1951

ANNUAL REPORT

DICKINSON EXPERIMENT STATION
DICKINSON, NORTH DAKOTA

SECTION I

AGRONOMIC INVESTIGATIONS

BY

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SECTION I

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ROTATION & TILLAGE TRIALS – 1951

Trials of 1951 complete 45 years of study in Dry Land Soil Management at the Dickinson Experiment Station. All trials were on uniform cropping the first year, and results from the first years' trials are not included in the long time average, leaving 44 years' data available for a comparison of tillage and fertility problems under conditions represented at this station.

In the following summary tables 1951 yields for the 4 principal crops included in these trials: wheat, oats, barley and corn, are compared with annual averages for the past 5 years and with the 44 year average for the more important cultural methods under study.

Table 1. Summary – Wheat Yields – 1951

Rotation & Tillage Trials-Dickinson Experiment Station, Dickinson, ND

Cultural Method	Plots	1946	1947	1948	1949	1950	1951	1908-1951	Relative Yields 1908-1951 Fallow-100%
Fallow	3	25.6	23.3	41.2	9.7	23.1	23.9	20.9	100
Green Manure	5	25.2	27.6	37.1	6.5	24.5	23.7	19.0	91
Disked Corn Ground	9	12.5	25.1	34.7	10.3	18.4	21.4	18.4	89
Spring Plowed	2	8.6	18.6	26.6	6.1	17.9	15.3	16.0	77
Fall Plowed	4*	5.3	23.2	27.8	9.1	21.9	19.8	16.3	78
Continuous:									
Spring Plowed	1	9.3	15.0	21.7	3.2	14.5	13.7	11.6	56
Fall Plowed	1	2.7	11.8	19.5	2.7	8.7	13.0	11.0	53
Alternate Wheat & Fallow	1	27.0	18.5	34.5	7.2	17.5	22.2	19.9	95

* Includes wheat in Manured Rotation 62, which has a 44 year average of 18.7 b.p.a.

Table 2. Summary – Oat Yields – 1951

Rotation & Tillage Trials-Dickinson Experiment Station, Dickinson, ND

Cultural Method	No. Plots	1946	1947	1948	1949	1950	1951	1908-1951	Relative Yields 1908-1951 Fallow-100%
Fallow	3	63.7	69.9	89.7	24.9	51.9	62.2	47.2	100
Green Manure	3	67.8	65.4	87.4	15.9	58.7	54.6	45.7	97
Disked Corn Land	5	23.6	61.1	71.7	22.7	40.8	54.2	37.5	79
Spring Plowed	6*	14.2	63.8	62.2	24.2	41.5	40.0	35.1	74
Fall Plowed	5	11.8	60.5	48.4	19.1	46.9	37.1	32.4	69
Sod	3	9.8	65.5	49.2	23.6	43.1	44.9	34.0	72
Continuous:									
Spring Plowed	1	20.3	37.2	31.6	13.8	30.6	42.5	26.8	57
Fall Plowed	1	6.6	38.1	29.1	8.1	43.0	33.8	24.7	52
Alternate Oats & Fallow	1	71.9	64.7	62.2	23.4	53.8	60.6	45.9	97

*Includes oats in the Manured Rotation 62, which has a 44 year average of 37.9 b.p.a.

Table 3. Summary- Barley Yields – 1951

Rotation & Tillage Trials-Dickinson Experiment Station, Dickinson, ND

Cultural Method	No. Plots	1946	1947	1948	1949	1950	1951	1908-1951	Relative Yields 1908-1951 Fallow-100%
Fallow	2	27.3	28.1	33.8	5.8	25.4	43.8	27.0	100
Disked Corn Ground	2	13.1	32.2	38.4	14.1	24.0	35.2	21.3	79
Spring Plowed	1	7.9	16.9	23.1	5.8	29.6	22.7	16.3	60
Continuous:									
Spring Plowed	1	9.8	21.5	22.3	7.7	19.4	28.1	16.0	59
Fall Plowed	1	3.8	23.8	18.3	1.5	12.9	29.2	14.7	54
Alternate Barley & Fallow	1	35.8	43.5	54.2	12.7	32.7	38.5	24.1	89

Table 4. Summary – Corn Yields – 1951

Rotation & Tillage Trials-Dickinson Experiment Station, Dickinson, ND

CORN GRAIN

Cultural Method	No. Plots	1946	1947	1948	1949	1950	1951	1908-1951	Relative Yields 1908-1951 S.P. – 100%
Spring Plowing	16	1.2	42.6	30.0	13.9	22.0	23.2	17.6	100
Fall Plowing	4	0.0	37.4	30.2	13.7	24.1	25.5	16.2	92
Continuous:									
Spring Plowing	1	16.6	27.8	26.4	5.0	22.1	29.1	19.1	109
Fall Plowing	1	11.9	28.4	28.4	14.1	20.4	34.4	18.9	107
Alternate Corn & Fallow	1	24.0	15.4	26.4	13.8	16.4	29.1	20.6	117

CORN FODDER

Cultural Method	No. Plots	1946	1947	1948	1949	1950	1951	1908-1951	Relative Yields 1908-1951 S.P. – 100%
Spring Plowing	16	1538	6209	4451	2263	3995	3964	3609	100
Fall Plowing	4	1025	4918	4430	1960	3612	4363	3143	87
Continuous:									
Spring Plowing	1	3000	4320	3550	1050	3950	4090	3231	90
Fall Plowing	1	2349	3130	3390	2360	3180	4760	3129	87
Alternate Corn & Fallow	1	4350	2060	3300	2870	3300	3990	3449	96

Results in 1951, both for rotations and for tillage methods, followed rather closely the pattern which has been established over the long period these trials have been continued at the Dickinson Experiment Station.

Judging from results of these trials up to the present time, the following facts have been established:

1. Highest yields of small grain are obtained after fallow, followed closely by yields on corn land. Corn should largely replace summer fallow in a combination livestock and grain farming system such as is widely practiced in this area, where the corn can be utilized as feed. The value of the corn crop greatly exceeds the value of the additional yield of small grain obtained from fallow over that obtained from corn land.

2. No significant yield differences have been found between plowed and plowless or “trashy” fallow.

3. Best results have been obtained from fallow operations which are begun about the middle of May and completed by June 1st.

4. Double disking as a preparation for seeding wheat on corn land is very satisfactory if the corn land is clean. If the corn land is weedy, spring plowing is a more desirable preparation.

5. Generally speaking, spring plowing has a slight advantage over fall plowing for this area.

6. Disking grain stubble as a preparation for seeding small grain is very unsatisfactory and should be ruled out as a farming practice for this area.

7. Lowered yields and an accentuated weed problem rules continuous cropping of small grains out as a farming practice for this area.

8. Results to date do not justify the practice of Green Manuring for this area.

9. A three year rotation of: wheat on disked corn land, oats on spring plowed wheat stubble and corn on spring plowed oat stubble is a very successful combination for this area.

10. Five and six year rotations or deferred rotations which include grass or legumes are valuable from the soil conserving and soil improvement standpoint, and because of the hay and pasture provided which is so necessary in a combination livestock and grain farming operation.

11. Even though higher yields of corn are obtained, growing corn continuously on the same land or on summer fallow is not a profitable farming practice in this area. Both fallow and corn land are better adapted to the production of small grains than to the production of corn.

FERTILIZER TRIALS – 1951

Two fertilizer trials were conducted at the Dickinson Experiment Station in 1951. One, essentially a rate trial of Phosphorus applied on oats was designed and conducted by the Soils Department, N.D.A.C., and results of this trial will be reported by that department. The other, designated as Series V Fertilizer Trial, designed by the USDA and begun in 1950 was continued in 1951 without change. Essentially this was a simple fertilizer trial which included applications of Nitrogen alone, Phosphorus alone and Nitrogen and Phosphorus combined on wheat. Because of the experimental design, it was necessary to conduct this trial on land cropped to wheat in 1950. Fertilized plots showed no yield advantage over unfertilized plots under these conditions.

Although data from fertilizer trials at this station is insufficient to base conclusions on, indications are that for best response, applications should be made on fallow or corn ground because of the additional moisture present in these preparations. Beginning in 1952, the Series V Fertilizer Trial will be revised to provide for the study of the response to fertilizer of crops growing on fallow.

ROUGHAGE TRIAL – 1951

Feed, always an item of paramount importance to any livestock operation, is of particular importance to stockmen of this area because of the ever present possibility of unfavorable season conditions. Periods of prolonged drought cause serious depletion of feed reserves. Exceptionally long, hard winters or an unseasonably cold, late spring, not uncommon to this region, will cause the stockman to look to his reserve supplies and hope they will be enough.

It is important, therefore, that farmers and stockmen of this area know what crops and which varieties of those crops will produce the largest volume of high quality feed.

With this in mind a trial designed to compare the relative value of several crops and varieties of these crops as roughage was begun at the Dickinson Experiment Station in 1951.

Included in this trial were: oats, Sweet Sudan, Dakota Kursk millet and Siberian millet harvested as hay, six varieties of corn and two sorghum varieties harvested as silage. Mida wheat, cut for grain yield, was included also to provide an indication of the returns which can be expected if wheat were grown as a cash crop instead of growing one of the roughage crops. In this connection it should be pointed out that corn land is one of the best preparations for a crop of small grain and an additional return from the crop of corn will be reflected in increased small grain yields from corn land as compared with yields from grain after grain.

Results from the 1951 Roughage Trial are presented in Table 5. These interesting data are inconclusive, being from a single year's trial, and several years tests will be necessary before properly qualified conclusions can be drawn. However, in the 1951 trial:

1. Corn was high yielder, followed by millet, oats, sorghum and Sudan grass in that order.

2. Moisture percentages ranged from a low of 59.2% for Siberian millet to a high of 81.1% for one of the corn hybrids.

3. All of the corn hybrids included in this year's trial contained a higher percentage of moisture than did the o.p. Rainbow Flint (Mandan strain). Consequently even though the hybrids in every case yielded a greater tonnage of green material per acre, Rainbow Flint produced the highest tonnage of dry material per acre.

Results of the protein determinations are not yet available.

Table 5. Results from the 1951 Roughage Trial

Dickinson Experiment Station, Dickinson, North Dakota

								Relative Yield Dry Material		
Crop	**Variety**	**Date Seeded**	**Previous Crop**	**Stage of Maturity When Cut**	**Average Yield Green Wt. #**	**Moisture %**	**# Dry Matter Per Acre**	**% Rainbow Per Acre**	**# Per Ton Green Wt.**	**# Per Ton % Rainbow**
Oats	Marida	5-17	Oats	Milk to soft dough	5561	66.8	1847	61	664	144
Sudan	Sweet	5-17	Do	Heading	3647	59.8	1462	49	804	174
Millet	Dakota Kursk	5-17		Do	6699	60.5	2646	88	790	171
Millet	Siberian	5-17			6501	59.2	2652	88	816	176
Corn	Falconer	5-16		Glazed	12850	78.7	2737	91	424	92
Do	Rainbow	5-16		Do	13025	76.9	3009	100	462	100
	KF-1	5-16			15550	81.1	2939	98	378	82
	Nodak 301	5-16			13575	78.5	2919	97	430	93
	Pride #1	5-16			14425	80.1	2871	95	398	86
	Pride B-5	5-16			14125	79.4	2910	97	412	89
Sorghum	Rancher	5-16		Dough	6100	75.8	1476	49	484	105
Do	Black Amber	5-16		Do	5950	77.3	1351	45	454	98
Wheat	Mida	5-17		Ripe	Average yield 12.4 bushels per acre.					
Wheat	Pilot 1/	----	Corn	Ripe	44 yr. avg. yield – 18.4 bushels per acre.					

1. The varieties Pilot & Mida have produced practically the same average over the last 10 yrs. in this station's variety trials and yields of these varieties on the same preparation are rather closely comparable.

SPRING WHEAT YIELD TRIALS

Varietal Field Plot Trials:

Twenty two varieties of hard red spring wheat and two varieties of amber durum wheat were seeded in the 1951 Dickinson Experiment Station Varietal Field Plot Trials. The search for high yielding rust resistant wheats possessing satisfactory milling and baking quality has led to numerous changes in this trial. New this year were four selections from Dr. L.R. Waldron's AM^2 x Newthatch cross, Ns 3805, Ns 3662, Ns 3681, and Ns 3823, N. No. 2313 from the cross N. No. 1750 x Timstein, Minn. 2824 and two Thatcher selections, Red Thatcher and Grimm's selection. The five highest yielding hard red spring wheats in the Dickinson trials this year were: Grimm's selection, 26.1 b.p.a., Mida, 26.1 b.p.a., Pilot, 25.4 b.p.a., Rival, 25.3 b.p.a., and Red Thatcher, 25.1 b.p.a. Test weights ranged from 57.0 to 60.0 pounds per bushel in this trial.

Comparison of long term average yields shows the varieties Mida, Pilot, Cadet and Rival have practically the same average for the past ten year period 1942-1951. Thatcher, the only other variety in the Dickinson trials that is widely grown in this area has averaged 93% of Mida for the ten years 1942-1951. Rescue for the past six years has averaged 93% of the yield recorded for Mida. Mida has outyielded all other varieties, included in these trials for 2 years or more, by a wide margin.

Three obsolete varieties, Haynes Bluestem, Red Fife and Marquis, still being carried in these trials for purposes of comparison have been completely outclassed by the newer strains. Over the past 10 years these old varieties have produced only about three fourths as much as the top yielders in this trial.

Comparative yields for the Wheat Varietal Trials conducted at the Dickinson Experiment Station from 1942-1951 inclusive are summarized in Table 6.

Table 6. Comparative Yields – Wheat Variety Trials – 1942 thru 1951 1/

Dickinson Experiment Station, Dickinson, North Dakota

Description	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	Average	% of Mida	No. Years Compared
Mida	27.1	19.6	23.4	25.0	18.1	24.3	35.9	11.9	20.5	26.1	23.2	100	10
Pilot	28.6	21.9	20.0	19.1	15.7	25.6	39.8	13.6	18.5	25.4	22.8	99	10
Rival	27.9	14.7	22.6	24.3	19.9	27.6	35.8	11.3	19.5	25.3	22.9	99	10
Thatcher	24.0	21.5	20.2	20.0	16.3	26.2	33.0	10.8	18.2	23.8	21.4	93	10
Ceres	24.6	20.7	16.8	21.0	14.0	18.6	36.3	12.5	19.2	24.1	20.8	90	10
Marquis	14.9	16.3	16.4	18.1	15.0	16.7	34.5	10.9	17.8	24.4	18.5	80	10
Red Fife	11.8	13.5	16.8	17.0	16.5	16.0	34.5	11.0	18.5	25.9	18.2	79	10
Haynes Bluestem	12.7	13.4	15.9	13.9	14.9	14.5	34.9	8.6	16.7	23.8	16.9	73	10
Cadet	29.3	20.6	21.4	20.2	17.7	25.3	37.8	13.0	21.2	23.7	23.0	100	10
Mindum durum	27.4	20.6	22.1	22.1	19.8	32.8	43.0	12.0	19.1	21.3	24.0	104	10
Rescue					19.9	25.4	32.7	9.6	19.0	20.9	21.3	93	6
Rushmore							28.0	9.8	18.9	22.8	19.9	84	4
Nugget							29.4	9.4	20.2	21.2	20.1	85	4
Lee							32.2	9.4	19.1	22.0	20.7	88	4
N. No. 2211									19.7	20.9	20.3	87	2
N. No. 2115									19.8	21.5	20.6	88	2
N. No. 2313										22.4			1
Minn. 2824										24.4			1
Ns 3805										18.1			1
Ns 3662										21.1			1
Ns 3681										24.2			1
Ns 3823										19.0			1
Red Thatcher										25.1			1
Grimm's Selection										26.7			1

1/ Grown on fallow 1945, 1947, 1948, 1949, 1950, and 1951. All other years, 2 plots on fallow and 2 plots on corn land.

Uniform Regional Nursery: 26 varieties or strains-triplicate 3 row

Plots-grown at 18 stations in the spring

Wheat region.

The composite report for this trial is not yet available.

In the Dickinson Trial the Thatcher check ranked 9th for yield averaging 25.9 b.p.a. Entries which exceeded the check included:

Three selections from Minnesota's Timstein x Thatcher cross which ranked 1st, 5th and 7th.

Ns. 3681 from Dr. L.R. Waldron's Am^2 x Newthatch cross which ranked 3rd.

N. No. 2300 from a USDA Henry x Cadet cross which ranked 2nd.

N. No. 2239 from Wisconsin's Henry x Cadet cross which ranked 4th.

N. No. 2118 from Montana's 1585 x Cadet Combination which ranked 6th.

R.L. 2619 from Canada's R.L. 2265 x $Redman^3$ which ranked 8th.

Test weights were only fair in this trial ranging from 54.0 to 59.0 pounds per bushel.

Nine out of the 26 entries in this trial showed no leaf rust infection. Six of these nine were from Dr. L.R. Waldron's Am^2 x Newthatch cross; the remaining three being from the Henry x Cadet Combination. Two selections from the Am^2 x Newthatch cross carried a trace of black stem rust.

Results of quality trials on the 1951 Uniform Regional Spring Wheat Nursery will not be available in time to be included in this report.

Intrastate Nursery: 26 varieties or strains-quadruplicate single rows-

Grown at 3 N. Dak. Stations – Fargo, Langdon & Dickinson.

Three station averages for this nursery are not yet available. Yields in the Dickinson trial ranged from a high of 30.0 b.p.a. from Dr. L.R. Waldron's Ns 3888 to a low of 20.7 b.p.a. from a Marquis x Frondozo cross, N. No. 2400. Three of the five entries from the Dickinson station were high yielders ranking 3rd, 4th and 6th. N. No. 2346 and N. No. 2345, selections from the Regent-Mida x 1552-Mida combination averaged 29.2 and 28.1 b.p.a. respectively and N. No. 2348 from a Pilot x Premier cross produced 29.0 b.p.a. Lee, included as a check, ranked 21st out of 26 entries, with an average yield of 23.9 b.p.a. Test weights were only fair in this trial ranging from 53.0 to 60.0 pounds per bushel with most entries falling into the 55.0 – 56.0 pound class.

Elimination Nursery: 101 varieties or strains-single rows-grown at

3 N. Dak. Stations, Fargo, Langdon & Dickinson

Three station averages for this nursery are not yet available. The spread in yield in the Elimination Nursery was considerably wider than in either the Uniform Regional or Intrastate Nurseries, ranging from a low of 16.0 b.p.a. from Ns 3944 to a high of 37.0 b.p.a. from three different Dickinson selections, Ds. 101, 105 and 284. Lee, used as a check in this trial yielded 23.8 b.p.a. Half of the 30 Dickinson entries in this nursery averaged well over 30.0 b.p.a. and 9 entries fell within the 25.0 – 30.0 b.p.a. class. Of the entire Dickinson lot, only four failed to exceed the yield of the Lee check.

As in the two previous trials, test weights were only fair ranging from 51.0 to 59.0 pounds per bushel.

Promising strains from this nursery are advanced to Intrastate and Regional trials as rapidly as space becomes available.

State Nursery: 10 entries – triplicate 3 row plots.

This nursery, made up of strains developed by Dr. L.R. Waldron, Plant Breeder, N. Dak. Agri. Experiment Station, was included in the 1951 plantings here at his request.

Mida, the highest yielding check included in this trial averaged 30.2 b.p.a. and ranked 3rd being out yielded by Ns 3890, which produced 32.5 b.p.a. and Ns 3963, which averaged 30.9 b.p.a. Ns 3962 averaged 29.7 b.p.a. and ranked 4th for yield followed by the Lee check, which produced 27.3 b.p.a. All other entries were outyielded by both check varieties.

Composite results from this nursery, which is also grown at several other stations will be reported by Dr. L.R. Waldron.

Advanced Station Nursery: 20 varieties or strains-triplicate 3-row plots.

This nursery is made up of promising strains of wheat produced at the Dickinson Experiment Station, from which are selected candidates for advanced state and Regional nurseries. Quality trials are made on sixteen of the most promising strains each year by the Department of Cereal Technology, State College Station, Fargo, N. Dak.

Yields in this trial were quite comparable to yields for nursery trials already reported. Mida, included here as a check variety averaged 22.9 b.p.a., which was exceeded by 13 of the 18 Dickinson selections. Highest yield in this trial was 29.5 b.p.a. from N. No. 2153, a selection from the cross 1552 x Mida made by Mr. Ralph W. Smith, former agronomist at this station.

Unfortunately many of the older strains included in the station nurseries lack resistance to leaf rust, which practically rules out the possibility of their ever finding widespread use as commercial varieties. The high yielding capacity of many of these strains makes them extremely useful in the wheat breeding program, however, and since 1948 one main objective of the breeding work here has been to improve the rust resistance, meanwhile maintaining or improving if possible the yielding capacities which have already been obtained. Although it is too early to predict results, progress has been made in this regard.

Dickinson Spring Wheat Nursery: 145 varieties or strains-triplicate single rows.

Pilot, the highest yielding check in this trial averaged 29.9 b.p.a. and was equaled or exceeded by 27 Dickinson Experiment Station strains, the best of which was a selection from the cross 1844 x Mida, which yielded 34.7 b.p.a. The 1844 x Mida combination was easily the highest yielding cross in this trial with 8 out of 13 selections from it producing yields of over 30.0 b.p.a. Other high yielding combinations included: 2157 x Rescue, 1740-Mida x 1753, 1552 x Mida, 1740 x Mida, 1556 x Cadet and Regent-Mida x 1552-Mida.

Uniform Bunt Nursery: 44 varieties or strains-duplicate 8′ rows.

This nursery, which contains current uniform plot varieties, wheats from the Uniform Regional Spring Wheat Nursery, promising strains from other nurseries and several checks is seeded at 5 stations in the spring wheat region. Composite results are not yet available. Infection in the Dickinson trial ranged from zero to 66% infected, with well over half of the entries carrying less than 10%. Dr. L.R. Waldron's Ns 3755 and Minnesota's 2824, 2806 and II-42-107 were free of infection in this trial.

Dickinson Bunt Nursery: 600 varieties or selections-4′ rows.

Wheats making up this nursery have all been developed at the Dickinson Experiment Station with the exception of standard checks. Included this year were selections from 43 of the best crosses made here since 1945. Several hundred selections were made from this material for future use.

Wheat Breeding: 1951

Forty-two successful crosses were made this year. A promising Dickinson wheat was used as one of the parents in each cross and several are combinations of two promising Dickinson wheats.

WINTER WHEAT TRIALS

Spring survival was recorded as zero for all winter wheat trials at the Dickinson Experiment Station for the 1950-51 season.

These trials, which included a varietal field plot test of 3 varieties and winter hardiness nurseries made up of approximately 150 varieties, strains and selections were seeded early in October 1950 and had emerged in less than two weeks. Reasonably good precipitation in the fall of 1950 resulted in a rapid growth and most entries had reached a height of over two inches before freezing weather ended the growing season. All entries in these trials winterkilled 100%.

In general winter wheat has not been dependable in this area. The amount of winter wheat grown in N. Dak. is relatively small, but because much of it has been grown in the Slope region, it has received considerable attention at this station.

In past years many different methods of protection have been tried without success, such as covering with straw, sowing in furrows in grain or corn stubble and in standing corn. Different methods of packing the soil have been tried as well as different rates and dates of seeding. No cultural method tried could offset the handicap of prevailing dry soil conditions in the fall and the severity of winter in this area.

OAT YIELD TRIALS

Varietal Field Plot Trials:

Of the sixteen varieties of oats included in the 1951 trials at this station, Gopher was high yielder averaging 69.8 b.p.a. closely followed by C.I. 5636, which yielded 69.4 b.p.a. and C.I. 5845 with an average of 62.6 b.p.a.

C.I. 5636, a very productive Andrew x Clinton derivative and C.I. 5845, a selection from the cross /Bond-Richland x Bond-Anthony/ x Overland/ x Clinton are new to the full scale varietal field plot trial this year. Five pounds of seed of each of these strains, C.I. 5636 and C.I. 5845, was obtained in 1950 from Dr. F.A. Coffman, Senior Agronomist, Oat Investigations, USDA, and both were grown in an abbreviated trial that year because of lack of sufficient seed for a full scale trial. From the limited data available both strains appear sufficiently promising for this area to be continued in trials at this station.

Comparative yields for the Oat Varietal Trials conducted at the Dickinson Experiment Station from 1942-1951 inclusive are summarized in Table 7.

Table 7. Comparative Yields – Oat Varietal Trials - 1942 thru 1951

Dickinson Experiment Station, Dickinson, North Dakota

Variety	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	Average	% of Gopher	No. Years Compared
Early Oats:													
Gopher	69.3	48.2	64.8	61.9	45.6	63.3	93.6	21.4	43.3	69.8	58.1	100	10
Marion	64.9	43.0	55.2	59.9	47.7	65.7	92.0	22.9	42.3	61.8	55.5	96	10
Ajax		45.9	56.3	56.6	55.5	63.6	92.8	22.5	45.1	60.9	55.5	98	9
Clinton			52.5	52.7	42.9	65.1	85.6	19.6	40.2	54.6	51.7	89	8
Andrew								19.8	40.7	59.8	40.1	90	3
Shelby									37.1	60.3	48.7	86	2
Zephyr									33.2	54.1	43.7	77	2
James (Hulless)									40.8	53.0	46.9	83	2
C.I. 5636										69.4	69.4	99	1
C.I. 5845										62.6	62.6	90	1
Midseason Oats:													
Bannock	82.9	49.6	81.3	60.9	50.7	57.4	95.1	17.9	38.6	57.2	59.2	101	10
Rainbow	80.0	45.0	60.0	52.1	54.9	64.2	91.5	23.5	37.9	51.1	56.0	96	10
Victory	81.6	45.8	68.6	62.4	57.6	56.6	95.3	17.9	38.4	57.2	58.1	100	10
Marida	86.5	46.7	76.7	62.2	54.4	55.6	109.0	17.7	36.3	53.4	59.9	103	10

Oat Nurseries: Uniform Early Nursery – 30 entries-triplicate single rows.

Uniform Midseason Nursery – 30 entries-triplicate single rows.

Station Nursery – 45 entries-triplicate single rows.

Of the 105 entries included in the above listed Oat Nursery Trials, two selections were outstanding. One, C.I. 4267, a selection from the cross Anthony x Morota, averaged 89.9 b.p.a., the other, C.I. 3350 from a Markton x Rainbow combination yielded 89.0 b.p.a., both outyielding the Ajax check by approximately 24.0 b.p.a.

A preliminary report on the performance of Anthony x Morota, C.I. 4267, shows it to have produced 103.0 b.p.a. as compared to 112.0 b.p.a. for Ajax at Fargo and 98.9 b.p.a. as compared to 90.5 b.p.a. for Ajax at Langdon.

BARLEY YIELD TRIALS

Varietal Field Plot Trials:

Top yielding Barley Varieties in field plot trials at the Dickinson Experiment Station were Hannchen, Tregal, and Vantage, all of which averaged 40.0 or more bushels per acre.

Comparative yields for the Barley Varietal Trials conducted at the Dickinson Experiment Station from 1942-1951 inclusive are summarized in Table 8.

Table 8. Comparative Yields – Barley Varietal Trials – 1942 thru 1951

Dickinson Experiment Station, Dickinson, North Dakota

Variety	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	Average	% Manchuria	No. Years Compared
6-Rowed:													
Manchuria	38.3	30.5	33.3	40.4	20.1	38.2	52.9	3.9	32.1	34.1	32.4	100	10
Trebi	42.5	30.9	40.2	36.3	25.7	47.3	63.7	6.9	37.1	34.8	36.5	113	10
Tregal	44.2	30.1	35.8	28.8	24.7	41.2	62.2	10.7	45.8	40.3	36.4	112	10
Kindred				31.5	18.0	35.4	59.7	6.5	33.2	23.1	29.6	94	7
Montcalm					28.4	31.7	55.4	7.8	30.5	27.9	30.3	96	6
Feebar						45.7	53.8	8.3	30.7	15.6	30.8	96	5
Plains						31.7	48.4	4.4	34.6	21.5	28.1	87	5
Moore							60.1	5.3	31.0	29.8	31.6	103	4
Titan								10.5	44.7	34.2	29.8	127	3
Vantage								10.6	36.5	39.8	29.0	124	3
Frontier									19.0	29.3	24.2	73	2
2-Rowed:													
Steigum	35.1	28.5	37.8	39.5	29.8	37.6	55.4	10.3	35.8	36.8	34.7	107	10
Hannchen	35.8	28.7	36.1	35.6	27.4	39.2	49.8	12.0	34.8	44.7	34.4	106	10

Table 8. Comparative Yields – Barley Varietal Trials – 1942 thru 1951

Dickinson Experiment Station, Dickinson, North Dakota

Variety	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	Average	% Manchuria	No. Years Compared
6-Rowed:													
Manchuria	38.3	30.5	33.3	40.4	20.1	38.2	52.9	3.9	32.1	34.1	32.8	100	10
Trebi	42.5	30.9	40.2	36.3	25.7	47.3	63.7	6.9	37.1	34.8	36.5	111	10
Tregal	44.2	30.1	35.8	28.8	24.7	41.2	62.2	10.7	45.8	40.3	36.4	111	10
Kindred				31.5	18.0	35.4	59.7	6.5	33.2	23.1	29.6	94	7
Montcalm					28.4	31.7	55.4	7.8	30.5	27.9	30.3	96	6
Feebar						45.7	53.8	8.3	30.7	15.6	30.8	96	5
Plains						31.7	48.4	4.4	34.6	21.5	28.1	87	5
Moore							60.1	5.3	31.0	29.8	31.5	102	4
Titan								10.5	44.7	34.2	29.8	128	3
Vantage								10.6	36.5	39.8	29.0	124	3
Frontier									19.0	29.3	24.2	73	2
2-Rowed:													
Steighum	35.1	28.5	37.8	39.5	29.8	37.6	55.4	10.3	35.8	36.8	34.7	105	10
Hannchen	35.8	28.7	36.1	35.6	27.4	39.2	49.8	12.0	34.8	44.7	34.4	105	10

Barley Nurseries: Uniform Great Plains Nursery – 15 entries-triplicate single rows.

Station Nursery – 45 entries-triplicate single rows.

Vantage, high yielder in the Uniform Nursery, averaged 65.9 b.p.a. Titan and Wyoming WS 471 ranked second and third in this trial.

High yielders in the Station Nursery were Dickinson selection 45-15 from composite cross C.I. 6725, and T-136-5-5 from Andy Lejeune's Kindred x Titan combination. Both averaged 61.3 b.p.a. exceeding the yield of Vantage, top check in this trial, by 6 bushels. Dickinson selection 45-15 has been consistently good. For the five year period 1947-1951 inclusive it has averaged 55.5 b.p.a. as compared with 45.7 b.p.a. from Trebi, high yielding check variety used in this trial. Dickinson 45-15 is scheduled to be moved up to field plot trials in 1952.

FLAX YIELD TRIALS

Varietal Field Plot Trials:

Yields were very poor in this trial, averaging less than 4.0 b.p.a. for the 15 varieties included.

Bison, used as a comparison standard in these trials, has been equaled or exceeded by all of the newer varieties which have been in trials here for the past 7 years. B. 5577 and B. 5128, two of Dr. H.L. Bolley's selections, have been the best yielders in trials at this station followed closely by B. Golden C.I. 977, Royal, Dakota, Koto and Victory.

Comparative yields for the Flax Varietal Trials conducted at the Dickinson Experiment Station from 1942-1951 inclusive are summarized in Table 9.

Table 9. Comparative Yields – Flax Varietal Trials – 1942 thru 1951

Dickinson Experiment Station, Dickinson, North Dakota

Variety	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	Average	% of Bison	No. Years Compared
Bison	13.8	7.2	5.6	6.9	9.7	11.3	7.4	0	8.9	4.0	7.5	100	10
B. 5577	16.5	10.4	10.0	10.7	10.5	14.1	6.2	0	10.2	3.7	9.2	123	10
B. Golden C.I. 977	16.3	10.5	7.7	7.8	9.7	16.0	5.9	0	9.4	3.8	8.7	116	10
B. Golden C.I. 644	14.3	6.8	7.6	10.7	9.8	13.0	3.3	0	9.1	3.3	7.8	104	10
Koto	13.0	8.5	7.3	7.2	10.0	11.0	10.6	0	9.1	3.8	8.1	108	10
B. 5128		12.2	8.6	8.2	8.7	14.6	5.0	0	12.1	3.0	8.0	118	9
Royal		8.6	7.9	8.3	10.7	12.0	7.0	0	11.5	3.9	7.8	115	9
Victory		10.3	8.7	8.6	9.1	10.1	5.4	0	9.5	3.8	7.3	107	9
Dakota			7.5	9.3	9.1	10.8	10.7	0	10.9	3.5	7.7	115	8
Sheyenne			6.2	6.5	9.3	14.0	4.5	0	9.5	3.8	6.7	100	8
Arrow				11.4	9.6	11.0	3.8	0	10.0	3.1	7.0	104	7
Marine									9.5	3.7	6.6	101	2
Rocket									9.0	2.9	6.0	92	2
Redwood									8.4	3.5	6.0	92	2

Flax Nurseries: Uniform Regional Nursery – 25 entries-triplicate, 3 row plots.

Station Nursery – 110 entries-single rows.

No entries in this year's Uniform Nursery Trial at the Dickinson Station were particularly outstanding, and yields were generally poor throughout both nursery trials. High yielder in the Uniform Trial was C.I. 1481, a selection from Argentine 144, which averaged 8.5 b.p.a. followed closely by B. 5128, which yielded 8.2 b.p.a. Ranking third high was C.I. 1482, from the combination JWS 153B9 x LaPrevision 18, which averaged 8.0 b.p.a.

One hundred and fifty-five single plant selections were made here in 1949 from a field of B. 5577 flax. Of this number, 108 selections were retained and included in rod-row yield trials for the first time this year, along with B. 5577 and B. 5128 checks. B. 5577 produced 6.2 b.p.a. and B. 5128 8.4 b.p.a. in this trial, yields which were exceeded by several of the selections, four of which yielded 10.0 bushels or more per acre and ten of which averaged between 9.0 and 10.0 b.p.a.

B. 5577 is one of the higher yielding strains in this station's field plot trials. It is heterozygous, containing a mixture of both fiber and oil seed types of varying heights, yielding capacity and degrees of maturity. It is felt that some improvement in yield is possible with this flax by the elimination of the fiber types, particularly and the lower yielding oil seed types.

CORN TRIALS – 1951

Seed of 12 O.P. Varieties and Hybrids and 8 Experimental Strains was furnished by Mr. William Wiidakas for trial at the Dickinson Experiment Station in 1951. Six other strains were added by this station bringing a total of 26 Varieties, Hybrids, or Experimental Numbers into this year's trial.

Top yielder in this year's trial was Experimental Double Cross No. 712, which was also high yielder in the 1950 trial.

A comparison of average yields for the past several years shows that Rainbow Flint (Mandan strain) has been a rather consistently good variety, and has produced the highest average yield over the last 9 year period, 1943-1951. The yield of Rainbow Flint has been exceeded however by Experimental No. 712 for the two years this numbered strain has been included in the Dickinson trials.

Comparative yields for the Corn Trials conducted at the Dickinson Experiment Station from 1943-1951 inclusive are presented in Tables 10 and 11.

Table 10. Comparison of Average Shelled Corn Yields – Dickinson Trials - 1943-1951

Dickinson Experiment Station, Dickinson, North Dakota

Shelled Corn – Bushels Per Acre											
Variety or No.	**1943**	**1944**	**1945**	**1946**	**1947**	**1948**	**1949**	**1950**	**1951**	**Avg.**	**% of Falconer**
Falconer	20.1	43.9	29.9	18.6	31.8	31.9	13.8	23.0	22.0	26.1	100
Rainbow Flint	19.0	38.9	22.6	18.4	38.9	34.2	14.3	23.1	18.5	25.3	97
Minn. 13 (Haney)	9.9	34.2	20.9	12.1	25.3	24.6	8.5	16.3	15.6	18.6	71
Nodak 201	14.8	40.2	26.3	15.0	27.9	30.2	11.5	20.4	15.4	22.4	86
Nodak 203	9.6	28.7	17.3	14.1	25.8	21.9	12.2	20.7	18.8	18.8	72
Wisconsin 240	18.6	40.7	26.2	15.0	29.8	26.8	10.7	16.9	18.3	22.6	87
Wisconsin 279	15.1	37.3	22.4	10.6	32.6	28.4	8.2	18.7	18.8	21.3	82
Nodak 301		42.3	29.9	16.9	27.9	34.9	12.7	19.6	22.6	25.9	96
Kingscrost KF-1			26.1	15.5	30.8	27.0	10.0	16.7	17.1	20.5	84
No. 785				18.5	31.9	32.7	12.6	22.0	28.3	24.3	103
N.D. 302A						30.2	8.3	17.4	18.5	18.6	82
Nodak 208						31.9	14.7	25.3	26.6	24.6	108
Nodak 304						28.6	14.5	15.8	24.7	20.9	92
No. 447						32.7	12.4	24.6	23.5	23.3	103
No. 712								27.2	31.8	29.5	131

Table 11. Comparison of Average Fodder Yields – Dickinson Trials – 1943-1951

Dickinson Experiment Station, Dickinson, North Dakota

	Fodder – Lbs. Per Acre										
Variety or No.	**1943**	**1944**	**1945**	**1946**	**1947**	**1948**	**1949**	**1950**	**1951**	**Avg.**	**% of Falconer**
Falconer	3920	7236	4874	3072	4422	5320	2567	4408	2757	4286	100
Rainbow Flint	5233	8384	4774	3406	5557	5671	2755	4343	3507	4848	113
Minn. 13 (Haney)	3313	7729	4320	2793	3811	3748	2115	3945	3445	3913	91
Nodak 201	3248	7054	3881	2568	4050	4388	2363	3365	3177	3788	88
Nodak 203	2090	5771	2903	2400	4012	3078	2201	3585	2953	3221	75
Wisconsin 240	3621	7709	4289	2976	4382	3936	1877	3200	3658	3961	92
Wisconsin 279	3766	7864	4320	2942	4887	4240	2457	4292	3862	4293	100
Nodak 301		7985	5644	3600	4050	5096	2644	3945	4361	4666	108
Kingscrost KF-1			5867	3572	4925	4320	2730	3611	4729	4251	109
No. 785				3573	4582	4435	2736	3950	5557	4172	111
N.D. 302A						4556	2823	4151	3383	3728	99
Nodak 208						4503	2406	4112	4005	3757	100
Nodak 304						3848	2331	3341	3782	3326	88
No. 447						4772	2804	4854	4449	4220	112
No. 712								5041	5944	5493	153

WINTER RYE TRIALS

Varietal Field Plot Trials:

Five varieties of Winter Rye were seeded on September 20, 1950 in spring wheat stubble. Yields were only fair with the highest average, 16.1 b.p.a., being made by White Soviet, followed by Emerald, Imperial, Dakold and Pierre in that order.

Winter Rye is not entirely dependable in this area, being affected by poor soil moisture conditions at seeding time in many years and also by the severity of winter.

WEATHER SUMMARY – 1951

Above average precipitation from September to December 1950 and nearly normal precipitation for January-March 1951 provided sufficient moisture for good germination and early growth of the crop. April and May precipitation was 1.32" below normal and crops were drawing heavily on subsoil moisture during those months. Continuous cool weather during this period aided considerably in bringing the crops through. By the end of May effects of the prolonged dry weather were noticeable, particularly on pastures, hay lands and small grains. Rainfall beginning on the last day of May and lasting through June 3rd, totaling 1.76" relieved the situation and greatly improved the outlook for a good crop. In addition, temperatures continued below par for the month of June, which favored the growth and development of small grain, but retarded development of the corn crop, which made slow progress up to the last two weeks in July. Small grains were filling at this time and some grain was damaged by the continuous high temperatures during the last half of July and the first week in August, particularly those crops which were on poorer tillage methods, such as disked stubble, where the subsoil moisture was practically gone. Warm weather coupled with above normal rainfall in August hastened the growth and development of the corn crop and good silage yields were obtained, although corn left for harvest until the first fall frost was poorly matured.

Wet weather during the harvesting season caused some delays in this area, but generally speaking, the crop was taken off with a minimum of loss, the damage in this area being minor as compared to the northern and eastern sections of the State.

This area was favored by the absence of both crop pests and diseases in the year 1951.

PUBLICATIONS:

Conlon, Thomas J. "Portable Shelter for Field Crossing", Bi-Monthly Vol. XIII, No. 2, Pages 70-71, Nov. - Dec. 1950.

Conlon, Thomas J. "Evergreens at Dickinson Experiment Station", Bi-Monthly Vol. XIII, No. 5, Pages 185-190, May-June, 1951.

Release Date	Title
December, 19, 1950	"Discard Red Durum"
January 9, 1951	"Area Farmers Pick Top Grain Varieties"
January 30, 1951	"Order Your Evergreens Early"
February 6, 1951	"Don't Buy Numbered Wheats"
March 15, 1951	Seeding Trials Planned at the DES for 1951"
April 5, 1951	"Grain Varieties for 1951"
April 26, 1951	"Sow Flax Early"
May 24, 1951	"Winter Wheat Winterkilled at DES"
June 18, 1951	"Weed Spraying Completed at DES"
July 19, 1951	"Fruit Crop Prospects Good at DES"
August 16, 1951	"Barley & Oats Yield Well in Rotation & Tillage Trials at the DES"
September 13, 1951	"Popular Wheat Varieties are High Yielders at the DES"
October 11, 1951	"New Oats Looks Good in DES Trials"
November 8, 1951	"Barley Yields in the West River Area"

SUMMARY OF PERSONAL ACTIVITIES – 1951

Scientific Conferences:

Annual Conference of Branch Station Superintendents, N.D.A.C., Fargo, N. Dak., Jan 9-12, 1951.

Correspondence:

One hundred and fourteen (114) letters concerning station work have been written since November 15, 1950. Individual reports on the various cooperative projects were included with correspondence to personnel in charge of these projects.

Public Meetings attended in North Dakota since November 15, 1950 at which the audience was largely farmers:

1. Feb. 17, 1951: Veterans Agriculture Class – Dickinson State Teachers College, Dickinson, North Dakota, Discussion of Small Grain Varieties – Attendance: 25.
2. Feb. 22, 1951: Annual Farmers Week – Beach, N. Dak., Discussion of Small Grain Varieties – Attendance: 200.
3. Feb. 23, 1951: Twelfth Annual Farmers Institute – New England, N. Dak., Discussion of Small Grain Varieties – Attendance: 500.
4. Mar. 5-7, 1951: Valley City Winter Show – Valley City, N. Dak., Assisted in judging grains.
5. Mar. 15, 1951: Veterans Agriculture Class, Dickinson State Teachers College, Dickinson, N. Dak. - Discussion of General Farming Practices in this area – Attendance: 21.
6. June 21, 1951: Two Veterans Agriculture Classes from Beulah, N. Dak. Tour of Dickinson Experiment Station – Attendance: 40.
7. June 29, 1951: Dickinson Experiment Station Annual Field Day – Attendance: Over 500.
8. July 24, 1951: Fruit Orchard Tour – Dickinson Experiment Station, Dickinson, N. Dak. Attendance: 80.
9. July 25, 1951: Bowman Homemakers Club – Tour of the Dickinson Experiment Station – Attendance: 20.
10. August 3, 1951: Veterans Agriculture Class – Dickinson State Teachers College – Tour of the Dickinson Experiment Station – Attendance: 70.
11. August 20, 1951: Veterans Agriculture Class, Belfield – Tour of the Dickinson Experiment Station – Attendance: 22.

12. August 24, 1951: Southwest District 4-H Girls & Leaders – Tour of the Dickinson Experiment Station – Attendance: 47.

13. August 28, 1951: Veterans Agriculture Class, Killdeer – Tour of the Dickinson Experiment Station – Attendance: 7.

14. Sept. 1, 1951: Slope County Farmers Festival – Judging grain & garden exhibits – Attendance: 1000.

15. Sept. 4, 1951: Hettinger County Fair – Judging grain and garden exhibits – Attendance: 1500.

16. Sept. 21, 1951: Golden Valley Harvest Festival – Judging grain and garden exhibits – Attendance: 1500.

17. October 9, 1951: General Agr. Class, Dickinson State Teachers College – Tour of the station – Attendance: 20.

18. October 10-13, 1951: Soil Conservation Exposition, Bismarck, N. Dak. - Assisted with N.D.A.C. Booth.

1951

ANNUAL REPORT

DICKINSON EXPERIMENT STATION

DICKINSON, NORTH DAKOTA

GRASS & LEGUME INVESTIGATIONS

BY

WARREN C. WHITMAN, BOTANIST

TABLE OF CONTENTS

HAY YIELDS FROM 1947 GRASS PLOTS

Eight species and strains were cut for hay from the 1947 grass seedings at the livestock farm of the Experiment Station. These plots were seeded in the fall of 1947, and the 1951 season was their first season of full production. It took these plots three growing seasons to become fully established. Two of the species, Russian wildrye and tall wheatgrass, have not yet become fully established. It is doubtful whether tall wheatgrass will make a stand in any of the 12 plots in which it was seeded. Russian wildrye has made a stand in terms of numbers of plants in all plots in which it was seeded, but the plants remain small and of low productivity. Neither of these species was cut in the 1951 season.

Green-weight and dry-weight yields, percent moisture at time of cutting, and percent leaves, stems, and heads of the eight species and strains cut for hay in the 1951 season are given in Table I of the Appendix. Yield data are the average of the yields from six 1/40 acre plots. Leaf, stem, and head data were obtained by separating small samples from one plot of each of the species.

Mandan wildrye produced the highest dry-weight yield, 1932 pounds per acre. Fairway crested wheatgrass, Lincoln bromegrass, standard crested wheatgrass, intermediate wheatgrass, and stiffhair wheatgrass all produced about the same dry-weight yield. The variation in production of these species was from 1421 pounds per acre for Fairway crested wheatgrass to 1296 pounds for stiffhair wheatgrass. The two lowest yielding species were green stipagrass at 1054 pounds per acre and northern bromegrass at 982 pounds per acre.

The leaf, stem, and head data show that green stipagrass, stiffhair wheatgrass, intermediate wheatgrass, and Lincoln bromegrass produced appreciably leafier hays then did the other species. Standard crested wheatgrass and northern bromegrass had the lowest percentages of leaves.

The character of the growing season, with a long dry period in early spring, was such as to put the grasses which make their best growth early in the spring, at a disadvantage in terms of total yield.

SEED YIELDS FROM 1947 GRASS PLOTS

Seed was harvested from three 1/40 acre solid drill plots and from three 1/40 acre cultivated row plots (row spacing 36") for each of the eight species and strains harvested for hay, as mentioned in the previous section. Because of lack of proper grass seed cleaning and processing equipment, the clean seed yields of the different species and strains have not yet been determined. However, on the basis of volume production, it is apparent that the row seedings produced about four times as much seed as did the drill plots in practically all cases. The two crested wheatgrass strains produced good crops of seed from drill plots, and the difference between drills and rows for these strains will probably not be as great as the differences between drills and rows for the other species and strains.

Influence of Nitrogen Fertilizer on an Old Crested Wheatgrass Stand

Nitrogen fertilizer (Spencer Ammonium Nitrate – 33.5% N) was applied at three different rates to a 10 year old stand of crested wheatgrass on April 18, 1951. Plots were 6' x 150', replicated four times. The fertilizer was broadcast on the surface by allowing the drill tubes of the fertilizer attachment to hang free from the drill. Rates of application were: light – 150 pounds of fertilizer per acre (50 pounds N); medium – 300 pounds of fertilizer per acre (100 pounds N); and heavy – 450 pounds of fertilizer per acre (150 pounds N). A check plot with no fertilizer was maintained in each replication.

The results of this trial are given in summary form in Table II of the Appendix. In harvesting the trial the plots were split, one-half of each plot in each replication being harvested as hay, while head counts were made, and small plots taken for seed production in the other half.

Light, medium, and heavy treatments all produced greater yields of dry matter than did the check. The increments of increase were small between the medium and heavy rates of application, but were of appreciable magnitude between the check and the light rate, the check and the medium rate and the light and medium rates. The light rate of 50 pounds of nitrogen per acre increased the yield over the check by 21.5%. The medium rate of 100 pounds of nitrogen per acre produced 37.2% more than the check, while the heavy rate – 150 pounds of nitrogen per acre – produced 38.3% more dry matter than the check.

Thus the first 50 pounds of nitrogen produced an increase of 21.5% in dry matter; the second 50 pounds, a further increase of 15.7%; while the third 50 pounds of nitrogen was of practically no value, producing an additional increase of only 1.1%.

The influence of seasonal conditions is without doubt, of great importance in determining the response of grass to nitrogen fertilizer. This experiment will have to be repeated over a period of several years before reliable conclusions can be drawn from the results. It seems apparent that lack of moisture in the early part of the season this year prevented the crested wheatgrass from taking much advantage from the additional nitrogen over the first 50 pounds.

The influence of nitrogen on the moisture content of the grass is of some interest. As shown in Table II of the Appendix, there was an increase in moisture content at time of cutting for each increment of nitrogen fertilizer. The check showed an average moisture content of 42.2%, the light rate 44.8%, the medium rate 48.1% and the heavy rate 49.5%.

The seed production data are not yet available, but the figures in Table II for the average number of heads per square meter quadrat indicate the probable differences in seed production. The light rate of application produced nearly twice as many heads per square meter as did the check; while the medium and heavy rates produced appreciably more than twice as many heads per square meter. The preliminary indications are that the influence of the nitrogen on seed production was greater than its influence on forage production in terms of percentage increase over the untreated plots.

Native Grass Pasture Yields

The 46 pasture cages in the native grass pasture at the livestock farm were clipped for yield for the sixth consecutive year. The pasture includes about 23 acres of formerly plowed land which was reseeded to crested wheatgrass in the late 1930's. The remainder of the pasture consists of unplowed native grass, the total area of the pasture being approximately 165 acres.

The dry weight yields of the eight different types included in the pasture are given in Table III of the Appendix. The table gives the average yield for each of the six years from 1946 through 1951, plus the six year average for each of the vegetation types.

It is apparent from the data of Table III that forage production on the native grass pasture during the 1951 season was relatively low. Some of the types produced less forage than they did in the 1949 season, which was the lowest producing season previous to this year. If the yields for all eight types in the pasture are averaged together for the 1949 season and for the 1950 season, it is found that the average yield for all types in 1949 was 825 pounds per acre while the average yield of all types in 1951 was 724 pounds per acre. On this basis, forage production on the pasture this season was the poorest in the six years of record.

However, the largest part of the surface acreage of the pasture is occupied by Types 1 and 5. On the basis of average production of Types 1 and 5, the 1951 season shows a slight advantage in production over the 1949 season.

The native grass pasture as a whole is in a rather low state of vigor. Heavy use in past seasons has contributed to its present low state of productivity. However, the character of the 1951 growing season was unfavorable from the standpoint of native grass forage production. There was very little carry-over moisture in the soil from the 1950 season this spring, and this factor combined with the dry weather of April and May, gave the native grass a set-back from which it did not recover, even after the favorable moisture conditions of late summer and fall. As a general rule, rains after mid-August do not have much influence on the native grass forage production of the current year. However, late season rains generally tend to keep the vegetation green over a longer period of time, and thus improve its forage quality.

Alfalfa Production

No harvestable forage was produced by the Alfalfa Variety plots during the 1951 season. The average height growth on the plots was about 5 inches, with only a few plants reaching a greater height than this. On one set of plots, a considerable amount of growth was developed where the discharge from the drainage ditch passed through one corner of several of the plots, but no comparative yields could be taken from these plots because of the small amount of plot area affected, and the great disproportion between growth on the portions of the plots in the ditch-way and those parts which did not receive additional moisture.

The Alfalfa Variety plots were clipped once during the season as a weed control measure, but otherwise received no treatment in the 1951 season.

WORK INITIATED DURING THE 1951 SEASON

1. Grass and alfalfa mixture trial.

A grass and legume (alfalfa) mixture trial was seeded on April 25, 1951. The trial consists of 45 1/40-acre plots comparing 7 single species and mixtures with and without alfalfa in three replications. These plots were seeded on disked corn ground and got off to an excellent start, although weed competition became heavy in the latter part of the season.

Table IV in the Appendix gives the single species and mixture combinations that were seeded together with the percentage emergence stands as determined on May 22, 1951. On the basis of the fine emergence stands obtained on practically all plots, the stands should all rate as excellent next year. Detailed counts will be made next spring.

2. Small plot grass trial.

A small plot grass trial involving three replicates of 30 1/80-acre plots each; a total of 90 plots was seeded with the hand drill on May 4, 5, and 7, 1951. This trial compares the performance of a number of species and strains alone, in mixture with other grasses, with alfalfa, and with slender wheatgrass and Mandan wildrye used as nurse grasses. A number of species and combinations not involved in the larger mixture trial are included in this trial.

Emergence stands for this small plot trial were determined on May 24, 1951. Excellent emergence stands were obtained in practically all cases. The detailed study of these plots will be started next spring.

3. Seedbed and time of seeding study.

Land was prepared for a seedbed and time of seeding study with the early fall seeding being made on August 16, 1951. This study is being made on a small plot basis, the individual plots being 5½' wide and 50' long. Russian wildrye, intermediate wheatgrass, green stipagrass, crested wheatgrass, and alfalfa are being used in the study with all plots triplicated.

The early fall seeding produced excellent emergence stands, with the exception of green stipagrass. Detailed study and continuation of the seeding schedule is to be carried on over a period of three years.

4. Legume Nursery.

Dr. Carter and Dr. Gorz of the Agronomy Department provided seed for a legume observation nursery which was seeded on May 18, 1951. This nursery got off to a poor start because of the dry weather at the time of seeding, but made excellent growth during the latter part of the season. Included in the nursery are seven strains of alfalfa, five strains of Ladino clover, three annual sweet clovers, and twenty-four species and strains of biennial sweet clover.

Additional Work with Native Vegetation at the Dickinson Station

1. The study of native grass forage production in relation to botanical composition conducted under Purnell Project #140 is being continued in the vicinity of Dickinson and in the Pyramid Park area. Progress in this work will be reported in the regular Station report under that project.

2. Work with the native legumes under Hatch 34 is in part conducted at the Dickinson Experiment Station. This work will also be discussed in the regular Station report under that project.

Plans for Additional Grass and Legume Investigations

It is planned to initiate the following projects during the 1952 season:

1. **New Alfalfa Variety Trials.** Land has been prepared for these plots and the trials will be seeded in the spring of 1952.

2. **Grass Seed Production Trials.** Land has been prepared for a grass seed production trial comparing seed production from solid drill plots and from row plots. This trial will be seeded in the spring of 1952.

3. **Renovation of Old Crested Wheatgrass Stands.** It is planned to apply cultural treatments, fertility treatments, and to use legumes in a study of the possibilities of improving production from old crested wheatgrass stands. The land for this study is available and tentative study plans have been worked out. The study will be begun in the spring of 1952.

4. **Expansion of Grass Nursery and Legume Nursery.** It is planned to introduce new material into both the grass nursery and the legume nursery as it becomes available.

Personal Activities Relative to Work

At the Dickinson Experiment Station

1. **Correspondence:**

   Sixteen (16) letters have been written in response to inquiries addressed to the Dickinson Experiment Station or in the conduct of matters relating to Dickinson Experiment Station affairs.

2. **News Articles and Radio Programs:**

   Seven news articles on grass and legume investigations at the Dickinson Experiment Station have been prepared and released since April 15, 1951.

   Participated in three radio programs over station KDIX, Dickinson.

   May 22, 1951 – Grass Culture

   August 30, 1951 – Early Fall Grass Seeding

   September 24, 1951 – Late Fall Grass Seeding

3. **Public Meetings:**

Date	Meeting	Attendance	Participation
6/18	Oliver Co. Alfalfa Growers	31	Talk on alfalfa seed production
7/7	Killdeer Farmers Group	9	20 minute discussion on grass and legumes
7/18	Dickinson Rotary Club	40	25 min. talk on grass
7/23	Minot Station Field Day	200	Introduced

4. **Dickinson Station Field Days:**

Date	Group	Attendance	Participation
6/21	Veterans Agr. Class - Beulah	44	Discussed grass and legume work
6/29	Annual Station Field Day	500	Discussed grass and legume work
7/10-11	Board of Higher Education	6	Grass and legume work discussed
7/17	Scranton Business Men	30	Grass and legume work discussed
7/24	Fruit Tour	80	20 min. on grass and legumes
8/20	Veterans Agr. Class – Belfield	22	40 min. on grass and legumes
8/24	4-H Girls Conference	47	20 minutes on grass and legumes
8/28	Veterans Agr. Class – Killdeer	7	30 min. on grass and legumes

5. **Miscellaneous:**

   Assisted in West River Livestock, Grain and Hay Show as a member of Grass and Legume Committee.

6. **Publications:**

   Carotene, Protein, and Phosphorus in Grasses of Western North Dakota, Bulletin 370, June, 1951.

APPENDIX

Table I. Yield and Physical Composition of Forage from Grass Plots at the Dickinson Experiment Station – 1951

Species	Green Wt. Lbs. / Acre	% Moisture	Dry Wt. Lbs. / Acre	% Leaves	% Stems	% Heads
Mandan Wildrye	3206	39.7	1932	32.5	50.6	16.9
Fairway Crested	2609	45.5	1421	28.1	53.6	18.3
Lincoln Brome	2827	50.1	1408	38.4	43.6	18.0
Standard Crested	2677	48.1	1389	19.4	57.6	23.0
Intermediate Wheatgrass	3061	55.8	1348	39.1	51.2	9.7
Stiffhair Wheatgrass	3067	57.6	1296	44.9	41.8	13.3
Green Stipagrass	2104	49.8	1054	48.6	29.0	22.4
Northern Brome	2402	58.6	982	25.2	46.5	28.3

Table II. Influence of Nitrogen Fertilizer on Forage Production and Head Production Of an Old Crested Wheatgrass Field, Dickinson – 1951

Treatment	Green Wt. Yield-Lbs. / Acre	% Moisture	Dry Wt. Yield-Lbs. / Acre	% Increase In Dry Wt. Over Check	Avg. No. Heads Per M^2 Quad
Check	2815	42.2	1627	----	160
Light (50# Nitrogen)	3588	44.8	1976	21.5	300
Medium (100# Nitrogen)	4306	48.1	2233	37.2	336
Heavy (150# Nitrogen)	4441	49.5	2250	38.3	354

Table III. Forage Yields from Cage Clippings, 1946-1951,

On Main Pasture at Livestock Farm

Type No.	Type Description	Forage Yield – Lbs. / Acre Oven-Dry Material						6-Year Average
		1946	1947	1948	1949	1950	1951	
1	Uplands Type	924.0	1432.2	776.1	434.2	709.7	512.4	798.1
2	Upland Draw	1313.0	2393.6	1209.7	869.5	914.7	869.2	1261.6
3	Lower Draw	1455.3	2972.2	1384.9	941.1	1226.5	597.4	1429.6
4	Bench Type	658.3	1039.5	667.4	315.2	741.6	310.5	622.1
5	Upland Slopes	561.3	1394.8	1128.7	548.8	623.7	349.1	767.7
6	Lower Bench	1268.8	1518.0	1263.3	742.8	800.1	339.1	988.7
7	Big Bluestem	2127.9	2849.0	2551.6	2135.7	3444.1	1823.5	2488.6
8	Crested Wheatgrass	936.9	1944.8	1221.6	612.7	1261.8	989.5	1161.2

Table IV. Emergence Stands on Grass and

Legume Mixture Plots – 1951 Seeding

Species	Emergence Stands - %			Average Emergence Stand %
	Plot 1	Plot 2	Plot 3	
Mandan Wildrye – Green Stipa	95	75	90	87
Mandan Wildrye – Russian Wildrye	80	90	90	87
Bromegrass	60	70	60	63
Intermediate Wheatgrass	100	90	95	95
Mandan Wildrye – Russian Wildrye Alfalfa	85	80	85	83
Bromegrass- Alfalfa	75	75	70	73
Mandan Wildrye – Green Stipa Alfalfa	90	80	85	85
Alfalfa	90	90	90	90
Crested Wheatgrass	90	90	90	90
Mandan Wildrye – Russian Wildrye Green Stipa	85	90	80	85
Tall Wheatgrass	80	95	90	88
Mandan Wildrye – Russian Wildrye Green Stipa – Alfalfa	90	85	80	83
Crested Wheatgrass – Alfalfa	90	90	90	90
Intermediate Wheatgrass – Alfalfa	80	90	95	88
Tall Wheatgrass – Alfalfa	90	85	90	88