

Varieties of Wheat for North Dakota¹

By

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Favorable moisture and temperature conditions during the growing season are factors of first importance to high production. The use of varieties, resistant to important plant diseases and capable of high yields, contribute to a more certain as well as larger production. Since 1941 North Dakota has experienced favorable seasons, enjoying record or near record wheat production. The contribution to the nation's food supply by North Dakota's farms made during the critical war period, as shown in Table 1, is something of which every North Dakotan can be justly proud.

North Dakota farmers are quick to appraise new varieties, and if they have merit, put them into extensive production. About 95 percent of the 1945 hard red spring wheat crop was produced by varieties which have come into production within the last 12 years, about 60 percent of the acreage to varieties not available before 1939.

Table 1—Average wheat acreage, yield per acre and total production in North Dakota for 5-year periods, 1926 to 1940, and annual and average production, 1941 to 1945^a

Years	Acreage harvested	Average yield, bu.	Total production, bu.
1926-1930	10,117,000	11.3	114,806,000
1931-1935	7,657,000	7.4	59,674,000
1936-1940	6,749,000	8.9	63,324,000
1941	8,155,000	17.8	144,799,000
1942	7,321,000	20.5	149,844,000
1943	3,343,000	18.8	156,737,000
1944	9,909,000	16.3	161,630,000
1945	9,896,000	16.4	161,888,000
1941-1945	8,524,800	18.0	154,979,600

^aData from Bureau of Agric. Economics, U. S. Dept. of Agric. The 1945 data are preliminary.

Which Variety to Grow

Each year at this time the farmer is faced with the question of which variety will be most profitable for him to grow. This report is an account of the findings

by the North Dakota Agricultural Experiment Station at Fargo and at five Branch Stations in other sections of the State with regards to comparative yields, disease resistance, kernel and

¹Trials at Dickinson in cooperation with the Division of Cereal Crops and Diseases, U. S. Department of Agriculture, R. W. Smith in charge. Trials at Edgeley, Langdon, Williston and Minot under supervision of superintendents, J. P. Tiernan, Victor Sturlaugson, W. H. Huber and G. N. Geiszler, respectively.

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straw characteristics, growth habits, and milling and baking qualities of a number of hard red spring and durum varieties now available. Since no one variety is superior to others in all respects, this information is presented to give a picture of what reasonably may be expected from growing any one or more of these varieties in different sections of the State.

Stem rust can be the most destructive of those diseases to which our wheat crop is subjected. Fortunately a number of varieties now available, and in general use, have considerable resistance to this rust. Leaf rust too, can cause serious crop losses and in much of the State only varieties having some resistance to this disease, as well as to stem rust, should be grown. In some years drouth is a serious crop threat. Differences in yield among varieties due to drouth injury are much less, and more difficult to measure, than in the case of rust. Early ripening is desirable in that it allows a variety to "escape" unfavorable high temperatures during the ripening season, late summer drouth, or serious disease injury. Usually associated with earliness, however, is a lower capacity for yield and it is only when later ripening varieties fail to attain full development that those ripening early show to the best advantage. The method of harvesting employed may make one variety preferable to another, altho it yields less. Varieties that stand up well and resist shattering can often be harvested with the combine-harvester without first swathing, especially if weeds do not interfere. When the practice is to swath, a bearded

variety picks up easier and so may be preferred. Where the straw is valued for feed there is preference for the variety without beards. All variety characters must be taken into consideration and the choice made on the basis of the variety which best combines with high yield the characters and qualities most desired.

Effect of Weather and Disease on Yield

To understand better the yield differences obtained and reported in Tables 2 to 5, a brief review of the seasonal conditions are presented, emphasizing the conditions under which the crop was produced and those disease and climatic factors which accounted for some of the differences in the yields obtained.

Serious drouth conditions influenced all variety yields in 1936. In 1937 stem rust was severe in about two-thirds of the State, and in 1938 both stem and leaf rust accounted for much of the yield differences, the susceptible varieties yielding from 30 to 60 percent less than those having good resistance. In 1939 an early and a late drouth reduced yield differences, and in 1940 late drouth and high temperatures were more injurious to late varieties than those ripening earlier. In 1941 leaf rust was especially severe in the eastern half of the State and the yields of susceptible varieties were disappointing. Leaf rust came early in 1942 and 1944 but failed to develop severely. Leaf rust came early also in 1945 and the infection became heavy in late fields in the northern part of the State, but with very favorable temper-

atures for filling the rust was not a large factor in causing the yield differences which were obtained.

Much stem rust developed on susceptible varieties in some communities in 1944, causing considerable damage in fields, especially in southwestern North Dakota. Stem rust was present also in 1945 but with more extensive use of resistant varieties did not develop or influence yields appreciably. Root rots and head blights were common in wheat fields in southeastern North Dakota in 1944, and to a lesser extent in 1945. Since all varieties are more or less susceptible, differences in yield caused by these diseases are not easily measured. Temperatures during the 1945 growing season were generally below normal and very favorable for small grain production, altho delaying the time of harvest from 10 to 14 days.

Variety Yield Comparisons Since 1936

The comparative average yields of the important varieties tested since 1936, at each of the stations, are shown in Table 2. While all varieties at any one station are given the same treatment there are unavoidable "errors" inherent in every test which result in yield differences that can not be attributed to the variety. These errors may be due to variations in the soil, to differences in stand or other factors, not under control. However, by the use of replicated plots these experimental errors are reduced, and by statistical analysis they can be measured, giving the differences in yield between varie-

ties that, under the conditions of these tests, are necessary to be significant. Such a figure is shown at the foot of each column. Thus for Fargo in Table 2, column 1, any variety yield as much as 1.0 bushels below the 26.4 bushel yield of Rival, or 25.4 bushels, is considered due to variety effect. The same is true for all other comparisons.

At Fargo the yields of Rival, Pilot and Vesta are not significantly different from one another, but are significantly higher than Thatcher or Renown. Results from the hard red spring varieties at Edgeley and Langdon are of about the same order as at Fargo. Variety differences at Dickinson have been less than in the eastern section of the State and there only Renown can be said to have yielded lower than the other varieties. At Williston, where leaf rust injury has usually been of little consequence, Vesta, Thatcher, Pilot and Rival, in that order, have yielded best. For the 43 tests, as shown in the righthand column, the yields for Rival, Pilot and Vesta are nearly the same with Thatcher and Renown distinctly lower.

Ceres and Marquis, while lacking in resistance to stem rust, have been continued in the trials at Fargo and Dickinson. For the 10-year period at Fargo Ceres yields averaged 10 percent, and Marquis 24 percent, below Thatcher. Compared with Rival, Ceres yields were 16 percent and Marquis 29 percent below Rival. At Dickinson where rust injury has been less, Ceres yields have averaged 7 percent, and Marquis 21 percent, below Thatcher and Rival.

Table 2—Comparing the average yields of the leading varieties of hard red spring wheat and Mindum durum, grown at the different experiment stations for varying periods in North Dakota, 1936 to 1945.

Variety	Average yields in bushels per acre						Weighted average (43 sta. years)
	Fargo	Edgeley	Langdon	Dickinson	Williston	Minot	
	1936 to 1945	1939 to 1945	1936 to 1945	1937 to 1945 ^c	1933 to 1945	1945	
Rival	26.4	23.1	28.7	18.4	26.7	36.9	25.4
Pilot	25.9	22.4	28.2	18.3	28.3	35.4	25.3
Vesta	26.3 ^a	23.7 ^a	27.9 ^a	18.2	29.0	30.4	25.5
Thatcher	24.7	18.9	24.3	18.4	28.5	31.0	23.5
Renown	24.2	18.7	25.0	15.2 ^b	25.7 ^b	27.6	22.4
Average	25.5	21.4	26.8	17.7	27.6	32.3	24.4
Mindum	26.6	20.7	28.6	.....	.....	.....	.....
Sig. dif. (bu.)	1.0	1.4	1.6	1.4	2.2	2.4	0.7

^aDiscontinued in 1945 and Rival yield used that year. ^bDiscontinued in 1944 and Regent yield used in 1944 and 1945. ^cYield comparisons obtained in 1938 and 1941 not reliable and omitted from average.

The best yielding varieties of hard red spring wheat have yielded as well as Mindum durum at Fargo and Langdon and better than Mindum at Edgeley for the years tested.

Mida and Regent

Mida and Regent entered field plot comparisons in 1939. Comparative yields of these two varieties with others are shown in Table 3. In these tests Mida

yielded as well or better than other good varieties, the advantages of Mida appearing to be greatest in the eastern sections of the State.

Regent, like Renown, has not shown the ability to yield as well as some of the other varieties, including Thatcher, except in years when Thatcher has been injured by leaf rust. Regent has been a more dependable yielding variety than Renown.

Table 3—How Mida and Regent have compared in yield with established varieties for the years tested, 1939 to 1945. Varieties listed in order of weighted average yield

Variety	Average yields in bushels per acre						Weighted average (32 sta. years)
	Fargo	Edgeley	Langdon	Dickinson	Williston	Minot	
	1939 to 1945	1940 to 1945	1939 to 1945	1940 to 1945 ^c	1940 to 1945	1945	
Mida	27.9	25.4	33.1 ^d	20.3	31.1	39.2	28.3
Rival	26.6	25.4	31.1	19.1	30.3	36.9	27.2
Pilot	26.9	24.4	30.0	19.0	32.1	35.4	27.1
Regent	24.0	22.2 ^b	29.2	18.2 ^b	30.8 ^b	32.5	25.4
Thatcher	25.2	20.7	26.9	18.8	32.6	31.0	25.3
Renown	25.3	20.8	27.3	15.6 ^a	29.3 ^a	27.6	24.2
Average	26.0	23.2	29.6	18.5	31.0	33.8	26.3
Sig. dif. (bu.)	1.3	1.3	2.2	1.9	2.3	2.5	0.8

^aRenown discontinued in 1944 and Regent yields used. ^bRenown yield substituted in 1940. ^c1941 crop was damaged by hail and yields omitted. ^dNs 2742 in 1939.

Newthatch and Cadet

Newthatch and Cadet have been tested in the field plots at some of the stations since 1941. Their yield comparisons with other varieties are shown in Table 4. Neither of these wheats have so far shown any yield advantage over Rival or Mida in the eastern part of the State. At Dickinson, and more especially at Williston, Cadet yields have compared favorably with other varieties. Results with Newthatch have been best at Williston. Comparisons over a longer period are of course desirable before finally appraising a variety. Variety characteristics other than yield must also be taken into consideration. Such a discussion of the different varieties and their characteristics are given below.

Discussion of Hard Red Spring Varieties

Reference to differences in disease resistance as used here means the relative reaction of a variety to those races of the dis-

ease common to the area. A genetically pure variety presumably does not change appreciably and so retains the "resistance" it originally had. However, the organism causing either stem or leaf rust is made up of many physiologic races. A variety may be highly resistant to a large number or all of the races now common to this area, yet may lack in resistance to races known to exist elsewhere. When such new races are introduced, or less common races increase and become predominant, the "resistant" variety may appear to have lost its resistance. **In 1944, and more especially in 1945, all the varieties of hard red spring wheat, usually considered as having considerable resistance to leaf rust, carried a moderate to heavy amount of infection.** Varieties like Newthatch, Regent and Renown, when grown in the northern part of the State, showed nearly as much leaf rust as did the susceptible Thatcher. Rival, Pilot, Mida and Cadet also carried more rust than usual,

Table 4—How Newthatch and Cadet have compared in yield with more commonly grown varieties tested, 1941 to 1945. Varieties listed in order of weighted average yield.

Variety	Average yields in bushels per acre						Weighted average (22 sta. years)
	Fargo	Edgeley	Langdon	Dickinson	Williston	Minot	
	1941 to 1945	1942 to 1945	1941 to 1945	1942 to 1945	1943 to 1945	1945	
Mida	30.2	29.5	38.7	23.8	35.7	39.2	32.0
Rival	28.2	30.0	37.3	22.4	35.5	36.9	30.9
Pilot	28.7	28.8	35.5	22.8	38.9	35.4	30.9
Cadet	25.2	26.1	34.7	22.9	37.2 ^a	37.1	29.3
Newthatch	26.3	27.0	34.3 ^a	20.2	36.6	33.9	28.9
Regent	25.2	25.3	34.8	21.5	35.9	32.5	28.5
Thatcher	26.1	24.0	30.6	21.5	38.1	31.0	27.8
Renown	27.0	23.7	32.4	18.2 ^b	^b	27.6	.....
Average	27.1	26.8	34.8	21.7	36.8	34.2	29.8
Sig. dif. (bu.)	1.6	1.6	2.0	1.3	2.4	2.5	0.8

^aRegent used for yield in 1941. ^bDiscontinued after 1943. ^cRegent used for yield in 1944 and 1945. ^dYield for Mida in 1943.

and to the extent that one would hesitate in classing them as more than moderately resistant. A significant change in the relative abundance of some races of rust in this area may account for this. Other factors which may have had a part in causing the heavy infection was the environment under which the crop developed, with low temperatures throughout the season and sufficient moisture, resulting in conditions that were favorable for lush growth and perhaps the development of plant tissue which was more susceptible to infection than usual.

Thatcher is grown chiefly in the northwestern part of the State, and on into Canada, where it yields well in comparison with other varieties. Thatcher is resistant to stem rust but is susceptible to leaf rust. Injury from leaf rust, however, has usually not been serious in that area. Because Thatcher holds its kernel tightly and stands up well, it is in favor for straight combining. In 1944 the Thatcher acreage in the State represented about 32 percent of the hard red spring wheat acreage, a decline from its high acreage in 1941 when more than 60 percent of the acreage was in Thatcher. Thatcher possesses excellent milling and baking qualities, is resistant to loose smut but rather susceptible to bunt. Early ripening, a small kernel, and a tendency to low test weight are some of the other characteristics of this variety.

Rival is moderately resistant to stem rust, showing more infection than Thatcher in a severe rust year. Rival has considerable resistance to leaf rust, is an ex-

cellent yielding variety as shown in Table 2, grows to good height, has a moderately strong straw, is mid-late in ripening, susceptible to black chaff but is less susceptible to scab than are most varieties. The kernels are large, the grain has good bushel weight and satisfactory milling and baking qualities. Rival, developed by the North Dakota Experiment Station, was first released in 1939, and by 1944 represented about 31 percent of our hard red spring wheat acreage, with most of this in the eastern two-thirds of the State. Its most serious weaknesses are a tendency to shatter when ripe, and to bleach and sprout readily if exposed to much wet harvest weather. The introduction of *Mida* is expected to replace much of the present Rival acreage.

Pilot, released cooperatively by the North Dakota Experiment Station and the U. S. Department of Agriculture in 1939, is similar to Rival in resistance to stem rust and also has fair resistance to leaf rust. This bearded variety grows to good height, is less resistant to loose smut than Thatcher or Rival, but has satisfactory resistance to stinking smut. Pilot is a rather late ripening variety but has yielded well under a wide range of conditions and, when not lodged, is satisfactory for direct combining. Mid-size, tapering kernels with a conspicuous brush and somewhat low test weight, are characteristics of this variety. Pilot has good milling and baking qualities. About 10 percent of the present hard red spring wheat acreage of the State is being sown to Pilot, most of this in the western and central counties.

Vesta, developed and introduced by the North Dakota Experiment Station in 1942, is a bearded high yielding, tall variety with good resistance to stem rust but lacking in resistance to leaf rust and in strength of straw. Unlike Rival, Vesta does not shatter, but holds its kernel well and may thresh with some difficulty. Vesta has large tapering kernels with a fairly conspicuous brush, but it is high in bushel weight. The flour yield is consistently higher than in other varieties commonly grown and the quality of flour, although not outstanding, is regarded as satisfactory. Because of its susceptibility to leaf rust and weak straw, Vesta is considered suited mainly to the western part of the State where rust injury and lodging are usually less serious.

Renown, developed in Canada, is a beardless, short-strawed early ripening variety like Thatcher and Regent, with good resistance to stem rust but only fair resistance to leaf rust. Renown is moderately resistant to stinking smut, the kernels are mid-large, have excellent color and the grain has high test weight. Renown is regarded as satisfactory in flour yield, protein content and baking strength. The flour, however, has an excess of yellow pigment resulting in an inferior crumb color. The Renown selection (R.L. 716.6) grown in these plots in recent years has less of this objectionable color than the strain introduced earlier. Renown, not a high yielding variety, is not grown extensively and its acreage is confined mainly to the heavier soils in eastern North Dakota. High test weight, excel-

lent color and resistance to weathering are its most desirable characteristics.

Regent, a beardless variety developed in Canada, has a relatively short straw, is early ripening and has good resistance to stem rust and to bunt. Regent has been considered as having fair resistance to leaf rust, but in 1944 and especially in 1945, it carried a heavy infection. This was most noticeable in the northern part of the State where the crop ripened late and was thus exposed to rust over a long period. Regent lacks in resistance to root rots and scab and is not considered high yielding. Low test weight but otherwise good milling and baking qualities characterize this variety. In 1944 Regent was grown on about 12 percent of the hard red spring wheat acreage of the State.

Mida, developed by the North Dakota Experiment Station and released first in 1944, is highly resistant to stem rust, and moderately resistant to leaf rust and to bunt, but is susceptible to loose smut. Mida is bearded, has strong straw, grows to good height, ripens mid-early, the beards sometimes turning dark as the crop ripens. The large kernels of Mida have good color, the test weight is high and its milling and baking qualities are satisfactory. Like a number of other varieties, Mida appears quite susceptible to root rot and to some of the head blights. Mida holds its kernels more tightly than Rival but not sufficiently tight to be considered always safe for direct combining. Yield comparisons available show that Mida can be expected to have its largest use in the

eastern and central parts of the State perhaps replacing much of the Rival acreage. Data from the Dickinson station and observations made on farms in southwestern North Dakota the last two years, where Hessian fly damage has increased, indicate that Mida is less susceptible than other varieties to the attacks of this insect pest. There is therefore, much interest at present in Mida in those communities and it may come to be grown extensively in that area to meet this threat.

Newthatch, developed by the Minnesota Experiment Station and first released in 1944, has many of the characteristics of Thatcher, such as earliness, short strong straw, good resistance to stem rust, a small kernel and low test weight. In the early testing of Newthatch it showed good resistance to leaf rust, one of the objectives in its breeding and selection, and was considered as a likely replacement for Thatcher. During the last two years, however, Newthatch has shown an increasing amount of leaf rust, and in some instances in 1945 it carried nearly as much as Thatcher. Like Thatcher, Newthatch is quite susceptible to scab.

In comparisons to date, shown in Table 4, Newthatch has out-yielded Thatcher in the Edgeley and Langdon tests but other varieties like Rival, Pilot and the newer Mida have yielded better. In the 3 years of trial at Williston, as representing the area where Thatcher is most extensively grown, Newthatch has not yielded any better than Thatcher. However, leaf rust was not a factor there during these years, and Thatcher yields

were very good. Newthatch is regarded as quite similar to Thatcher in milling and baking qualities.

Cadet (N.N. 1597) is a beardless wheat bred under the supervision of the Division of Cereal Crops and Diseases of the U. S. Department of Agriculture. It resulted from a cross between Merit and Thatcher. Cadet will be released cooperatively in 1946 by the North Dakota Agricultural Experiment Station and the U. S. Department of Agriculture.

Cadet compares favorably with other good varieties in resistance to stem and leaf rust. It is less resistant to bunt than Mida, Regent or Renown and about the same as Thatcher and Newthatch. Cadet grows taller than Thatcher, or other common beardless varieties, does not shatter readily, has medium strong straw and requires a few days longer to ripen than Thatcher, comparing more to Pilot and Marquis in this respect. Cadet is thus expected to find its largest usefulness in the northern and northwestern sections of the State where the later ripening varieties more often realize their fullest yield, and when a beardless variety is desired. In weight per bushel Cadet resembles Thatcher and Regent. In milling and baking trials, Cadet has compared favorably with Thatcher and other wheats of good quality.

Varieties of Durum

North Dakota leads all states in the production of durum, as it does in the production of hard red spring wheat. About 85 percent of the durum produced in

the United States in the last 5 years was produced in North Dakota. About one-fifth of the wheat acreage in this State is sown to durum, the production centering in a group of northern counties beginning with Cavalier on the east, Rolette on the west and extending south into the east-central part of the State. Other counties extending to the South Dakota border, and counties adjacent to this area, also grow considerable durum but with less success. (See Table 2 for yield comparisons). Amber durum wheat is milled into semolina, used in the manufacture of macaroni products. In recent years the annual requirements of amber durum for the manufacture of macaroni products has increased from about 15 to more than 22 million bushels. The North Dakota durum grower serves a specialized and expanding market and to a large extent has this market to himself.

Many of the problems in the growing of hard red spring wheat are also common to the production of durum. Durum varieties as a class have high resistance to leaf rust and some are resistant to many races of stem rust. Durums have longer straw than hard red spring wheats and require from a week to 10 days longer to ripen. Durums are susceptible to root rots and some of the head blights, particularly black point and scab. A brief description of the principal varieties grown follows herewith:

Mindum is the most commonly grown variety, is excellent yielding when grown under favorable conditions, the grain usually has a clear amber color and

produces an excellent quality of semolina. Mindum, however, lacks some in strength of straw, is not very tolerant to drouth and high temperatures, and is susceptible to some races of stem rust common to this area.

Kubanka, one of the older varieties, is no longer grown extensively having largely been replaced either by Mindum or by hard red spring varieties. Kubanka is less uniform in plant type than Mindum and in some communities local strains have been developed and are being grown. Some of these strains have more rust resistance than others or more tolerance to drouth than Mindum. Kubanka is generally satisfactory in semolina quality, but is more variable in this respect than Mindum.

Stewart was developed cooperatively by the U. S. Department of Agriculture and the North Dakota Experiment Station and released in 1943. Stewart is highly resistant to stem rust, has about the same strength of straw as Mindum, yields about the same, but requires about 2 days longer to ripen. Stewart holds the kernel tightly, the color of the grain is a clear amber and the quality of its semolina is equal to Mindum. The advantage of Stewart over Mindum comes mainly from its higher resistance to stem rust.

Carleton, like Stewart, was developed cooperatively by the U. S. Department of Agriculture and the North Dakota Experiment Station and released in 1943. Carleton was also bred and selected for high resistance to rust and like Stewart offers the maximum rust protection avail-

able among amber durums of good semolina quality. Carleton has a stronger straw than other durum varieties, and so has considerable popularity where durum is grown on summer fallow or other fields where serious lodging might be experienced. Carleton is later in ripening than Mindum, is more susceptible to scab, and is not as consistently high yielding as either Stewart or Mindum. (See Table 5). Carleton is outstanding in the quality of the macaroni produced.

Red durum (D-5), also called Pentad, was grown rather extensively at one time because of its high resistance to stem rust and ability to yield relatively well when sowed late and under unfavorable rust conditions. It matures earlier than Mindum, has a weak straw and the grain has a dull reddish color. Red durum is not commercially accepted for the production of macaroni products and in the market usually goes into feed channels. It is the preferred wheat in mixed poultry feeds.

Table 5—A comparison of the durums Stewart and Carleton grown comparably with Mindum and Red durum (D-5) at three stations in eastern North Dakota, 1940 to 1945

Variety	Yield in bushels per acre				
	Fargo	Edgeley	Langdon	Weighted average	
	1940 to 1945	1943 to 1945	1940 to 1945	Station years	
				15	12
Mindum	28.5	23.7	38.0	31.3	33.3
Stewart	28.2	22.7	39.7	31.7	33.9
Carleton	24.6	.....	36.5	.....	30.6
Red durum (D-5)	27.8	.....	32.1 ^a	.....	30.0

^aYield for Monad (D-1) 1940-1944.

Summary

No one variety is superior to other varieties in all respects. Varieties differ in their capacity to yield and in their reaction to important plant diseases. Resistance to stem rust is highly important. Among several resistant varieties now available the choice of a variety will be determined by the better combinations of resistance to stem and leaf rust, capacity for yield, good agronomic characters, and desirable milling and baking qualities.

In the eastern part of the State where hard red spring varieties are grown, Mida or Rival is recommended. If a beardless early-ripening shorter-strawed variety

is preferred, then Regent or Renown is suggested.

In the central parts of the State, varieties like Rival, Pilot, Vesta and Mida should yield best with Pilot, Vesta and Regent considered the most suitable if the crop is to be straight combined.

Thatcher has preference in extreme northwestern North Dakota. (See Williston data) While lacking in resistance to leaf rust, this deficiency has generally been less serious in that area and Thatcher yields have been satisfactory. Pilot and Vesta are also suited to this area and do relatively well in other western counties, with Mida deserving

consideration in the Hessian fly area.

In the durum growing areas, Mindum is usually satisfactory unless rust is severe. Stewart af-

fords rust protection and is recommended especially for the northern sections of the durum belt. Carleton is recommended where strong straw as well as high rust resistance is desired.

INCREASING THE GRAZING CAPACITY OF SHORTGRASS RANGE BY MECHANICAL TREATMENTS

A Review of Wyoming Agr. Exp. Sta., Bull. 273. "Mechanical Treatments for Increasing the grazing Capacity of Shortgrass Range." 1945.

In a series of tests begun in 1939 at the Archer Field Station near Cheyenne, Wyoming, the effects of various mechanical treatments on the plant cover of typical shortgrass range were tested. The implements used included an eccentric one-way disc for pitting the surface, a groover, a moldboard plow and a sub-soil chisel or Killifer implement.

The eccentric one-way disc applied as a continuous treatment leaves the surface resembling a waffle, with the pits about 16 inches apart. This treatment and grooving at 2-foot intervals proved most effective in increasing forage production. When grazed with sheep, the range subjected to these two treatments showed a 4-year average of 11% greater grazing capacity and 6 pounds more lamb gain per acre than untreated range. In the fourth year the two treated areas carried 36% more sheep per acre.

In additional tests it was found that the wider the spacing between treatments the less the effect on forage production. In general, treatments spaced wider than a 5-foot interval failed to produce significant results. Both plow and groover with a 5-foot furrow interval produced significant increases, but the Killifer chisel failed to be effective at any furrow spacing.

The principal effect of the treatments on the vegetation was to thin the cover resulting in an increase of the taller grasses such as western wheatgrass and needle-and-thread and a decrease in the short grasses including blue grama and buffalo grass. The increase in the taller grasses resulted in an increase in total forage production, an increase in feed available in the early spring, and an increase in the ability of the range to retain moisture. The pits and grooves also helped to retain excess precipitation on the range.
(Reviewed by Warren Whitman)