraska
D. W. Allred, Assistant Regional Conservator, Soil Conservation Service
M. K. Elias, Plant Paleontologist, Conservation and Survey Division, University of Nebraska
E. C. Conard, Nurseryman, Soil Conservation Service Nurseries
M. L. Baker, Animal Husbandman, College of Agriculture

The planning committee has considered the adaptation of native and introduced grasses for specific purposes, soils, and climatic regions of the state. Information accumulated through years of experience indicates that certain species are the most promising for particular soils and conditions. In many parts of Nebraska the adapted grasses are limited to native species. The large scale harvesting of such grasses as the bluestem, grama grasses, buffalograss, and wheatgrass from native stands during the past few years has added new impetus to the utilization of grasses throughout the state. Although many of the grasses which would be best suited to use for particular conditions are not yet available, they have been listed with the thought that increased efforts should be made to bring them into use by selection and improvement and through studies of their seed and forage production.

Research has been conducted at the Nebraska Agricultural Experiment Station at Lincoln, and at other points throughout the state over a period of years on the establishment and adaptation of varieties and strains of both native and introduced grasses. This work under the direction of L. C. Newell and E. C. Conard has shown certain strains to be markedly superior for certain regions and conditions. Research is being conducted on the further improvement of the most important grasses. Information on the utilization and management of pasture grasses under grazing with cattle and sheep is also being obtained at the Experiment Station in cooperation with M. L. Baker and M. A. Alexander of the Animal Husbandry Department of the College of Agriculture.
Perennial Grasses (Continued)

Adaptation of Certain Important Grasses by Physiographic Areas in Nebraska

The adaptation of certain selected promising grasses for use in revegetation is indicated in the following groupings of grass species corresponding to physiographic regions shown on the accompanying map (Fig. 1).

1. East Loess Hills
   
   (a) Good and average soils
   
   Bromegrass and associated legumes
   Little bluestem
   
   (b) Eroded soils and dry sites
   
   Little bluestem
   Blue grama
   Sidecarts grama
   Buffalograss

2. Loess-Savannah Transition
   
   A. Eastern part of state
   
   (a) Sandy uplands
   
   Sandhill bluestem
   Sand reedgrass
   Sand dropseed
   Sand lovegrass
   Redfield's grass
   
   (b) Eroded medium-textured soils and dry sites
   
   Little bluestem
   Blue grama
   Sidecarts grama
   Buffalograss
   
   (c) Sandy and medium-textured soils with favorable moisture and fertility
   
   Bromegrass and associated legumes
   Little bluestem
   Switchgrass
   Sand lovegrass
Perennial Grasses (Continued)

B. Western part of the state

(a) Sandy uplands

- Sandhill bluestem
- Sand reedgrass
- Sand dropseed
- Sand lovegrass
- Redfield's grass

(b) Valleys and medium-textured upland soils

- Crested wheatgrass
- Western wheatgrass
- Feather bunchgrass
- Big bluestem
- Switchgrass
- Sand lovegrass

3. Loess-drift Hills

(a) Good and average soils

- Bromegrass and associated legumes
- Big bluestem

(b) Eroded soils and dry sites

- Little bluestem
- Blue grama
- Sideoats grama
- Buffalograss

4. Nebraska (Loess) Plains

(a) East of Hastings and Grand Island

(Same as Area III)

(b) West of Hastings and Grand Island

(Same as Area V)

5. West Loess Hills and Canyons

(a) Average soils

- Western wheatgrass
- Crested wheatgrass (chiefly north of the Platte River)
- Blue grama
- Sideoats grama
- Buffalograss
- Sand dropseed
Perennial Grasses (Continued)

(b) Fertile soils with favorable moisture conditions

- Bromegrass
- Big bluestem

6. Wyoming - Colorado - Nebraska Tablelands (High Plains)

- Crested wheatgrass
- Western wheatgrass
- Feather bunchgrass

7. Sandhills

(a) Uplands and dry valleys

- Sandhill bluestem
- Sand reedgrass
- Sand dropseed
- Sand lovegrass
- Redfield's grass

(b) Wet valleys

- Big bluestem
- Switchgrass
- Sand lovegrass

8. Dakota - Nebraska Eroded Tablelands

- Crested wheatgrass
- Western wheatgrass
- Feather bunchgrass
- Blue grama
- Sideoats grama
- Buffalograss
- Sand dropseed

9. Pierre (Gumbo) Hills

- Western wheatgrass
- Crested wheatgrass
- Feather bunchgrass
- Buffalograss

10. River Valley Lowlands

- Big bluestem
- Bromegrass and associated legumes
- Reed canarygrass (on poorly drained soils)
Perennial Grasses (Continued)

Recommended Grass Varieties and Seed Sources

The classification of grasses into two groups, viz., cool-season grasses and warm-season grasses, is convenient not only to indicate their general seasonal growth responses, but also for the purpose of informing the public in generalized terms concerning the best methods and times for seeding grasses and the best methods of management of established stands. The presentation of recommended grass varieties and seed sources is here necessarily limited to the grasses most commonly available at the present time.

I. Cool-season Grasses

This group of grasses includes those which start growth early in the spring, make their maximum forage production during the spring months, and mature seed early in the summer. Grasses in this group make little growth during hot dry periods of midsummer but frequently renew growth in late August or in September under favorable moisture and temperature conditions.

Bromegrass (Bromus inermis)

Bromegrass is the leading grass in eastern Nebraska and in other parts of the state on favorable planting sites and under irrigation. For best production over a period of years it should be planted with a legume, but it may be grown in pure stands for seed production or erosion control. Yields of seed can be increased profitably by annual early spring applications of commercial nitrogen or by repeated applications of barnyard manure. The yields of forage and the protein content of the forage are also increased by these practices.

There are two types of bromegrass in the United States. These probably originated from seed introduced into this country from different sources. The type grown in the northern states appears to have originated from a large shipment of seed made to the South Dakota station from Russia in 1897, as judged by field tests of the seed from these sources. The type which has become naturalized in the latitudes of the central states appears to have originated from a seed introduction coming from Hungary in 1884 to the California station. It was introduced into Nebraska and Kansas during the 1890's where it has made its greatest spread during the last 35 years. This type is now spreading eastward through the cornbelt states with an increasing demand. The present best sources of this type of bromegrass are the certified varieties, Lincoln, Achenbach, and Fischer.

Lincoln bromegrass is a variety introduced by the Nebraska Station under that name in 1949. It was developed from several old fields in Nebraska thought to have been derived from seed of Hungarian origin. The oldest of these fields trace to seedings made during or prior to 1898. Only those with suitable history and performance in field tests were accepted as fields for foundation seed. Lincoln bromegrass is a large, aggressive, high yielding grass which forms a good sod. Because of its size and potential yield it requires a readily

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available supply of nitrogen, a limiting factor after several years of growth on soils of low fertility. It is tolerant of drought and heat, has an excellent seedling vigor, and is more easily established on critical planting sites than bromegrass which is now available from northern seed sources. Seed yields of 500 pounds or more have been reported from good soils and average yields of 300 pounds or more are not uncommon. The annual production of certified seed has increased to 240,000 pounds in 1944. It is accordingly considered the most available of the certified strains. It is recommended throughout Nebraska and for similar latitudes in other states where bromegrass is adapted.

Achenbach bromegrass is a variety named by the Kansas station in 1944. It was developed on the farm of Achenbach Bros., in Washington County, Kansas, where it has been grown for over 45 years. According to correspondence, the seed for this strain was obtained in the late 1890's from a farm near Sutton, Nebraska, and it is accordingly presumed to have the same origin as the Lincoln strain. Having been grown in northern Kansas for that length of time, it is considered to be adapted farther south than other strains of bromegrass. In tests in Nebraska it produces similar yields of forage to those of Lincoln bromegrass but it is somewhat lower in seed production when moved northward. It is an extremely aggressive variety, tolerant of drought and heat, and is accordingly recommended for the area south of the Platte river in Nebraska and in northern Kansas, and for corresponding areas in western Iowa and northern Missouri.

Fischer bromegrass is a variety similar to the Lincoln and Achenbach bromegrasses, which is being certified by the Iowa station. It was discovered on the Fischer farm near Shenandoah, Iowa, where it was established from seed obtained in Ohio. Circumstantial evidence indicates that it is a strain which was derived from Achenbach bromegrass at an early date. Although similar in type and performance to Achenbach and Lincoln bromegrasses it is considered best adapted in western Iowa and extreme eastern Nebraska and should not be considered further south or west until more extensive tests have been conducted with it in those regions where it might be lacking in drought and heat tolerance.

Crested wheatgrass (Agropyron cristatum)

Crested wheatgrass is a leading cool-season grass in the dry regions of the northern Great Plains and on certain critical planting sites not adapted to the production of bromegrass. It starts growth very early in the spring furnishing important grazing early in the season before native grasses should be grazed. It must be utilized early in the season as it becomes unpalatable at maturity and makes little growth after seed production in the summer. It is best adapted to Nebraska in the panhandle section and in certain areas in northern Nebraska favored by the temperatures associated with higher altitudes than those of eastern and southern Nebraska. It is an extremely variable grass in growth habits and in seed type but does not have the variability in adaptation as found in bromegrass. Accordingly the seed from northern sources is as well adapted as locally produced seed. There are two kinds of crested wheatgrass.
Perennial Grasses (Continued)

Standard or Common crested wheatgrass is the most important variety now being grown extensively throughout the northern Great Plains. It is a typical bunchgrass. It has an excellent seed yield and seed characters which make it easily established, and it produces a fair yield of forage even under adverse conditions.

Fairway crested wheatgrass is a rather dwarf, fine-stemmed, leafy strain selected in Canada for use on lawns and fairways. It produces a more even sod than common crested wheatgrass and accordingly may be superior for erosion control. It has a smaller, finer seed, is usually somewhat lower in yield of forage, and the forage is less palatable for livestock than common crested wheatgrass.

Western wheatgrass (\textit{Agropyron smithii})

Western wheatgrass is one of the most important native grasses which can be classified in the cool-season group. It starts growth early in the spring and like crested wheatgrass, it must be utilized early in the season if a maximum utilization is to be obtained. It is usually left ungrazed by livestock if allowed to produce heads and to mature. Grazing which follows maturity is most severe on the grasses associated in the mixture. Because of its aggressiveness it is not recommended for use in planted mixtures, but finds its greatest usefulness for plantings for erosion control purposes. In the drier sections of the plains it is an important component of native hays. For this purpose it should be cut early in the season before it reaches maximum heading or maturity. The best adapted strains for Nebraska conditions are found in western and southern Nebraska and in northern Kansas in preference to strains from seed obtained farther north.

Reed canarygrass (\textit{Phalaris arundinacea})

This grass offers some promise for erosion control purposes and pastures on lands too wet in the spring to produce crops of bromegrass. It is tolerant to wet conditions during part of the year and once established will withstand considerably dry weather. Seed from northern Iowa and from Minnesota has produced strains which are more winter hardy than strains obtained from the west coast states.

II. Warm-season Grasses

Warm-season grasses start growth during mid-spring and make their maximum forage production during the warm season of the year. The grasses in this group vary considerably as to the time of year in which they produce seed.

Big bluestem (\textit{Andropogon fuscatus})

Big bluestem is a native, long-season, perennial grass belonging to the same group of grasses as the sorghums. It is the most important constituent of native prairie hays in the eastern part of Nebraska and in the sandhills. It ranks high in palatability among the grasses. This grass has the greatest potential yield of any of the perennial grasses which may be grown in Nebraska. It is best
Perennial Grasses (Continued)

adapted to the better soils and to planting sites with favorable moisture content. It has a chaffy seed which is difficult to harvest and care. Stands are established with some difficulty and are slow to come into maximum production. Because of seed dormancy, year-old seed will give better results in stand establishment than new seed.

Because of its day-length adaptation and its long season of growth the strains of big bluestem which are best adapted to Nebraska conditions should come from areas not to exceed 200 miles north or south from the section where they are to be planted. Seed from too far south will produce stands which will not mature seed before frost in most years. On the other hand, strains from too far north will not yield as well as local strains or strains from short distances south of the region in which they are to be planted. The best section of the state for harvests of adapted strains of big bluestem are in southeast Nebraska and along the eastern border of the sandhills.

Switchgrass (Panicum virgatum)

Switchgrass is a native, long-season perennial grass belonging to the same group of grasses as the millets. It is associated with big bluestem in the prairie lowa of eastern Nebraska and the sandhills. It is accordingly best adapted to the more favorable planting sites in respect to moisture, and it will probably prove to be most useful in the transition areas bordering the sandhill region. In its early stages of growth this grass is palatable for cattle but less so for sheep. The grass is coarse at maturity. It has a millet-like seed that is easily harvested, cleaned and sown. Seed which has been stored throughout one summer period after harvest will produce better stands than relatively new seed. The best source of seed in Nebraska is in the sandhills, particularly if it is to be used near that region. Stains of this grass can not be moved far southward from their place of origin because of increasing danger of infestation by rust. Southern strains moved northward are usually considered too late in maturity and too coarse for use as pasture.

Sideoats grama (Bouteloua curtipendula)

Sideoats grama is another native, perennial, warm-season grass. Since the years of drought, this grass has increased in abundance in native stands. Meadows and pastures throughout Nebraska and northern Kansas form the chief source of adapted strains. Strains from farther south are subject to winter injury when grown in Nebraska, while northern strains are too low in yield to be profitably grown in the state. Sideoats grama ranks high in palatability, along with big bluestem among the warm-season group. When seeded it is best used in mixture with other grasses such as blue grama and buffalograss. It is easily established by seeding and forms an important part of the mixture during the first years before the effects of grazing or the competition of other grasses becomes too severe.

Blue grama (Bouteloua gracilis)

Blue grama is a warm-season short grass commonly associated with buffalograss. It occurs widely throughout the Great Plains as a dominant grass.
Ferennial Grasses (Continued)

Although blue grama is a typical bunchgrass, it forms a good sod of particular value for use on uplands and on slopes that should be removed from cultivation. It is one of the most drought resistant grasses. It is climatically adapted to the central and western parts of the state but it should be considered also throughout eastern Nebraska for use on planting sites made critical due to slope, exposure, or erosion. Under such adverse conditions it may do relatively better than grasses of larger growth habit or with higher moisture and nutrient requirements.

There are many naturally occurring strains of blue grama. The best sources of adapted high yielding strains are native stands in south central Nebraska and northern Kansas. Strains originating in the Nebraska sandhills and northward have been shown by experimental tests to be lower in yield than strains from near the Platte river or southward. Strains from Oklahoma and Texas lack winter hardiness. The seed of blue grama is frequently hard to obtain because of the failure in some years to obtain a good crop. This may be due to failure on the part of the grass to set seed due to adverse weather conditions or to failure to harvest the crop before shattering. Although strains vary in earliness of seed maturity, seed may be produced at varying times throughout the summer season.

Blue grama is easily established from seed by mid-spring sowings. The seed has no prolonged dormancy and accordingly should be used the year following its harvest or, at most, in the second year as it loses viability unless carefully stored. Because of seed shortages and the general adaptation of the grass, it is best used in mixture with buffalograss with which it ranks closely in palatability.

Buffalograss (Buchloe dactyloides)

Buffalograss is the typical sod-forming short grass of the Great Plains. It is a drought resistant grass climatically adapted to areas of low rainfall and high summer temperatures although it does best under these conditions when it receives additional moisture and nutrients due to favorable planting site. It is not well adapted to regions of high rainfall under certain conditions. It does not compete with taller growing grasses or weeds and owes its survival in pure stands to removal of competition by grazing or close mowing. It offers possibilities for use throughout the state if these conditions are realized. It is an excellent grass for erosion control on slopes and on planting sites exposed to high summer temperatures.

The present sources of adapted seed are the short grass pastures in south central Nebraska and in northern Kansas, where it is being harvested annually by seed companies and enterprising individuals. Among the drought resistant grasses of the plains it offers the most promise from the standpoints of commercial seed production and improvement by selection and breeding for desirable seed and forage production. Newly harvested seed burs must be treated in order to break the seed dormancy before viability can be determined by tests or success of plantings can be assured.
SMALL GRAIN

Recommendations on small grain varieties by crop testing districts in Nebraska are given in Figure 2. The varieties listed are divided into three groups, i.e., those that are recommended, those that are acceptable, and those not recommended. Of these groups, recommended varieties are preferable, either because they have shown superiority in tests or because they have been tested more extensively under the conditions in question and, hence, more is known about their performance. All of the recommended varieties are eligible for certification in Nebraska.

It will be noted that recommendations for spring wheat are made only for Districts VI and VIII. Over a period of years the production of spring wheat is not considered a profitable enterprise in the remainder of the state as shown by experimental data and also by the fact that very little of the crop is grown by farmers.

Winter Wheat

Recommended Varieties

Pawnee was selected from a Kawvale x Tenmarg cross in experiments cooperative between the Nebraska and Kansas experiment stations and the United States Department of Agriculture. The outstanding characteristics of the variety are moderate resistance to leaf and stem rust and to bunt, high resistance to loose smut and resistance to the forms of Hessian fly common to Nebraska. The variety is early, less winter hardy than Turkey, has a better test weight than Turkey and its milling and baking characteristics are satisfactory to the trade. At Lincoln during the period 1936-44, Pawnee has had an average acre yield of 31.3 bushels compared to 25.6 bushels for Cheyenne and 29.7 bushels for Turkey. At North Platte and Alliance, Pawnee has not outyielded Cheyenne because of its lack of winter hardiness, but in cooperative tests in southeastern Nebraska it has been high in yield. Pawnee was first released in the fall of 1943 and more seed was distributed in 1943 and 1944. It is recommended for southeastern Nebraska, in the area south of the Platte River and west to U. S. Highway 81. This includes District I and the southern part of District II.

Nebras was selected from a Turkey wheat at the Nebraska Experiment Station. The variety is resistant to the forms of bunt present in Nebraska and is less susceptible to stem rust than Turkey or Cheyenne. It is midseason as to maturity and more winter hardy than Turkey. The grain mills well and the flour gives a large loaf of bread having a slightly yellow color. Nebraska has yielded a little less than Cheyenne in tests at Lincoln, North Platte and Alliance. It is recommended for the entire state.

Cheyenne is the result of a selection made from Crimean wheat at the Nebraska Agricultural Experiment Station in 1922. At North Platte and Alliance it has been the highest yielding variety, while at Lincoln it has ranked first over a 16-year period but has been exceeded by Pawnee in more recent years. Cheyenne is characterized by stiff straw and short erect heads making it a good variety for
Fig. 2 - Recommended varieties of winter wheat, spring wheat, barley, and oats by crop testing districts in Nebraska

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<th>III Varieties</th>
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<td>Winter Wheat: 2-3-5</td>
<td>W. Wheat: 2-5-8</td>
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<tr>
<td>Barley: 1-2-3-4-5-6</td>
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<td>Oats: 1-7-8-9-10-11</td>
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<td>Oats: 3-4-5-6</td>
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<th>II Varieties</th>
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<td>W. Wheat: 1-2-5-8</td>
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<tr>
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<tr>
<td>Oats: 2-3-4-5-6</td>
<td>Oats: 1-2-7-8</td>
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<th>I Varieties</th>
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<td>W. Wheat: 2-3-5-6-7-9</td>
<td>W. Wheat: 1-2-5-6-7-8-9</td>
</tr>
<tr>
<td>Barley: 1-3-4-5-6</td>
<td>Barley: 1-6</td>
</tr>
<tr>
<td>Oats: 2-3-4-5-6</td>
<td>Oats: 1-2-7-8</td>
</tr>
</tbody>
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Key to Varieties:
(R) Variety recommended and eligible for certification
(a) Variety acceptable

Winter Wheat
1. PANNEE (R)
2. NEBRAD (R)
3. CHEYENNE (R)
4. Nebr. #60 (a)
5. Turkey (a)
6. Tenmarc* (a)
7. Blackbull* (a)
8. Iobred ** (a)
9. Conanche ***

Spring Wheat
1. THATCHER (R)
2. Ceres (a)
3. Pilot (a)
4. Rival (a)

Barley
1. SPARTAN (R)
2. TREM (R)
3. BEECHER** (R)
4. EZOND (R)
5. Club Marigut (a)
6. Velvon (a)

Oats
1. CEDAR (R)
2. OTOE (R)
3. BRUNNER (R)
4. TROJAN (R)
5. FULTON (R)
6. KANOTA (R)
7. Tama (a)
8. Boone (a)
9. Marion (a)
10. Vieland (a)
11. Vikota (a)

* Southern two tiers of counties only
** Eastern two tiers of counties only
*** In District VIII, south half only
Cheyenne Winter Wheat (Continued)

Combining. It is tolerant to Hessian fly but is susceptible to bunt, leaf rust, and stem rust. Cheyenne is slightly more winter hardy than Turkey and the flour requires a long mixing time in order to give good bread. It is recommended in Nebraska for the western two-thirds of the state.

Acceptable Varieties

Nebraska No. 60 is one of the first improved types or selections of Turkey distributed in Nebraska. It differs from Turkey in being more winter hardy, slightly later, and less tolerant to Hessian fly. In years when winter killing has not been a factor, the yields of Nebraska No. 60 have not compared so favorably with other varieties especially at Lincoln. It is still popular in some sections of western Nebraska and is an acceptable variety for the western two-thirds of the state.

Turkey is one of the most widely grown varieties of hard red winter wheat. It is more a type than a variety since it has been shown that so-called Turkey wheat from different parts of the country differs quite widely in growth characteristics. Most Turkey wheats are winter hardy, a little late in maturity, have straw that lodges rather easily, and are susceptible to leaf rust, stem rust and smut. The milling and baking characteristics are acceptable to the trade. Turkey is popular with many farmers, but tests show both Cheyenne and Nebred to be higher in yield. The variety is acceptable for the entire state.

Temiarq was selected from a Marquis (spring) x Crimean selection (winter) cross at the Kansas Agricultural Experiment Station. It is early, rather winter tender, has fair straw strength, short, plump kernels, and yields well in the absence of winter killing. The variety has some resistance to leaf rust and being early may escape serious damage from stem rust. The grain is inclined to "yellowberry" rather easily, and the test weight may be low but the milling and baking characteristics are well liked by most of the trade. The yield of Temiarq at Lincoln has been about the same as for Nebred, but at North Platte and Alliance it has been lower than this and other adapted varieties. Temiarq is an acceptable variety in the southern two tiers of counties of Districts I, IV, and VII.

Blackhull is a well known and widely grown variety in Kansas. It was developed and distributed by Earl G. Clark, a Kansas farmer. As the name indicates, the plumes or chaff turn black in most seasons serving as a means of identification. Blackhull is earlier than Turkey, less winter hardy, often escapes rust damage, and is noted for its high test weight. In seasons of a wet harvest the straw of blackhull may lodge due to the presence of wet weather diseases. The milling and baking characteristics are acceptable to the trade. During the last few years Blackhull has not yielded as well as Temiarq at Lincoln and Alliance and only slightly more at North Platte. In cooperative trials it has yielded about the same as Temiarq in most tests. Blackhull is acceptable in the southern two tiers of counties in Districts I, IV, and VII.

Comanche was selected from an Oro x Temiarq cross and was released in Kansas in 1942. It is best described as a bunt resistant Temiarq, since it carries resistance to most bunt forms found in Kansas and Nebraska. At Lincoln its yield
Acceptable Winter Wheat Varieties (Continued)

has been about equal to Temmarq, but lower than Pawnee. It is hardly equal to Cheyenne in yield at North Platte and Alliance because of lack of winter hardiness. Its test weight is better than that of Temmarq. In areas where Blackhull and Temmarq have performed satisfactorily Comanche could be used, or in other words the southern two tiers of counties. It will probably be unable to compete in yield with Pawnee.

Iobred, a variety from Iowa, enjoys considerable popularity in eastern Nebraska but in yield tests at Lincoln has been very low. In the cooperative tests in eastern Nebraska in 1942-43 it failed to outyield Turkey or Nebred. Iobred has brown chaff, short, broad kernels, stiffer straw, is resistant to leaf rust and moderately resistant to stem rust. Its worst fault is an inclination to shatter under dry conditions at harvest. Iobred is acceptable in the eastern two tiers of counties in Districts I, II, and III.

Varieties Not Recommended

Kawvale is a semi-hard variety developed by the Kansas Station. Over an 11-year period at Lincoln it gave an average yield 1.4 bushels per acre less than Cheyenne. It has considerable leaf rust resistance, and is a "late mister" with regard to stem rust. It is resistant to loose smut and Hessian fly, is fairly early, but shatters badly. It causes difficulty in grain grading and although it looks like a soft wheat it mills and bakes like a variety of hard wheat. It is one of the parents of Pawnee. The acreage of Kawvale in southeastern Nebraska will probably be replaced by Pawnee.

Iowin is a variety from Iowa, differing from Turkey by having broader, lighter green leaves, and taller stems which may turn purple in some years. Its kernels are rather soft, but it has some resistance to stem rust. At Lincoln it failed to outyield Turkey, and in cooperative trials in eastern Nebraska it has been outyielded by Pawnee and Temmarq.

Michita is a very early winter wheat selected from the cross Early Blackhull x Temmarq. It is now being distributed by the Kansas, Oklahoma, and Texas Stations as a substitute for Early Blackhull. It has no disease resistance, rather weak straw, and is very winter tender and is nearly as early as Early Blackhull. Its milling and baking characteristics are more acceptable than those of Early Blackhull. At both Lincoln and North Platte it has averaged less than Pawnee for yield, but it was number one variety at North Platte in 1944 because it escaped damage from stem rust. At present it is doubtful if the variety will find a place in Nebraska, although it has not been tested for a sufficient number of years to allow a final statement.

Chiefman is a beardless, black-glumed, hard red winter wheat developed by Earl G. Clark in Kansas. The variety has shown considerable yielding ability in Nebraska, when not injured by winter killing. It has nearly equalled Cheyenne in yield at Lincoln, but has been far behind Pawnee. It has some resistance to leaf rust, but it is very susceptible to other common diseases such as loose and covered smut. The grain has good color, a heavy test weight, and mills satisfactorily, but the baking behavior is rather inferior. The variety does not seem to have a place in Nebraska.
Spring Wheat

Recommended Varieties

Thatcher is a beardless spring wheat selected from a Jumillo (durum) - Marquis x Marquis-Kenred cross developed by the Minnesota Agricultural Experiment Station and the United States Department of Agriculture. It was released in Minnesota in 1934 and by 1939 was the leading variety of spring wheat in the United States. At Alliance, Thatcher has yielded 14.0 bushels per acre compared to 13.0 for Ceres during the period 1939-43. At North Platte during the period 1937-44 Thatcher has averaged 10.3 and Ceres 9.7 bushels per acre. At Lincoln it has yielded 7.3 bushels compared to 7.4 bushels per acre for Ceres during the last 8 years. Thatcher is resistant to stem rust, is relatively early, has short stiff straw, is drought resistant, and its milling and baking characteristics are satisfactory. Its disadvantages are susceptibility to leaf rust, scab, mildew and some races of bunt; and sometimes it grows so short as to make harvest difficult. The grain has a dull red color and is inclined to be low in test weight, and if there is considerable moisture at harvest time it has a tendency to bleach. Under favorable conditions in Nebraska, Thatcher may be expected to produce a fairly good yield, but if moisture gets short and the weather becomes hot before harvest the yield will be low and the grain very light in test weight. Thatcher is a recommended variety for Nebraska in Districts VI and VIII, the only districts where spring wheat is recommended.

Acceptable Varieties

Ceres is a bearded spring wheat developed at the North Dakota Agricultural experiment station from a Marquis x Kota cross. It was released in 1926 and spread rather rapidly for a number of years. It has yielded slightly less than Thatcher at Alliance and Lincoln, and at North Platte for the period 1937-44 has averaged 9.7 bushels compared to 10.3 bushels for Thatcher. Ceres has some resistance to stem rust, is medium in time of maturity, has fair straw, and the milling and baking characteristics are acceptable. In years of heavy stem rust epidemics, Ceres will be injured, but in the absence of rust it may be expected to yield fairly well. While Ceres is not recommended in Nebraska, it is classed as acceptable in Districts VI and VIII.

Pilot is a new, bearded spring wheat developed cooperatively by the United States Department of Agriculture and a number of the experiment stations in the spring wheat area. It was distributed in 1939 in Montana and North and South Dakota. Pilot has been nearly equal to Thatcher in yield at Alliance and has outyielded Thatcher at Lincoln and alliance. Pilot is resistant to stem and leaf rust and to bunt, and is reported to have excellent milling and baking characteristics. Its straw tends to be weak and under conditions of heavy growth may be inclined to lodge.
Acceptable Spring Wheat Varieties (Continued)

Rival was selected from a Ceres x Hope-Florence cross at the North Dakota Agricultural Experiment Station and was first distributed in 1939. At the three Nebraska stations Rival and Pilot have average yields that are nearly identical. Rival is resistant to leaf and stem rust, is fairly tall, medium early and has large hard kernels. Its milling and baking characteristics are acceptable to the trade. Under some conditions the variety may have a tendency to shatter.

Varieties Not Recommended

Kosak is a sister selection of Ceres and was developed in North Dakota. The variety was distributed by Colorado and Nebraska because it seemed to give a little better yield than did Ceres. It failed to become popular because the kernels were so hard as to be objectionable to the trade, especially when present in a mixture.

Kermis is a beardless spring wheat which for many years was considered as the standard hard red spring variety. It was always a favorite of the trade, but because of susceptibility to rust, it has been replaced by the newer varieties. In Nebraska its yields have been very low in all tests, but in the northwestern part of the state it is still grown on a limited acreage. It is characterized by rather short straw, heads, chaff and kernels, and in the absence of rust gives a fairly good yield since it is early.

Humback and Dixon are found in limited amounts in western Nebraska. Humback has pubescent or hairy glumes while Dixon has smooth glumes. Both have rather large, soft kernels which are distinctly humped. These varieties are objectionable to the trade, and when found as mixtures in a sample will cause a discount in price. In yield tests they have never given a good performance. The growing of these varieties should be discouraged.

Durum is a market class of wheat used for the manufacture of semolina and macaroni. There are several varieties of Durum with the best ones being Mindun and Kubanka and several new ones just being distributed. Durum wheats usually have considerable resistance to rust and because of this are good yielders in bad rust years. Until Thatcher, Pilot, and Rival were included in the variety tests in Nebraska, Mindun was one of the highest yielding varieties. Durum varieties should be grown only under contract because most elevators are not equipped to keep the grain separate, and if mixed with common wheat, a discount will be given. Most durum wheats have amber colored grain, although there is one exception and that is Pentad. Pentad (D-5) has red grain, but is popular because of rust resistance. Its chief use is for feed.
Small Grains (Continued)

Winter Rye

Recommended Varieties

Rosen is a variety obtained from Michigan. It is rather late, with large, well-filled heads and large, mostly dark green kernels. It is fairly winter hardy and has given good results in Nebraska. The plump kernels and good test weight make it a popular variety.

Balbo was distributed by the Tennessee Agricultural Experiment Station about 1933, having been received from Italy in 1919 and was named Balbo in honor of the Italian aviator. The variety has an erect habit of growth, is very early, and can be pastured earlier in the fall and spring than can other varieties. Hardiness tests have shown it to be about as winter hardy as a good winter wheat which means that it is distinctly less hardy than most rye varieties. Claims of high pasture yield have not been substantiated by field tests. It is also claimed that it will not taint milk, but there is some doubt if it is different from other varieties in this respect. It is recommended for southeastern Nebraska for early feed, both fall and spring.

Acceptable Varieties

Dakold was selected in North Dakota for unusual winter hardiness. It has narrow, dark green leaves and is fairly late. The heads are small and the kernels rather dark in color. If high cold resistance is desired, this is the variety to use, but in the absence of winter killing it may not yield too well when compared with earlier varieties.

Varieties not Recommended

Common rye might be most anything and probably is what is growing in ordinary fields. Rye is an open pollinated crop and must be isolated if it is to be kept pure. Left alone nature probably selects the better adapted types in a field and these tend to increase. For best results, a pure variety should be used.

Abruzzas is another Italian variety, very similar to Balbo, but probably not as good for Nebraska. It has the erect habit of growth, is early in fall and spring, and is not as cold resistant as Dakold.

Spring Rye

Spring rye is of minor importance when compared with winter rye, and only in isolated cases will it equal the yield of winter rye. The crop can be seeded late and it will mature quickly, although best results are obtained from early seeding. It is reported to have been grown on sandy soils in northeastern Colorado. If winter varieties survive, they give the higher yields. No distinct varieties are known, although many years ago one named Vorn was distributed. With the development of good winter varieties, spring types passed out of the picture.
Cedaw was developed from the cross Victoria x Richland in cooperative experiments between the Iowa and Nebraska Agricultural Experiment Stations and the United States Department of Agriculture. In plot tests at Lincoln for the period 1938-44 Cedar has had an average yield of 36.8 bushels per acre compared to 42.7 bushels for Otoe. At North Platte, Cedar has not given good yields, but at Alliance it is only slightly lower in yield than Kanota which is the leading variety. In cooperative tests in eastern Nebraska Cedar has proved to be a good producer. It is classed as a yellow, common oat with short, stiff straw. It carries resistance to both crown and stem rust and to smut, and the grain is of good quality. Cedar is susceptible to halo blight, a minor oat disease. Seed was first released in Nebraska in the spring of 1943, and the variety is recommended in the eastern third of the state, namely in Districts I, II, and III.

Otoe, originally known as Nebraska No. 518 or Burt 518, was selected from Burt in Nebraska. At Lincoln for the period 1938-44, it has yielded 49.7 bushels per acre compared to 36.6 bushels for Cedar and 43.1 bushels for Kherson. Its record at North Platte and Alliance has been fairly good, but it is best adapted to southeastern Nebraska. Otoe is characterized by early maturity, some stem-rust resistance, yellowish grain and straw a little stiffer than for Brunker. The grain of Otoe is inclined to be lighter in test weight than for most other varieties. The variety is recommended in Districts I, II, IV, and V, or roughly, the central and southeastern parts of the state. It is particularly suitable under conditions of delayed planting.

Brunker was selected from Burt oats at the U. S. Dry Land Field Station, Akron, Colorado. It is a yellow oat and its outstanding characteristics are early maturity, good yield record and some resistance to smut. One of its faults is weak straw and, as a result, the variety lodges very easily. Brunker has slightly outyielded Otoe at Lincoln and Alliance, but at North Platte in recent years the two varieties have been nearly equal. In cooperative tests in central and western Nebraska its yield record has been very good. Brunker should not be used on low ground where growth may become rank. The variety is on the recommended list for Nebraska. It is best adapted to the western two-thirds of the state, that is, Districts IV, V, VI, VII, and VIII.

Trojan is another Burt selection made at the U. S. Dry Land Field Station, Akron, Colorado. In Nebraska tests it has yielded about the same or slightly less than Brunker. It is early, has white grain, stiff straw and is resistant to smut. The kernels are small and the grain usually weighs less per bushel than that of some other varieties. Trojan is a recommended variety for central and western Nebraska, in fact, the same area for which Brunker is recommended. It is most useful for irrigated regions because of stiff straw, and because of erect growth and moderate to light tillering it makes a good companion crop.
Recommended Oat Varieties (Continued)

**Fulton** is a variety that was selected from a Fulghum x Market cross at the Kansas Agricultural Experiment Station. It is resistant to most forms of smut, is early, yields well and has fair test weight. It has kernels that are light red in color, resembling white oats more than Kanota but ordinarily it grades red. It is susceptible to crown and stem rust, has weak straw and if planted early may be injured by late spring frosts. It may be planted later in the spring than Fulghum or Kanota and still give a good yield. In Nebraska Fulton has about the same yield as Trojan at Lincoln, North Platte and Alliance during the last 7 years. In the field, Fulton often gives the impression of being ragged since it is not very uniform in height. The variety is recommended for the western two-thirds of Nebraska.

**Kanota** is a Fulghum type oat and in some areas of Nebraska is called "Winter." Kanota is a red oat, susceptible to smut and rust. If seeded early it will give a good yield and behave as an early variety, but if seeded late, the yield drops rapidly. At Lincoln, Kanota has been outyielded by such varieties as Fulton and Brunner, while at North Platte it is one of the high yielding varieties, and at Alliance for the period 1933-42 it yielded 59.5 bushels per acre compared to 59.6 bushels for Fulton. Kanota is recommended for Districts IV, V, VI, VII, and VIII provided seeding is done at the normal time, but if delayed, some other variety should be used.

**Acceptable Varieties**

**Tama, Boone, Vicland, Vikota, and Marion** are resistant to most forms of oat rusts and smut and all are acceptable in Districts II and III. The first four came from the same cross as Cedar and the histories are the same. Vicland is being distributed in Wisconsin and Vikota in South Dakota. Marion was selected from a Market x Rainbow cross. None of this group of varieties seems quite as well adapted to Nebraska as does Cedar, although all are good. Tama is nearly equal to Cedar in yield, or possibly slightly better in northeastern Nebraska. Vicland and Vikota are a little later than Cedar, but do well north of Lincoln. Boone seems to be the lowest yielder of the group, and in dry years its straw is very short. Marion is somewhat later, taller, and the grain is almost white with thin hulls and large groats.

**Varieties Not Recommended**

**Erban** was developed by the Ontario Agricultural College at Guelph, Canada, from a cross between Banner and Early Hipe (a strain of Bart). It was distributed to farmers for the first time in 1938. Erban is a midseason white oat with a spreading panicle. It has also shown no resistance to the rusts and smuts, and is too late in maturity for Nebraska. In tests at Lincoln it has given a very low yield.

*The information regarding the history and description of Cortie, Clinton, Erban, Gopher, Legacy and Vanguard was furnished by E. R. Stanton, Division of Cereal Crops and Diseases, Bureau of Plant Industry, Soils and Agricultural Engineering, and U. S. Department of Agriculture, Beltsville, Maryland.

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Oat Varieties Not Recommended (Continued)

Vanguard was developed from a cross made in 1926, between Hajira and Banner at the Dominion Rust Research Laboratory, Winnipeg, Manitoba, Canada. It was distributed in small quantities for the first time to farmers in Canada in 1937. Vanguard is a midseason, midgill, stiff-strawed, white oat, with spreading panicles, midlong, rather plump grains with some awn. It has been highly resistant to the prevailing races of stem rust but has shown no resistance to crown rust and smut. Like all other midseason oat varieties, Vanguard is just too late for maturity in Nebraska. During the last two years at Lincoln the variety has yielded 38.3 bushels compared with 55.9 bushels per acre for Cedar.

Legacy was developed from a cross between Banner and "Eighty-Day" made in 1906 by the Cereal Division, Central Experimental Farm, Ottawa, Ontario, Canada. It is an early to midseason variety with spreading panicles, and rather slender, mostly awnless, white grains. Legacy has no resistance to the rusts and smuts, and is not adapted to Nebraska, and has yielded only slightly more than half as much as Cedar.

Cartier was developed at Macdonald College, Quebec, Canada, from a cross between Alaska and Early Triumph. Cartier is an early to midseason variety in Nebraska, has spreading panicles, midlong white grains that are usually awned. It is susceptible to the rusts and smuts of oats, and has not been of any promise for Nebraska. At Lincoln in 1944 it yielded 16.1 bushels per acre compared with 32.7 bushels for Cato and 48.0 bushels for Cedar.

Clinton was developed at Ames, Iowa, from a cross between D69 and Bond, in tests cooperative between the Iowa Agricultural Experiment Station and the Division of Cereal Crops and Diseases, Bureau of Plant Industry, Soils and Agricultural Engineering, U. S. Department of Agriculture. D69 is a Richland x Green Russian cross. The Iowa, Illinois, and Indiana Agricultural Experiment Stations are planning to distribute Clinton for commercial production in 1946.

Clinton is an early short to midgill oat with a very stiff straw that resist lodging. The kernels are rather short, yellow, plump, with an occasional weak awn. Under Nebraska conditions, it is a little later in ripening and grows a little taller than Cedar and Tara. Clinton has been highly resistant to the races of crown rust and stem rust that occur in Nebraska. It has been resistant to some of the races of the oat smuts and also has high resistance to the leaf spot diseases. In a yield test at Lincoln in 1944 Clinton yielded 54.3 bushels compared with 41.4 bushels for Cedar, and in oat state tests in northeastern Nebraska it did not equal Cedar. The variety is to be watched very carefully.

Gopher was developed and distributed by the Minnesota Agricultural Experiment Station, University Farm, St. Paul, Minnesota. The original plant selection giving rise to Gopher was made from Sixty-Day by H. H. Hayes and Lee Alexander in 1917. Gopher was first distributed to farmers in 1923. It is an early to midseason white oat similar to Nebraska 21 with slightly larger and plumper kernels that usually are awnless. It has no resistance to the rusts and smuts. Gopher has not given yields equal to the better varieties in Nebraska.
Cat Varieties Not Recommended (Continued)

Ignot is a variety selected from Kherson at the Iowa Agricultural Experiment Station. It is described as being early, stiff-strawed, and highly resistant to stem rust. It has been used as a parent in many crosses. In Nebraska the variety did not give a yield equal to Kherson and therefore was discarded from the variety tests in 1943.

Kherson is more nearly a type of oats than a variety and many selections have been made from it. The original Kherson was described as being early, productive, and drought escaping, and undoubtedly was of great value. Many varieties are now available that are earlier and higher yielding, in fact, the variety has been surpassed in almost all characters.

Nebraska No. 21 is a selection from Kherson developed at the Nebraska Agricultural Experiment Station, and was first distributed in 1917. It became quite popular and considerable acreage was grown. It is similar to Kherson, being medium early and having white grain. It usually outyields Kherson, but in turn is outyielded by Otca, Brunker, and Cedar.

Fulgum is the parent variety from which Kanota was selected. The two are very similar, although Kanota has been continued as a representative of the red oat type. Fulgum is often called a "winter" type and will not stand late seeding. When seeded early it will give a fairly good yield.

Winter Barley

Winter barley has been grown with considerable success for the past few years in the southwestern counties of the state and in northeastern Colorado. Much of the acreage has been planted on the surplus fallow acres that normally would have been planted to winter wheat. Although there have been a few hardy varieties of winter barley developed recently, it is not likely that one will be produced that will be as hardy as the best winter wheats grown in the state.

In growing winter barley, it is very important that the best varieties be selected. From the information at hand it seems that Reno and Ward will give the best performance in Nebraska.

The seeding of winter barley in the spring is a questionable practice. Some varieties such as Ward and Reno will produce a crop when spring planted, but they will be late in maturing and relatively low in yield. For best yields it would be better to plant spring varieties at this time of the year.
Barley (Continued)

Spring Barley

Recommended Varieties

Spartan is a two-rowed, smooth-bearded variety having a very stiff straw. The grain usually has a weight per bushel superior to all other varieties tested. It has a tendency to shatter when overripe and is therefore not well adapted for combine harvesting. A light hailstorm when the crop is ripe may cause severe shattering. Spartan has been the highest average yielding variety at Lincoln since 1930 and also has been among the high yielding varieties at North Platte and Alliance. It is a fairly early variety and is recommended for all districts of the state.

Ezond is the result of an effort to produce a smooth-bearded Trebi barley. The work was done in Idaho with the cooperation of the United States Department of Agriculture. It is slightly earlier than Trebi. At North Platte and Alliance Ezond has been the high yielding variety when compared for a number of years, while at Lincoln its average yield for the 1930-33 period is 25.6 bushels as compared with 30.4 and 36.6 bushels for Spartan and Trebi. Ezond is recommended for the western two-thirds of the state.

Trebi is a six-rowed, rough-bearded type, medium late in maturity. It has lost some of its popularity since better adapted, high yielding varieties have been developed. This variety was distributed from Idaho after having been selected in Minnesota from barley brought into the United States from the south side of the Black Sea. Spartan has averaged nearly six bushels more than Trebi at Lincoln since 1925. At North Platte Trebi is a good yielding variety. At Alliance, where the later varieties are more adapted, it has produced very satisfactory yields. Trebi is recommended primarily in Districts VII and VIII.

Beecher is a very early maturing, six-rowed variety developed from an Atlas x Vaughn cross and first distributed by Colorado. It resembles Club Maricut except for its shorter, stiffer straw and smoother beards. For the 1930-33 period, this variety has averaged 2.9 bushels less than Spartan at Lincoln. It has had a good yield at North Platte and yielded very well in the cooperative small grain tests in 1943 in the central and south central counties. At Alliance, Beecher is apparently too early for maximum yields. For the three-year period at Alliance, Ezond outyielded Beecher by 11.5 bushels. Beecher is recommended in the southwestern counties in District VII and the south half of District VIII.

Acceptable Varieties

Velvon is a new smooth-bearded variety developed in Utah. It has not been tested long enough in Nebraska to be included in the list of recommended varieties. It has given good yields at most places where it has been grown, especially in the central and eastern counties. For a five-year period at North Platte it ranks
Valvon Spring Barley (Continued)

fourth with a yield of 32.1 bushels, while at Lincoln it ranks second for the past five years and has an average yield practically equal to that of Spartan. At Alliance since 1936 it has an average yield of 30.0 bushels compared with 28.2 for Etxond. This variety seems to be especially well suited as a smooth-bearded six-rowed type for Districts I, II, and IV and is an acceptable variety for all the state.

Club Mariout is a six-rowed, rough-bearded variety introduced from Egypt. It has a dense head and is somewhat resistant to covered smut but is very susceptible to lodging. Club Mariout has had a lower yield than Beecher at Lincoln and the cooperative small grain tests in central and south central Nebraska, but it has slightly outyielded this variety at Alliance. At Lincoln for the years 1936-43 it has had a yield of 22.7 bushels as compared with 24.9 bushels for Spartan. For the past ten years it has had an average yield of three bushels less than Spartan at North Platte, while at Alliance it has had an average yield nearly equal to Spartan but 7.3 bushels less than Etxond. Club Mariout is only on the acceptable list for Districts VI, VII, and VIII.

Flynn is a six-rowed, smooth awned, white kernelled barley with fair straw strength and moderate height. It is grown quite extensively in Kansas and at one time was on the Nebraska Certified list of varieties, but there never was much of an interest in it. Flynn made its best record during the drought years.

Mars is a new variety produced and distributed by the Minnesota Experiment Station. It is an early, six-rowed, smooth bearded type resistant to stem rust and moderately resistant to spot blotch. This new variety has given higher yields than Wisconsin Pedigree 36 in Minnesota. For a two-year period at Lincoln, Mars has been about as early as Spartan and has been slightly higher in yield. This variety seems to be quite promising in the limited number of tests conducted in Nebraska. Until more information is available, no definite recommendations can be made.

Varieties Not Recommended

Kanchuria is a malting type. It is a six-rowed, rough bearded variety. It is late in maturing and although at Lincoln since 1935 it has been the lowest yielding variety tested, it may give a relatively better performance in the northeastern counties.

Wisconsin Pedigree 37 and 38 are smooth-bearded, white seeded, six-rowed types. They have good straw, are resistant to barley stripe, and the grain has good malting quality. Of the two, Wisconsin Pedigree 36 is the better. It has been tested at Lincoln since 1936 and has an average yield of five bushels less than Spartan. The variety is quite late and is not recommended for the state except possibly in the northeastern counties.

Comanche is a two-rowed variety distributed in Montana that is inferior to Spartan when grown in Nebraska and therefore not recommended. It seems to be more susceptible to chinch bugs than other varieties tested.
Barley Varieties Not Recommended (Continued)

Short Comfort is a six-rowed, smooth-bearded variety that was quite popular in Nebraska before the drought period of the middle 1930's. It has been replaced by Spartan which will give higher yields and better quality of grain.

Glabron was at one time a very popular variety in the state being smooth bearded and moderately late in maturity. For the 1933-39 period at Lincoln it had an average yield of 13.7 bushels per acre or nearly 10 bushels less than Spartan and at North Platte for the period 1931-35 it had the lowest average yield of all varieties tested.

Spelt and Emmer

Both winter and spring types of both spelt and emmer are known. The crop commonly called spelt (spelts) (speltz) in Nebraska is not spelt but is spring emmer. The nearest known production of spelt of any consequence is in Michigan. This is of the winter type and will not produce seed if planted in the spring. Emmer and spelt can be distinguished from each other in the threshed grain by noting the position of the rachis joint. This joint or segment is usually attached to the end of the emmer kernel and to the side of the spelt kernel. This is not an infallable rule for each kernel, but with kernels in the mass it is reliable.

Tests with spring emmer have been conducted at both the North Platte and Lincoln Experiment Stations. In both instances emmer gave lower yields than oats or barley. The following figures are from the Lincoln station and represent average yields of hull-free grain in pounds per acre, for a four-year period:

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Emmer ripens a week to ten days later than oats which no doubt accounts in part for its poor showing. It has a test weight of 30 to 40 pounds per bushel and has a feeding value, pound for pound, slightly higher than oats. Winter emmer is not hardy under Nebraska conditions.
BUCKWHEAT

In some years buckwheat is seeded late following a failure of a previous crop. In 1944 buckwheat was seeded in eastern Nebraska on land where corn had been washed out. There are two varieties of common buckwheat. Japanese is tall, late, and has large, angular, black seeds and Silverhull is shorter, earlier, and has smaller rounded seeds that are gray in color. Since buckwheat is readily cross pollinated, much crossing occurs and the type of seed usually found is more or less intermediate between the two varieties. Buckwheat is recommended only as a special or emergency crop.

28577jh-3/45
HYBRID CORN

The superiority of well chosen corn hybrids compared with open-pollinated varieties is thoroughly established throughout the eastern third of Nebraska and under irrigation elsewhere. In many of the eastern counties, 95 per cent or more of the acreage was planted to hybrids in 1944, while 75% of the entire corn acreage of the state was in hybrids.

In south central, central, and western Nebraska, in the absence of irrigation, progress in the testing, demonstration, and general acceptance of corn hybrids has been more retarded because of crop failures due to drought. However, in the central and south central sections, hybrids are now coming into more general use. Corn breeders and seed producers now understand better the adaptation requirements and have a more effective improvement program for those regions. During this transition period, conservatism in the use of hybrids would seem the wise policy except as local experiments and experiences may justify their more general adoption.

It is commonly regarded advisable for individual corn growers to plant several hybrids representing a range of maturity dates. Such a plan brings about diversification within a crop and assures greater continuity of production. Keeping a record of the specific hybrids planted serves as a guide to choosing the more productive ones in future years.

In localities where hybrids are well established, both experiment station and privately-controlled hybrids commonly are available. Usually suitable hybrids may be found in both classes. Being highly competitive and also differing greatly in their vegetative habits, productivity, and local suitability, hybrids should be chosen for planting only after a careful study of their respective merits.

There is a special industrial demand for a limited amount of white corn of good quality. The breeding program has not advanced as far with white as with yellow corn. Availability of superior, suitable seed will determine the extent to which one might benefit from the current price differential. It would seem that white corn should be grown primarily only as a cash crop for specialized demand. The superior feeding value of the yellow grain with its higher vitamin content is universally acknowledged.

Tests have fully proved that the gains from hybrid vigor in corn can be had only from the use of first generation hybrid seed. Planting seed from the previous year's commercial hybrid crop results in reduced yields. In the case of double crosses, this loss averages about 17 per cent compared with 34 per cent for single-cross hybrids. Thus, second generation seed of superior commercial hybrids usually does not surpass standard open-pollinated varieties and may prove inferior.

The regional adaptation and productivity of any specific hybrid have been found unaffected by the locality of seed production provided correct foundation seed stocks are used and the procedures of crossing and seed processing are properly carried out.

28577jh-3/45
Corn (Continued)

Recommended Experiment Station Hybrids

Brief descriptions are given of nine superior Experiment Station hybrids that are recommended in Nebraska. Table 1 shows where in the state they are suitable for production as standard full-season hybrids, and also where some of them may serve for delayed planting because of their earlier maturity. For late planting it is advisable to use the earlier maturing hybrids as this will reduce the likelihood of a "soft corn" crop and reduced feed units per acre. The hybrids are given in approximate order from the earliest to the latest ripening, based on average performance.

Iowa 4616 - (Wf9 x M14) (L269 x I205) is a very promising new early hybrid. It is a few days earlier than Iowa 939. The plants are small and the ears are borne low on the stalk. It has shown excellent yielding ability and general all-round performance in its maturity class in tests thus far. The ears carry 14 to 16 rows of deep, well-dented kernels.

Iowa 939 - (Os 420 x Os426) (1205 x L289) has plants of medium height, large ears with good lodge-resistance and ear retention. It produces a large ear of good grain quality.

Iowa 306 - (Os 420 x Os426) (1205 x L289) has plants of medium height and dark green in color. The ears are borne at a good height on the stalk, are of medium length and have medium depth grain. Ear dropping occurs when grown in regions where later ripening hybrids are suitable, or where the plants die prematurely because of drought.

Nebr. 463 - (M6 x Ind. 66) (Os 420 x A) has plants of medium height and quite susceptible to stalk breaking. It has strong shanks and is not as subject to ear dropping as is Iowa 939. The ears are medium rough with reddish-yellow kernels.

Iowa 4059 - (Wf9 x Hy) (1205 x L289) has shown unusual promise in its maturity class. It is very resistant to lodging and ear dropping. The plants are tall and the ears are large with a starchy grain.

Indiana 5022 - (Wf9 x Hy) (A x Tr) has plants of medium height which are fairly lodge resistant. It has medium size ears with grain of rather starchy texture.

U.S. 35 - (Wf9 x 38-11) (Hy x R4) has plants medium tall and quite resistant to lodging. The ears are large and have a relatively soft starchy grain.

Nebr. 101 - is a full season corn in east-central Nebraska and west under irrigation in the Platte Valley. It has a dark green foliage with ears borne at a medium height on a medium to long shank. The plants are of medium height and show considerable resistance to stalk breaking. Under normal corn growing conditions this hybrid will give excellent yields of good quality grain. The ears are thick and carry 16 to 18 rows of deep somewhat smoothly dented kernels. Its performance in experimental yield trials to date has been excellent.
Recommended Experiment Station Corn Hybrids (Continued)

Ohio C32 - (Wf9 x 38-11) (Hy x 07) has plants which are medium tall and dark green in color. The ears are large and cylindrical with rather deep, soft, starchy kernels. Ohio C32 has excellent stalk quality and a good root system, making it highly resistant to lodging.

Illinois 201 - (Wf9 x 38-11) (L517 x 187-3) has plants which are tall with a very dark green foliage. The ears are long and slender and are borne on a long shank. It appears to be rather lodging resistant.

U.S. 13 - (Wf9 x 38-11) (Hy x L317) is a medium tall hybrid and bears its ears at a medium height. The ears are large with deep grain. They are borne on a relatively short shank making it less subject to ear dropping.

Kan. K 2234 (White) K 2234 is perhaps the most outstanding full season white hybrid now available to Nebraska corn growers in southeastern Nebraska. The plants are tall and the ears are borne well up on the stalk. The plants are quite drought resistant and very resistant to stalk breaking. Under some conditions root lodging may occur, however. The ears carry 14 to 16 rows of broad deep kernels.

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Table 1 - Recommended Experiment Station Corn Hybrids for Nebraska, by Districts

<table>
<thead>
<tr>
<th>District</th>
<th>Maturity classification of hybrids in the various districts</th>
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<tbody>
<tr>
<td></td>
<td>Early</td>
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<tr>
<td>Southeast (No. I)</td>
<td>Iowa 4316</td>
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<tr>
<td></td>
<td>Iowa 306</td>
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<tr>
<td></td>
<td>Iowa 939</td>
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<tr>
<td></td>
<td>Nebr. 463</td>
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<tr>
<td>East Central (No. II)</td>
<td>Iowa 4316</td>
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<tr>
<td></td>
<td>Iowa 306</td>
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<tr>
<td></td>
<td>Iowa 939</td>
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<tr>
<td></td>
<td>Nebr. 463</td>
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<tr>
<td>Northeast (No. III)</td>
<td>Iowa 4316</td>
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<tr>
<td></td>
<td>Iowa 306</td>
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<tr>
<td></td>
<td>Iowa 939</td>
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<tr>
<td></td>
<td>Nebr. 463</td>
</tr>
<tr>
<td>Central and Dryland South Central (No. IV &amp; V)</td>
<td>Iowa 4316</td>
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<tr>
<td></td>
<td>Iowa 939</td>
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<tr>
<td></td>
<td>Iowa 306</td>
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<td></td>
<td>Nebr. 463</td>
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<tr>
<td>Irrigated</td>
<td>Iowa 4316</td>
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<td></td>
<td>Iowa 306</td>
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<td></td>
<td>Iowa 939</td>
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<td></td>
<td>Nebr. 463</td>
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<tr>
<td>Southwest (No. VII) Dryland</td>
<td>Iowa 4316</td>
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<td></td>
<td>Iowa 306</td>
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<td></td>
<td>Nebr. 463</td>
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<td>Iowa 4316</td>
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<td>Iowa 306</td>
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<td>Iowa 939</td>
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<td></td>
<td>Nebr. 463</td>
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</tbody>
</table>

Districts used here correspond with those shown for small grain on p. 13.

The terms "early", "midseason", and "full-season" apply here to good corn land in an average season.

28577th-5/45
SOYBEANS

Dunfield - This medium-early variety is recommended because of its desirable growth habits and its consistently good performance in yield tests over a period of years. The plants mature uniformly and are very shatter resistant. The erect growth and lodging resistance of Dunfield makes it well liked where combine harvesting is employed.

Illini - The yields of Illini approximate those of the Dunfield variety. In time of maturity it is nearly a week later. The plants are less erect than are those of Dunfield and the stem tip growth is somewhat twining. Illini is best suited to the east central and southeastern parts of Nebraska.

Lincoln is a new high-yielding variety developed at the Illinois Agricultural Experiment Station with the cooperation of the U. S. Regional Soybean Laboratory. Where adapted it has consistently outyielded all other commonly grown varieties in Nebraska tests. In 61 tests over a period of five years, in several corn-belt states, Lincoln has shown an increase in yield of 23.9 per cent over the average of Dunfield and Illini. It has also exceeded Dunfield in percentage of oil, percentage of protein, and iodine number of the oil. Its upright growth and resistance to lodging makes it well adapted to combine harvesting. Being about two days earlier in time of maturity than Illini, it is best suited to east central and southeastern Nebraska. The seed supply of this variety is being increased at the present time. General distribution to farmers will begin in 1945.

Richland - The outstanding characteristic of this variety is its lodging resistance when grown on soils of very high fertility. Combining is facilitated by its erect growth habits on rich soils where other varieties may go down badly. In Nebraska tests it has given good yields and the grain is high in protein and oil content. Since it matures about five days earlier than Dunfield it is especially adapted to highly fertile land in northeastern and east central Nebraska.

Earlyana is a variety developed and recently released by the Indiana Experiment Station. It is earlier than Richland and grows taller on soils of average fertility. Earlyana yields about as well as Richland but it is less desirable from the standpoint of its poor lodging resistance on rich soils. Its very early maturity makes it adapted to the extreme northeastern section of the state and to other areas where a variety of such early maturity is desired.

Mukden is grown in northern Iowa and is especially suited to the east central and northeastern sections of Nebraska. It is somewhat earlier than Dunfield but it is slightly inferior to this variety with respect to yielding ability. It has about the same height and lodging resistance as Dunfield. Seed can be obtained locally or from Iowa where it is grown as a certified variety.
Soybeans (Continued)

Chief is a selection from a cross between Manchu and Illini developed and released by the Illinois Experiment Station. The plants are tall and are similar to Illini in erectness. Since it matures about a week later than Illini, its production should be restricted to southeastern counties. In that section of the state it outyields all other varieties.

Manchu - The Manchu is one of the older varieties that is still being grown by many farmers. However, the introduction of new superior varieties such as those described above puts the Manchu in the class of acceptable but not recommended soybeans.

Areas where recommended varieties are adapted:

I. Northeast
   Richland
   Earlyana
   Mukden
   Dunfield (except in northern part)

II. East Central
   Lincoln
   Dunfield
   Illini
   Varieties of Group I for late plantings

III. Southeast
   Chief
   Lincoln
   Illini
   Varieties of Group I and II for late plantings

26577ig-3/45
SORGHUMS

Grain Sorghum Varieties

Recommended Varieties

_ Early Kalo _ is an early selection from Kalo. The first large distribution in Nebraska was made by the North Platte Substation in 1937. It has been a very popular and high yielding variety and because there is some danger of its lodging at the time of maturity, it is not recommended as a suitable variety for harvesting with a combine. Intensive selecting has been done in this variety by the Experiment Stations at Lincoln, Nebraska, and Hays, Kansas, and, as a result of this work, one particularly outstanding selection was found at the Ft. Hays Experiment Station, seed of which has been increased for distribution. Enough seed was produced in 1944 to plant a considerable acreage this year. This selection does not differ very much in general type and yielding ability from the old Early Kalo, but it is much more uniform in plant height. Early Kalo is somewhat chinch bug resistant and can be grown with considerable success in southeastern Nebraska except in years when there is a heavy infestation.

_Day_ has the same parentage as Sooner. It resembles Sooner except that it does not grow as tall and is a few days later in maturity. Day is sufficiently lodge resistant to usually permit combining. It is a high yielding variety at North Platte and in cooperative tests conducted in central and south central Nebraska. This variety is highly susceptible to chinch bugs and should not be grown in the southeastern counties of the state. It is recommended for all districts except VIII (See Fig. 3) and the eastern two-thirds of District I. Martin and Kalo H. C. 617 are superior to Day as varieties suited for combine harvest.

_Coes_ was selected at the United States Dry-Land Field Station, Akron, Colorado. It is a very early maturing, white seeded variety and although it grows taller than Early Kalo, it is more lodge resistant. For the four year period of 1940-44 at North Platte, Coes yielded 37.4 bushels as compared with 39.1 bushels for Early Kalo. Coes is recommended for Districts IV, V, VI, VII, and VIII.

_Club_ was selected from a row of Dawn Kafir at the Fort Hays, Kansas Experiment Station. It requires the full season to mature and is quite resistant to chinch bugs. At Lincoln it has had the highest average yield of all varieties tested since 1932. Its yield for this period is 33.7 bushels or 5.3 bushels more than Early Kalo. It also has had a high average at North Platte, but the variety is too late to mature there consistently. Club is recommended for Districts I and II.

_Alliance_ was introduced into Nebraska in 1936 from the United States Dry Land Station, Akron, Colorado. It is a selection from a cross between extra Early Pink and Highland and was called Yellow Highland or A. C. 1. In the spring of 1941 a purified strain was released and named Alliance by Nebraska.
Fig. 3 - Recommended varieties of grain sorghums and forage sorghums by crop testing districts in Nebraska

Note: The "R" designation following a variety name means that it is recommended; the "a" designation means that it is acceptable.
Alliance Sorghum (continued)

The variety is quite similar to Early Kalo in appearance and a few days earlier in maturing. It is quite susceptible to charcoal rot and should not be left standing for combine harvesting. At Lincoln for the period 1939-44 it has had an average yield of 22.2 bushels as compared with 34.3 for Early Kalo. At North Platte for the 1940-44 period it has had an average yield of 34.2 bushels or 4.3 bushels less than Early Kalo. Because of its earliness, Alliance is a safer variety than Early Kalo to grow in the extreme western counties. It is recommended for Districts VI and VIII.

Midland is a new early combine grain sorghum, formerly known as Kalo Selection H. O. 617. This sturdy, high yielding, combine type was developed at the Fort Hays Experiment Station from the same cross that produced Kalo and Early Kalo. It is quite lodge resistant and has about the same maturity range as Early Kalo. The heads are elongated, and somewhat open. The seed is red color, medium size, and the grain will grade as milo. It combines easily and threshes out clean from the glumes. It can also be harvested with a binder. At Lincoln for the past three years, Midland has yielded 44.1 bushels in comparison with 47.3 bushels for Early Kalo. It is recommended for Districts IV, V and VII. The variety has been certified by the Nebraska Crop Improvement Association.

Martin and Westland are new combine types recently released to farmers in Kansas and Texas. Westland is a milo disease resistant selection from Wheatland, selected at the Garden City Experiment Station, Garden City, Kansas. Martin was selected in Texas from the same variety by a farmer named W. P. Martin. Both varieties are quite similar in appearance, having short stalks, reddish seed, and long, semi-compact heads. They are earlier than Wheatland, but not as early as Early Kalo. Because Martin is slightly earlier than Westland, it is better adapted to Nebraska farms and is on the recommended list for Districts IV and VII. These varieties are as susceptible to chinch bugs as Day and should not be planted in the southeastern counties of the state.

Acceptable Varieties

Colby was developed from the same cross as Sooner and Day but the purification, testing, and distribution was done at Colby, Kansas Substation. It is similar to Day in appearance except the heads are somewhat less compact and are exerted further above the top leaf. Colby never has equaled Day in yield and is highly susceptible to charcoal rot and as a result usually lodges at the time of maturity.

Western Blackhull is a high yielding variety that has produced excellent yields in the southeastern part of the state. It is a full season, medium tall variety, quite chinch bug resistant, and is acceptable only in District I. At Lincoln it has had an average yield of 29.9 bushels since 1932 as compared with 28.4 bushels for Early Kalo and 33.7 for Club.
Grain Sorghums (Continued)

Pink Kafir was selected at the Fort Hays Experiment Station, Hays, Kansas, from material originally introduced from Africa. Its yielding ability and time of maturity are similar to Western Blackhull, but it is more susceptible to lodging. Pink Kafir has given good yields of grain and forage at Lincoln when drought was not too severe. This variety is acceptable only in District I.

Highland is an early maturing variety that originated from a selection in Dawn Kafir at the United States Dry Land Field Station, Akron, Colorado. It has had a lower average yield than Coos at North Platte, is more susceptible to lodging and there is some tendency for it to give poor stands. The variety is acceptable in Districts VI and VII, but Coos would be a more desirable variety to grow if seed is available.

Hegari is a late maturing, white seeded variety that does not produce much grain unless grown under favorable conditions. When the crop produces only a fair yield of grain the fodder is very palatable to livestock. The value of the fodder decreases with increased grain yields. Hegari has averaged 24.5 bushels at Lincoln since 1932 or 9.2 bushels less than Club. It is acceptable in Districts I and IV and when irrigated in Districts IV, V and VII.

Varieties Not Recommended

Kalo was introduced into Nebraska in 1934 from the Fort Hays Experiment Station, Hays, Kansas. Kalo was selected from the progeny of a natural cross between Pink Kafir and Dwarf Yellow Milo. It has been grown to a limited extent in Nebraska but has never become very popular. The variety is no longer on the approved or recommended list.

Sooner is a selection from the cross Early White Milo x Dwarf Yellow Milo at the Southern Great Plains Field Station, Woodward, Oklahoma. It is early, has a rather high potential yielding capacity and was widely grown during the drought years but is now grown to a very limited extent because it lodges too badly when mature. It is no longer on the certified seed list and is not a recommended variety.

Plainsman is a new combine type developed by the Experiment Stations in Texas. It is later in maturity than either Martin or Westland and will not mature unless planted early or in years with later than average frost dates in the fall.

Early Hegari is similar in appearance to Hegari except that it is shorter and much earlier maturing. Its maturity date is similar to that of Early Kalo. This variety has given high yields in all tests in which it has been included, but because it is so highly susceptible to charcoal rot, it is not recommended.
Grain Sorghums (Continued)

Feterita was one of the first grain sorghums grown in Nebraska, early introductions having been made in the period between 1905 and 1910. It is fairly well adapted in this state but often gives poor stands because the soft seeds rot quickly in cold, wet soil. Feterita stalks do not make good forage although they are sometimes used for that purpose.

Grohoma originated in Oklahoma, and its parentage is somewhat in doubt. The variety received much unjustified promotion about ten years ago and is still grown to a limited extent in several states. Grain from Grohoma is not of good quality and yields have not been promising. Grohoma is not recommended for any part of Nebraska.

Forage Sorghum Varieties

Recommended Varieties

Atlas was developed at the Kansas Agricultural Experiment Station at Manhattan from material supplied by L. W. Farr of Stockton, Kansas who had found a field cross between Sourdless sorgh and Blackhull kafir. In Atlas have been combined the tall, sweet, juicy stalks of Sourdless sorgh and the white, palatable seed and lodge resistance of Blackhull kafir. Atlas may truly be called a dual-purpose variety since both the grain and forage are of excellent quality. Atlas is the best forage sorghum variety for eastern Nebraska and the irrigated areas as far west as North Platte. Over a period of years at Lincoln, it has given a higher average forage yield than any other variety tested. Atlas requires a long growing season but will ripen under eastern Nebraska conditions if growth is not retarded too long by drought. It is one of the most chinch bug resistant sorghums. It is recommended for all districts except VI and VIII. A good quality of forage will be produced even when the seed does not fully mature.

Norkan was introduced into Nebraska in 1938 from the Fort Hays Experiment Station, Hays, Kansas. It is a selection from a cross between Atlas and Early Sumac and may be described best as an early Atlas, but it is not as lodge resistant. At Lincoln for the 1942-44 period it has had an average grain yield of 57.2 bushels compared with 54.6 bushels for Atlas and 57.0 bushels for Club. At North Platte since 1940 it has yielded an average of 33.9 bushels as compared with 39.1 bushels for Early Kalo. Atlas did not mature grain at North Platte in these four years. The forage yield of Norkan is not as high as that of Leoti at North Platte. Norkan is recommended for Districts IV, V, VI, and VII.

Leoti is of unknown origin but was grown locally in Kansas for many years before being taken to the Fort Hays Experiment Station for testing. Leoti produced forage of excellent quality and is sufficiently early in maturity to be well adapted in central, and southwestern parts of the state. It will lodge readily under some conditions but is more lodge resistant than Black Amber.

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Lecti (Continued)

It has been one of the highest yielding forage varieties at North Platte. Lecti is a recommended variety for all parts of the state except for the north half of District VII.

Black Amber is a widely grown forage variety in Nebraska especially in the northern and western parts of the state. It is fairly productive and except in the northwestern counties where earliness is essential, Lecti will usually yield a greater tonnage of better quality forage. Black Amber is recommended for all districts except I and II.

Rox Orange was developed by the Wisconsin Agricultural Experiment Station, Madison. The variety was later distributed in Minnesota and Iowa by the Waconia Sorghum Mills Company as Waconia Orange. It is a little later than Lecti and at Lincoln has outyielded Black Amber and Lecti. Rox Orange is acceptable in all districts except VIII. It will produce a high quality of forage even though it does not fully mature every year in the districts in which it is listed as acceptable. Rox is especially suited for farm production of sirup and molasses.

Fremont is an early forage variety developed at the United States Dry Land Field Station, Akron, Colorado. It is best described as an early Early Sumac. This variety is as early as Black Amber and at North Platte has given yields about equal to Early Sumac. It does not grow as tall as Black Amber or Lecti and the bundles of forage are much easier to handle. Fremont is now being grown to a limited extent in northeastern Colorado and is being increased for Districts VI and VIII in Nebraska. It has been made eligible for certification in Nebraska.

Acceptable Varieties

Early Sumac was selected from Standard Sumac at the Fort Hays Experiment Station, Hays, Kansas. It is slightly later than Black Amber and about the same as Lecti in time of maturity. This variety is acceptable in Districts III, IV, V, VI, and VII.

Kansas Orange is somewhat later than Atlas and has given high yields at Lincoln but is too late to mature grain consistently and has lodged severely in some years. It is acceptable only in District I.

26577:jh-3/45
SUDAN GRASS

Wheeler. Little selecting has been done in Sudan grass and as a result the common sudans are quite variable in seed color which ranges from black to straw color. Most of the seed is straw color. When the demand for certified seed became great enough in Kansas, a survey was made of the Sudan being grown in that state and a very desirable looking strain was found growing on the farm of Mr. Wheeler at Bridgeport, Kansas. Because this was the best lot of seed available it was used as a foundation for certified seed in Kansas. The present certified Sudan in Nebraska has been traced in this Kansas source. A great deal of testing work has not been done on Sudan, but the most outstanding characteristic of this strain is the rapidity with which it establishes a stand and grows during the first few weeks after planting. In a test at Lincoln in 1944 the Wheeler strain gave the highest yields. The only Sudan that approaches Wheeler in its rapid early growth is California 23. This strain is a week or ten days later in heading and, judging from the meager data available, it is more susceptible to chinch bugs and somewhat lower in yield.

Texas Sweet Sudan was developed by the Texas Experiment Station as the result of a cross between Sudan grass and Leoti. By making several backcrosses to Sudan the Sudan type of vegetation was retained but the seed has reddish or sienna colored glumes. These strains from this cross have not yielded as much forage as Wheeler at Lincoln, but they do produce higher seed yields and they are more resistant to chinch bugs. The forage is more palatable to livestock as pasture and bundle feed. There is some evidence at present which indicates that these strains are relatively high in prussic acid. It has not been determined whether it is as safe to pasture the Texas Sweet Sudans as Wheeler in Nebraska. Until such information is available, it is advisable to go slow in recommending these strains for production in the state.

Tift is a Sudan strain which was the result of a cross at the Experiment Station in Georgia. At Lincoln it has given high forage yields, is somewhat more lodge resistant, and later in heading than Wheeler, but it has rather coarse stems. Not enough information is available to recommend it to Nebraska farmers.
ALFALFA

Because of seed production difficulties, alfalfa does not lend itself to the development of numerous locally adapted varieties as is the case with many farm crops including corn and the small grains. Alfalfa is normally cross-pollinated by wild bees. Through years of natural selection regional strains have developed which today are known as domestic strains of alfalfa and are commonly designated as Nebraska Common, Kansas Common, etc., depending upon the state wherein the seed was produced. There is little difference among these domestic strains except as one goes from North to South where extreme differences in winterhardiness and productivity are found. The southern commons are very productive in the absence of winterkilling but are so susceptible to winter injury that they often fail to survive even mild winters in states as far north as Nebraska. The northern commons are relatively unproductive when grown in the south but are winterhardy and if properly managed usually survive even the most severe winters. The central commons are intermediate between these two extremes.

Estimating the seed possibilities of a meadow.—The current shortage and high price of northern-adapted alfalfa seed tends to emphasize the importance of knowing how to determine when it may be profitable to hold a meadow for seed production rather than to harvest it for forage. There are many factors, some of which are not well understood, that influence the yield of alfalfa seed. More and more evidence is accumulating on the importance of tripping by insects for satisfactory seed production.

High soil moisture along with cloudy rainy weather generally stimulates vegetative growth of alfalfa and may cause the plants to lodge. Satisfactory yields of seed cannot be expected under these conditions and it usually will prove more profitable to cut the meadow for hay. A moderate supply of soil moisture along with clear sunny weather is favorable for a type of growth conducive to high yields of seed. If under these conditions one finds numerous racemes with all flowers open in full bloom, few flowers tripped, and many blossoms falling to the ground, it is an indication that beneficial-insect activity is lacking and that although other prospects for a seed crop are good the meadow will prove most profitable if harvested for hay. On the other hand, if under these same conditions one finds little stripping of flowers and numerous racemes with flower buds, mature turgid flowers several of which are tripped, wilted flowers, and immature pods all on the same raceme, seed prospects are excellent and the meadow should be held for seed production which will prove satisfactory providing the weather continues favorable (clean and sunny) for the formation of flowers and for beneficial-insect activity.
Alfalfa (Continued)

It generally is recommended that alfalfa seed be harvested when about two-thirds of the pods are black or brown. At this stage of development rainy weather, especially intermittent showers, is very unfavorable and if long-continued will cause many of the pods to shatter as well as to lower the quality of the harvested seed.

Description of Varieties

Ranger, new bacterial wilt resistant variety.—Ranger alfalfa, formerly known as AL36, is a new synthetic variety produced through the cooperative efforts of the Nebraska Station and the Division of Forage Crops and Diseases, U. S. Department of Agriculture. On recommendation of the Agronomy Department it was admitted as a certified variety in Nebraska on November 19, 1942. It was released for commercial distribution by the Alfalfa Improvement Conference on November 11, 1942.

Ranger may be called a multiple-strain variety, having been synthesized from five selections developed from the varieties Cossack, Turkistan, and Ladak. Some of the selected strains entering Ranger were from Turkistan introductions brought direct from that country by the late H. L. Westover, explorer for the U. S. Department of Agriculture. In morphological characters, Ranger exhibits considerable variability, both in habit of growth and flower color. It is distinctly variegated in flower color, but only occasionally, if at all, are yellow-flowered plants observed. Plants vary in habit of growth from docile to upright. The variety has greater rapidity of recovery after cutting than do Ladak or Cossack, being about the same as Grimm in this respect. It is slightly more susceptible than Grimm to leaf spot diseases and leaf hopper yellowing, but not as susceptible as Hardistan or the Turkistan strains in this respect. These latter characteristics should not prove a handicap under Nebraska conditions, but may be detrimental for areas east of the Mississippi River. However, where bacterial wilt is a serious factor, its resistance to this disease may more than offset its susceptibility to leaf diseases.

Ranger is superior in seed production to Hardistan or the Turkistan strains, being about equal to Grimm. In forage production it is intermediate between Grimm and Hardistan. It is about equal to Grimm in cold resistance. Outstanding characteristic of this variety is its resistance to the bacterial wilt disease, being greatly superior to all domestic strains and equal or superior to the Turkistan, including Hardistan and Croatan. (56th Annual Report of the Nebraska Agr. Exp. Sta., pp. 21-22, 1943.) Ranger is recommended for Nebraska in those irrigated or humid areas of the state where wilt is known to be prevalent and where a productive stand is desired for more than three years.

Hardistan.—Kiesselbach, Anderson, and Feltier give the detailed origin of Hardistan as follows:

"The immediate seed source of this new variety is an old superior field of alfalfa belonging to Arnold Brothers in Dawson county, Nebraska. Special attention was first called to this field by County Extension Agent A. B. Hecht, who described it as the most outstanding field known in Dawson county. In 1927
Hardistan Alfalfa (Continued)

16 years after sowing, it was recognized as having a practically perfect stand aside from predation by pocket gophers. Hecht investigated the history of the seed from which this field had been sown and found it was obtained from a seed house as Turkistan seed."

In Nebraska tests, it has yielded 94 per cent of Grimm. It has also been somewhat lower in seed productivity. In controlled freezing tests it has proved consistently more cold resistant than Grimm. One of the best characteristics is its wilt resistance. Hardistan has maintained stands under bacterial-wilt conditions several years longer than Grimm. At the end of 10 years in the demonstration plots in the Platte valley, Hardistan still had a practically perfect stand, while Grimm had "gone out" in four years. (Nebr. Agr. Exp. Sta. Bul. 331, p. 35.)

Grimm.—The present commercial stocks of Grimm are the progeny of an original importation from Germany made by Wendelin Grimm into Carver county, Minnesota, in 1857. It became widely recognized as a cold-resistant variety when the Minnesota Agricultural Experiment Station first drew attention to its cold resistance, and its ability to overwinter in northern regions in 1905.

It has become the standard variety over the northern sections of the United States and Canada. The hardiness of Grimm alfalfa is probably due in part to the presence of the yellow-flowered alfalfa in its ancestry, and in part to the presence of natural selection which took place under the severe climatic condition to which it was subjected for a long period of years in Minnesota. Its variegated flower colors, which indicate its yellow-flowered ancestry, range from green, smoky black or black, to purple and white, although at present the variegation tends toward the lighter colors.

Grimm alfalfa has been used as a standard in the yield tests at Nebraska, and, although it has been outyielded by several strains in single tests, it is near the top in average yield over a long period of years. It is susceptible to the bacterial-wilt disease, and for this reason its stand maintenance has been poor under conditions where this disease has been a factor. Because of its extreme susceptibility to this disease it is not now recommended for long rotations where wilt is known to be prevalent. (Nebr. Agr. Exp. Sta. Bul. 331, pp. 31-33)

Cossack.—Cossack alfalfa was introduced from Siberia through the efforts of the United States Department of Agriculture. It is somewhat more variegated in flower color than Grimm, with yellow blossoms conspicuous. It rates as the highest forage-producing strain in yield tests in Nebraska.

In controlled freezing tests its average for cold resistance has been slightly higher than that of Grimm. It is not resistant to bacterial wilt, but appears to be somewhat more tolerant to it than Grimm under ordinary field conditions, withstanding the disease perhaps one or two years longer than Grimm. (Nebr. Agr. Exp. Sta. Bul. 331, pp. 33-34)

Ladak.—It is an introduction from the province of Ladak, Kashmir, in Northern India, made by the office of Foreign Plant Introduction of the United States Department of Agriculture in 1910. The seed was labelled Medicago falcata but it proved to consist of hybrids between the yellow-flowered species
M. falcata and the purple-flowered species M. sativa. No other alfalfa grown commercially in the United States shows such a diversity of habit of growth and flower color. An outstanding characteristic of this variety, exceeding all other varieties in this respect, is its ability to make an exceptionally heavy first crop. It is therefore especially suited for growing in those regions where only one cutting per season is normally obtained.

In tests at the Nebraska Experiment Station, Ladak has averaged 3 per cent lower in yield than Grimm, while it has averaged slightly higher in cold resistance.

This variety has not proved wilt resistant where the disease is severe, but apparently it is more tolerant of the disease than is Grimm, maintaining a stand from one to three years longer. (Nebr. Agr. Exp. Sta. Bul. 331, p. 34.)

Common.—Common alfalfas include the ordinary purple-flowered strains which trace largely to Chilean origin. Through the years the crop has been remarkably changed by natural selection, and, after being grown for many generations in an area, it has come to be designated by the name of the area in which it is grown, for example, Nebraska Common, Kansas Common, etc. In this way southern-grown Common has become adapted to southern areas and northern Common to northern areas, with a corresponding difference in their cold resistance.

In Nebraska yield tests, the hardy northern Common strains have produced almost as well as Grimm, while the southern, non-hardy strains have not maintained a stand under severe conditions. Strains of Common originating in northwestern Nebraska, or to the north of this area in the Dakotas and Montana, have proved about as cold resistant as Grimm in controlled freezing tests. It is probable that some of the so-called Northern Common of today has also had an admixture of Grimm and Turkistan. Dakota 12 is essentially the same as Dakota Common.

One difficulty with the Common alfalfa is that often a regional designation is given after production under those conditions for perhaps only one generation which would not provide opportunity for adaptation to the new conditions. In addition to the domestic regional strains, imported Common alfalfas are also found on the market. (Nebr. Agr. Exp. Sta. Bul. 331, pp. 35-36.)

Argentina.—Because of the large quantities of Argentine seed being currently imported into the United States, its lack of adaptation in Nebraska has already been discussed. Seed of this origin lacks winterhardiness. Its use in Nebraska is not recommended although it has proved superior to southern domestic seed.

Turkistan.—Turkistan alfalfa includes all alfalfa of Turkistan origin. Usually it is uniformly purple flowered, but slower growing than Common. The majority of importations are fairly cold resistant and wilt resistant. Turkistan alfalfa has obtained considerable publicity because of its being somewhat resistant to bacterial wilt. There are distinct regional strains as in the case of the Common. (Nebr. Agr. Exp. Sta. Bul. 331, p. 14.)
Hybrid alfalfa.--Hybrid vigor in alfalfa has been clearly demonstrated at the Nebraska Agricultural Experiment Station in cooperation with the U.S. Department of Agriculture. Basic lines are now being developed and methods are being studied for making this increased vigor available to farmers. Whether this will be done through the use of a commercial hybrid similar to those now used in corn or through the development of a superior synthetic variety will depend upon the results of experiments now in progress.

New varieties of alfalfa.--In addition to Ranger, several new varieties have been released during the past few years. Buffalo is a new variety produced at the Kansas Agricultural Experiment Station in cooperation with the U.S. Department of Agriculture. It is similar to Kansas Common except that it is much more resistant to bacterial wilt and is somewhat more tolerant to cold. It is generally recommended for the same area as Kansas Common.

Atlantic is a new, high-yielding strain developed at the New Jersey Agricultural Experiment Station. It is well adapted to the eastern United States but is not resistant to bacterial wilt.

Orestan is the commercial increase of a lot of seed originally introduced from Turkistan and released commercially by the Oregon Agricultural Experiment Station. It has a high degree of resistance to bacterial wilt and has been high yielding under western conditions.

Nemastan is another Turkistan introduction and is being released by the Nevada Agricultural Experiment Station to be used in the intermountain area where both bacterial wilt and stem nematodes are serious enemies of alfalfa. Nemastan has a high degree of resistance to both.

With the exception of Ranger, and possibly Buffalo for the southern part of the state, none of these new varieties are recommended for Nebraska.
SWEETCLOVER

Madrid.—Madrid is a yellow-flowered, early-maturing variety of biennial sweetclover derived from seed received by the United States Department of Agriculture from Spain. It has proved to be an excellent variety for the central dry-farming areas of the Great Plains. Stands are easily established because of quick seedling emergence and vigorous seedling growth. Madrid may be distinguished in the field among a group of commonly grown varieties by a peculiar cast of very dark foliage. It is outstanding in first-year pasture and hay production. Very little difference between Madrid and Common Yellow is shown in second-year forage production. First-year growth is relatively resistant to fall freezes, remaining green longer than the commonly grown varieties. It starts second-year growth comparatively early, matures slightly later than Common Yellow, and is an excellent seed producer. The variety is in small scale farm production, with about 75 bushels listed for sale in the fall of 1944.

Spanish.—This white-flowered variety of biennial sweetclover is from seed received by the United States Department of Agriculture from Spain. Spanish has shown marked ability to compete with weeds in its first year, due to quick germination and rapid seedling growth, which are important factors in areas where adverse climatic conditions often prevail at seeding time. In its first year the quantity of forage produced exceeds that of Common White. No marked advantages are shown in the second year from either a hay or pasture standpoint. It is unusually uniform in type of growth and in time of coming into flower. Seed is produced abundantly under favorable temperature and moisture conditions. The variety is distinctive in appearance and reaches maturity at about the same time as true Common White. A 15-acre increase field was planted by the experiment station in the fall of 1944, preliminary to seed distribution.

Evergreen.—This biennial variety of white sweetclover is the result of several years of mass selection of desirable roadside plants by the Ohio Agricultural Experiment Station. It has been an outstanding variety at Lincoln from the standpoint of late maturity and heavy first and second-year forage production. It produces seed abundantly under favorable temperature and moisture conditions, but due to late maturity the development of a good seed crop is often prevented by midseason drought and high temperatures. Quick germination and rapid seedling growth with marked ability to overcome first-year weed competition are other distinctive and desirable characteristics. Growth is more upright than that of the other large, commonly grown white-flowered varieties. In time of starting second-year growth, it appears slightly earlier than Common White. Its most distinguishing characteristic is its late maturity in the second year, in some seasons extending the pasturing period fully three weeks later than that of Common White. Because of its many desirable qualities, special effort is being made to increase the seed supply for use in those areas of the state having more favorable moisture conditions. A 15-acre increase field was planted by the experiment station in the fall of 1944, preliminary to seed distribution.
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and the total growth is less. The first- and second-year hay is of comparative­ly good quality. Due to early maturity, this variety generally is not rec­ommended for use as a second-year pasture crop. Early maturity and small vegetative size are important factors in making Common Yellow a reliable producer of seed. It is relatively easy to establish stands of Common Yellow, and at Lincoln it has shown an ability to overcome first-year drought and weed competition better than have the commonly grown white-flowered varieties.

Switzer.—Switzer, sometimes called Madison County, is a variety of bien­nial yellow grown to a considerable extent in Madison and adjoining counties of Nebraska. It is regarded as finer-stemmed and more prostrate than Common Yellow. The average of six seven-year hay yields of Switzer at Lincoln was 1.3 tons to the acre, as compared with 1.5 tons of Common Yellow.

Common White.—This is a large white-blossomed, coarse-growing variety of biennial sweetclover. Under favorable conditions, it may attain a height of 30 inches in the first year and seven feet in the second year. As a general pur­pose crop, it is distinctly superior to Grundy County and Common Yellow, as it normally produces more hay and pasture and matures later in the second year. Great variations occur in the growth from different lots of seed purchased under this name, which in many instances are due to mixtures with Grundy County and Common Yellow. The true Common White flowers in late June and early July and may be classed as medium in time of maturity.

Grundy County.—This white variety of biennial sweetclover is of unknown origin but was first noted in Grundy County, Illinois, about 1917. It is of comparatively uniform growth and maturity. Grundy County does not generally attain a height greater than four feet in its second year, and as it matures 10 days to two weeks earlier than Common White, its second-year pasturing season is relatively short. It is distinctly inferior from the standpoint of forage yield, but its quality is excellent. As Grundy County yields seed abundantly and is easily harvested, it has become popular with many northern seed growers and has entered increasingly into the seed trade, making difficult the purchase of seed of genuine Common White.

Hubam.—Hubam is an annual white-flowered variety that continues to be of minor importance in Nebraska. It is of chief value for plowing under in the late summer or early fall for green manure, and for seeding when biennial clovers have failed. Though its pasture and hay yields have exceeded somewhat those of the common biennial types in the first year of growth at Lincoln, its relative merit is distinctly lessened by its early maturity, and by the necessity of seeding each year. The annual type has proved of less value for soil improvement than the biennial.

Sour clover.—This is an unproductive annual yellow variety which should never be grown in this region.

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Disease Resistance of The Three More Prominent Flax Varieties

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<td>Bison</td>
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**Varieties**

At the present stage of development of flax in Nebraska, difference between varieties commonly grown is not as important as the use of high quality seed and careful production practices.

**Bison** is the most commonly grown variety. It is wilt resistant, has medium to large brown seeds, and deep blue flowers. It generally yields a higher percentage of oil than do the smaller seeded varieties, but the oil is of somewhat lower quality.

**Redwing** is also grown to some extent. This variety normally matures about a week earlier than Bison. It is moderately wilt resistant, and can be distinguished in field by its light blue flowers and in the bin by its small seed.

**Linota** is grown by a few farmers in the extreme southeastern counties. This variety is similar to Redwing in maturity, but the oil content of the seed is somewhat lower.

**Biwing**, a selection from a cross between Redwing and Bison, combines the good characters of both parent varieties without sacrificing yield. This variety is now being certified in Nebraska.

Experiments over a period of years at the Nebraska Experiment Station at Lincoln, Nebraska, show that the earlier maturing varieties have had a distinct advantage in yielding ability in comparison with the later maturing varieties. In the western part of the state, tests have indicated that the later maturing varieties, such as Bison, have some advantage especially under irrigation.

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