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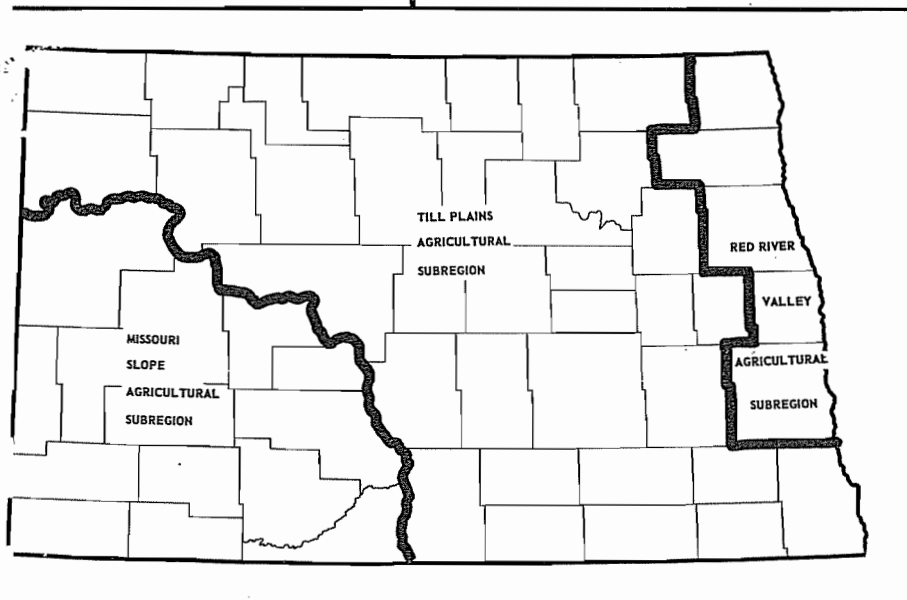
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By
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Statistics on
Fertilizer Consumption
in North Dakota

DEPARTMENT OF AGRICULTURAL ECONOMICS
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FARM ECONOMICS DIVISION
ECONOMIC RESEARCH SERVICE
UNITED STATES DEPARTMENT OF AGRICULTURE

CONTENTS

	<u>Page Number</u>
Introduction-----	1
Statistics on fertilizer consumption for the state as a whole-----	1
Sources of fertilizer-consumption data-----	1
Trends in fertilizer consumption-----	2
Trends in consumption of primary plant nutrients-----	5
Estimates of fertilizer consumption by specified crops, 1954 and 1959-----	10
Methodology employed in estimating fertilizer consumption by individual crops-----	10
Acreage of each crop fertilized-----	11
Percentage of each crop fertilized-----	11
Amount of fertilizer and primary plant nutrients applied to each crop-----	12
Percentage distribution of fertilizer consumption among specified crops-----	12
Average application rates per acre-----	12
Average amount of plant nutrients per acre-----	13
Use of fertilizer on irrigated crops-----	13
Census data on fertilizer use by counties, 1954 and 1959-----	28

LIST OF TABLES

<u>Table No.</u>		<u>Page No.</u>
1	Trend in consumption of commercial fertilizer by North Dakota farmers, 1951 to 1961, as indicated by various statistical series-----	4
2	Amount of primary plant nutrients in commercial fertilizers consumed in North Dakota, 1945 to 1960-----	7
3	Amount of primary plant nutrients as percent of total fertilizer consumption in North Dakota by years, 1945 to 1960-----	9
4	Estimated fertilized acreage of specified crops and pasture, by agricultural subregions of North Dakota, 1954 and 1959-----	14
5	Fertilized acreage in percent of harvested acreage, specified crops and pasture by agricultural subregions of North Dakota, 1954 and 1959-----	15
6	Estimated amounts of commercial fertilizer and plant nutrients applied to specified crops and pasture, North Dakota, 1954 and 1959-----	16
7	Estimated amount of commercial fertilizer and plant nutrients applied to specified crops and pasture, Red River Valley subregion of North Dakota, 1959-----	17
8	Estimated amount of commercial fertilizer and plant nutrients applied to specified crops and pasture, Till Plains subregion of North Dakota, 1954 and 1959-----	18
9	Estimated amount of commercial fertilizer and plant nutrients applied to specified crops and pasture, Missouri Slope subregion of North Dakota, 1954 and 1959-----	19
10	Amount of fertilizer applied to specified crops and and pasture in percent of total consumption, by agricultural subregions of North Dakota, 1954 and 1959-	21
11	Average amount of fertilizer applied per fertilized acre on specified crops and pasture, by agricultural subregions of North Dakota, 1954 and 1959-----	22
12	Average amount of nitrogen applied per fertilized acre on specified crops and pasture, by agricultural subregions of North Dakota, 1954 and 1959-----	23
13	Average amount of available P ₂ O ₅ applied per fertilized acre on specified crops and pasture, by agricultural subregions of North Dakota, 1954 and 1959-----	24

LIST OF TABLES (CONTINUED)

<u>Table No.</u>		<u>Page No.</u>
14	Average amount of potash (K_2O) applied per fertilized acre on specified crops and pasture, by agricultural subregions of North Dakota, 1954 and 1959-----	25
15	Estimated use of fertilizer on irrigated crops in North Dakota, 1959-----	26
16	Estimated use of fertilizer on irrigated crops in North Dakota, 1954-----	27
17	Summary of fertilizer use in North Dakota, by counties and agricultural subregions, 1954 and 1959----	29
18	Fertilization of corn in North Dakota, by counties and agricultural subregions, 1954 and 1959-----	32
19	Fertilization of potatoes in North Dakota, by counties and agricultural subregions, 1954 and 1959-----	35
20	Fertilization of wheat in North Dakota, by counties and agricultural subregions, 1954 and 1959-----	36
21	Fertilization of tame hay and cropland pasture in North Dakota by counties and agricultural subregions, 1954 and 1959-----	39
22	Fertilization of other crops in North Dakota, by counties and agricultural subregions, 1954 and 1959----	42
23	Fertilization of improved open pasture in North Dakota, by counties and agricultural subregions, 1954 and 1959-	45

LIST OF FIGURES

<u>Figure No.</u>		<u>Page No.</u>
1	Various estimates of amount of commercial fertilizer used in North Dakota, 1951-1961-----	3
2	Amount of available plant nutrients in commercial fertilizer consumed in North Dakota by years, 1945-1960-----	6
3	Amount of primary plant nutrients as percent of total fertilizer consumption in North Dakota, 1945-1960-----	8
4	Tons of commercial fertilizer used in North Dakota on various crops, 1954 to 1959-----	20
5	Total fertilized acreage as percent of harvested acreage of all crops, 1959-----	48
6	Percentage of harvested wheat acreage fertilized in 1959-----	49

STATISTICS ON FERTILIZER CONSUMPTION IN NORTH DAKOTA

By Stanley W. Voelker¹ and Marvin T. Nordbo²

Introduction

An important technological development in North Dakota agriculture during the past decade has been the substitution of fertilizer for land and other capital. Consumption of fertilizer increased about tenfold from 1951 to 1961. Different kinds of fertilizer-consumption statistics are available from several sources. The various data supplement each other in many respects. This report consolidates data from various sources into a more complete summary of trends in fertilizer usage in the state.

This report is an outgrowth of work done initially as part of a national survey to determine amounts of plant nutrients applied to each crop within each state and agricultural subregion. The national survey was conducted by Economic Research Service and Agricultural Research Service of the U. S. Department of Agriculture in cooperation with state agricultural experiment stations.

Statistics on Fertilizer Consumption for the State as a Whole

Sources of fertilizer-consumption data. -- Three primary sources of statistics on fertilizer consumption in North Dakota are available: (1) semiannual summaries of retail sales, compiled by the North Dakota Laboratories Commission from data submitted by retail dealers; (2) annual estimates of fertilizer consumption in each state, made by the Soil and Water Conservation Division of the Agricultural Research Service, U. S. Department of Agriculture; and (3) the U. S. Census of Agriculture estimates of fertilizer consumption for 1954 and 1959. For sake of brevity, these three sources are indicated in this report as "NDLC," "ARS," and "Census," respectively.

The NDLC reports give the tonnage of each fertilizer grade and analysis sold in the state during each 6-month period since 1950. The ARS reports include estimated tonnages of each primary plant nutrient (N, P₂O₅, and K₂O) as well as total tonnages of mixed fertilizers and fertilizer materials. These statistics are by 12-month periods, ending June 30 of each year, since 1940. In recent years, the ARS estimates have been based on shipments reported by about 96 percent of the fertilizer manufacturers and distributors throughout the country, supplemented by data compiled by state agencies. The Census fertilizer-consumption data are based on returns from a 20-percent sample of farms in 1954 and

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1959. These data are available for every county and include acreage fertilized and tons of material applied to six groups of crops in each state. For North Dakota, the six groups are: (1) Corn for all purposes; (2) wheat and durum; (3) potatoes; (4) hay and cropland pasture; (5) noncrop pasture; and (6) all other crops, including barley, oats, rye, flax, soybeans, and sugar beets.

Trends in fertilizer consumption. -- The annual tonnage of fertilizer sales, as reported by NDLC, and the annual tonnage of fertilizer shipments by manufacturers and distributors, as reported by ARS, both indicate the same steeply rising upward trend in fertilizer consumption since 1951. These two series are in close agreement for most of the years. Minor differences between them probably are due to year-to-year variations in the July 1 inventories of retail dealers (figure 1 and table 1).

The Census statistics of farm consumption, however, were 14.8 percent higher than the NDLC estimate in 1954 and 20.3 percent higher in 1959. The Census estimates include only the fertilizer used on farms, while the ARS and NDLC estimates include not only farm uses, but also nonfarm uses (lawns, gardens, golf links, parks, cemeteries, etc.). In view of this, it would be reasonable to expect the Census estimates to be slightly smaller than either the ARS or NDLC estimates.

A considerable portion of the fertilizer used in North Dakota is trucked in from the Twin Cities and other points in Minnesota, frequently as a backhaul by trucks used to transport agricultural products from North Dakota to terminal markets in Minnesota. Apparently, a large part of the fertilizer bought in Minnesota by North Dakota farmers and by commercial truckers on consignment for North Dakota farmers is included in the "shipments to Minnesota" by the fertilizer manufacturers and distributors in their reports to ARS. The NDLC, which depends entirely on reports from retail dealers in North Dakota for its statistics, has no record of the fertilizer bought in Minnesota by North Dakota farmers and those truckers who are not registered fertilizer dealers.

A comparison of ARS and Census estimates for North Dakota and Minnesota provides further evidence that some of the fertilizer used in North Dakota is included in the ARS statistics for Minnesota. In 1954, the ARS estimate for Minnesota exceeded the Census estimate by 55,500 tons while the ARS estimate for North Dakota was less than the Census estimate by 6,600 tons. In 1959, the ARS estimate for Minnesota exceeded the Census estimate by 37,500 tons, while the ARS estimate for North Dakota was less than the Census estimate by 25,100 tons.³

The above analysis suggests that the most reasonable estimates of annual fertilizer consumption by North Dakota farmers would be the ARS or NDLC annual estimates, adjusted upwards on the basis of Census data for 1954 and 1959 to allow for truck inshipments credited to Minnesota by the fertilizer industry (figure 1 and table 1).

³Reasons why the apparent deficits in North Dakota do not balance exactly the apparent excesses in Minnesota are that the ARS estimates include both farm and nonfarm uses, while the Census estimates include only farm uses. Also, the ARS estimates for Minnesota probably include some fertilizer used by farmers in northeastern South Dakota.

Fig. 1 - Various estimates of amount of commercial fertilizer used in North Dakota, 1951 to 1961.

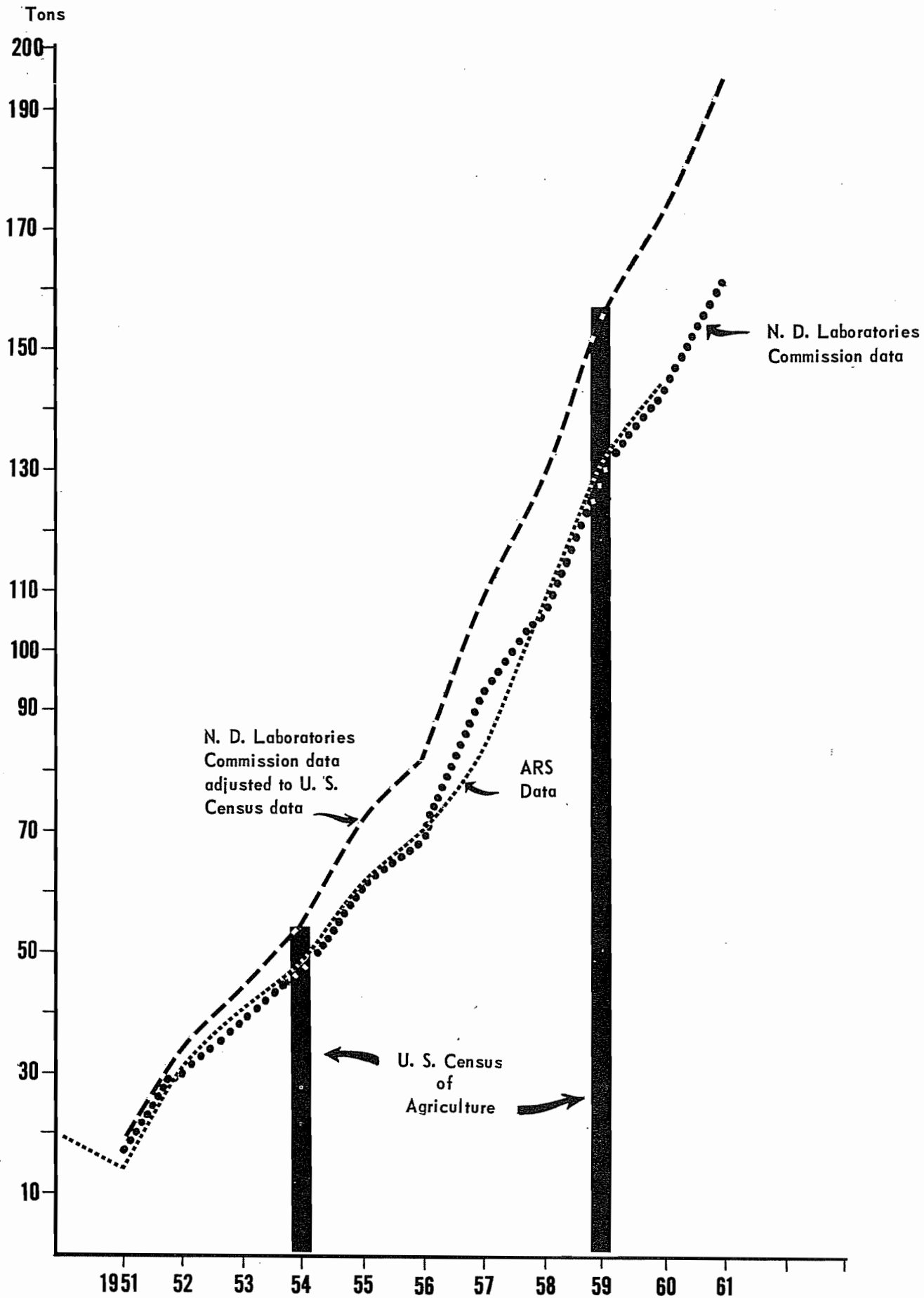


Table 1. - Trend in consumption of commercial fertilizer by North Dakota farmers, 1951 to 1961, as indicated by various statistical series

Year ending June 30	Sales by North Dakota dealers ¹	Shipments by manufacturers and distributors ²	Census estimates of farm use ³	Estimated annual use by farmers ⁴
	Tons	Tons	Tons	Tons
1951-----	17,017	14,205	---	18,969
1952-----	30,642	31,148	---	34,497
1953-----	38,380	40,495	---	43,632
1954-----	47,271	47,677	54,248	54,248
1955-----	62,644	63,010	---	72,603
1956-----	69,010	69,168	---	80,744
1957-----	92,621	81,745	---	109,395
1958-----	105,426	106,742	---	125,686
1959-----	130,425	131,834	156,978	156,978
1960-----	142,733	143,977	---	171,741
1961-----	160,974	5/	---	193,689

¹Compiled from semi-annual reports of the North Dakota Laboratories Commission, Bismarck, North Dakota.

²Compiled by Soil and Water Conservation Division, Agricultural Research Service, USDA. Data for 1950 to 1959 published in the annual editions of "Agricultural Statistics," U. S. Department of Agriculture, Washington, D.C. Data for 1960 published in "Consumption of Commercial Fertilizers and Primary Plant Nutrients in the United States," Agricultural Research Service, USDA, ARS 41-19-4, Sept. 1961.

³Compiled from U. S. Census of Agriculture, 1954 and 1959.

⁴Sales by North Dakota Dealers, adjusted to 1954 and 1959 Census estimates.

⁵Not available.

Trends in consumption of primary plant nutrients. -- The tonnage of primary plant nutrients -- nitrogen (N), available phosphoric oxide (P_2O_5), and potash (K_2O) -- consumed each year in North Dakota from 1945 to 1960, as reported by ARS, are shown in figure 2 and table 2. These data do not include truck inshipments not credited to North Dakota.

The plant nutrient in greatest demand throughout this 16-year period was P_2O_5 . Increase in demand for nitrogen was proportionately greater, however. Between 1950 and 1960, there was a 34-fold increase in the consumption of nitrogen, compared with a 9-fold increase in the consumption of P_2O_5 . One reason for the rapidly increasing use of nitrogen has been the increased practice of fertilizing nonfallowed land. Farmers use little or no nitrogen for crops planted on fallow. However, nonleguminous crops planted on nonfallow generally respond to nitrogen applications along with the phosphate treatment.

The rate of increase in potash consumption has been smaller than that of either P_2O_5 or nitrogen. Potash usually is included in the fertilization of potatoes and sugar beets in the Red River Valley. Some is used for wheat, barley, and corn in localized areas.

Consumption of primary plant nutrients in North Dakota has increased somewhat faster than consumption of commercial fertilizer, because of the trend toward higher analysis fertilizers. Before 1949, the total primary plant nutrients in commercial fertilizers never amounted to more than 30 percent of the fertilizer tonnage, but since 1949 this percentage has increased steadily, reaching nearly 49 percent in 1960 (figure 3 and table 3).

Technological advances by the fertilizer industry made the use of high-analysis fertilizers both physically possible and economically feasible. This trend toward higher analysis has been general throughout the country. For example, the primary plant nutrients amounted to 31.8 percent of the total fertilizer tonnage used in the United States in 1960, compared with only 20.4 percent in 1948. In North Dakota, high-analysis fertilizers are especially important because of the long distances to the principal sources of supply. Freight costs, therefore, account for a relatively high proportion of the retail price of fertilizer.

Fig. 2 - Amount of available plant nutrients in commercial fertilizer consumed in North Dakota, by years, 1945 to 1960.
 source: ARS

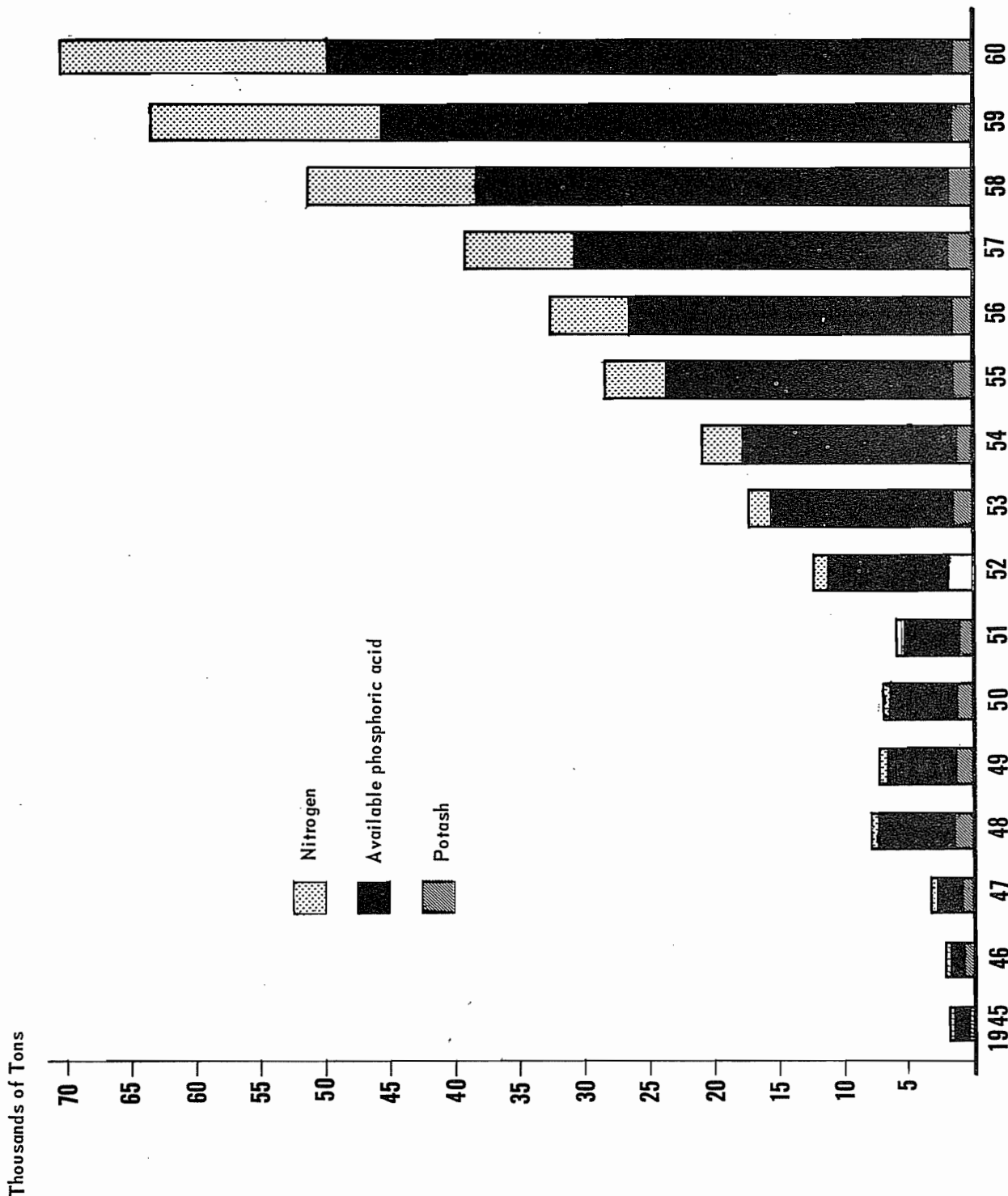


Table 2. - Amount of primary plant nutrients in commercial fertilizers consumed in North Dakota, 1945 to 1960

Year ending June 30	Total tons of fertilizer mixtures and materials	Available plant nutrients			
		N	P ₂ O ₅	K ₂ O	Total
	<u>Tons</u>	<u>Tons</u>	<u>Tons</u>	<u>Tons</u>	<u>Tons</u>
1945-----	5,266	54	1,232	252	1,538
1946-----	7,801	132	1,362	566	2,060
1947-----	12,354	270	2,017	861	3,148
1948-----	33,625	630	5,781	1,483	7,894
1949-----	21,520	672	5,051	1,368	7,091
1950-----	18,671	604	5,116	1,205	6,925
1951-----	14,205	573	4,383	1,038	5,994
1952-----	31,148	1,356	9,515	1,560	12,431
1953-----	40,495	1,614	14,088	1,437	17,139
1954-----	47,677	2,924	16,541	1,275	20,740
1955-----	63,010	4,598	22,329	1,359	28,286
1956-----	69,168	6,101	24,935	1,446	32,482
1957-----	81,745	8,458	28,858	1,626	38,942
1958-----	106,742	12,923	36,483	1,674	51,080
1959-----	131,834	18,033	43,697	1,519	63,249
1960-----	143,977	20,456	48,192	1,588	70,236

Source: Taken from data compiled by Soil and Water Conservation Division, Agricultural Research Service, USDA, and published in annual editions of "Agricultural Statistics," U. S. Department of Agriculture, Washington, D.C., except for 1960 data which are taken from "Consumption of Commercial Fertilizer and Primary Plant Nutrients in the United States," Agricultural Research Service, USDA, ARS-41-19-4, table 11, Sept. 1961.

Fig. 3 — Amount of primary plant nutrients as per cent of total fertilizer consumption in North Dakota, 1945 to 1960.

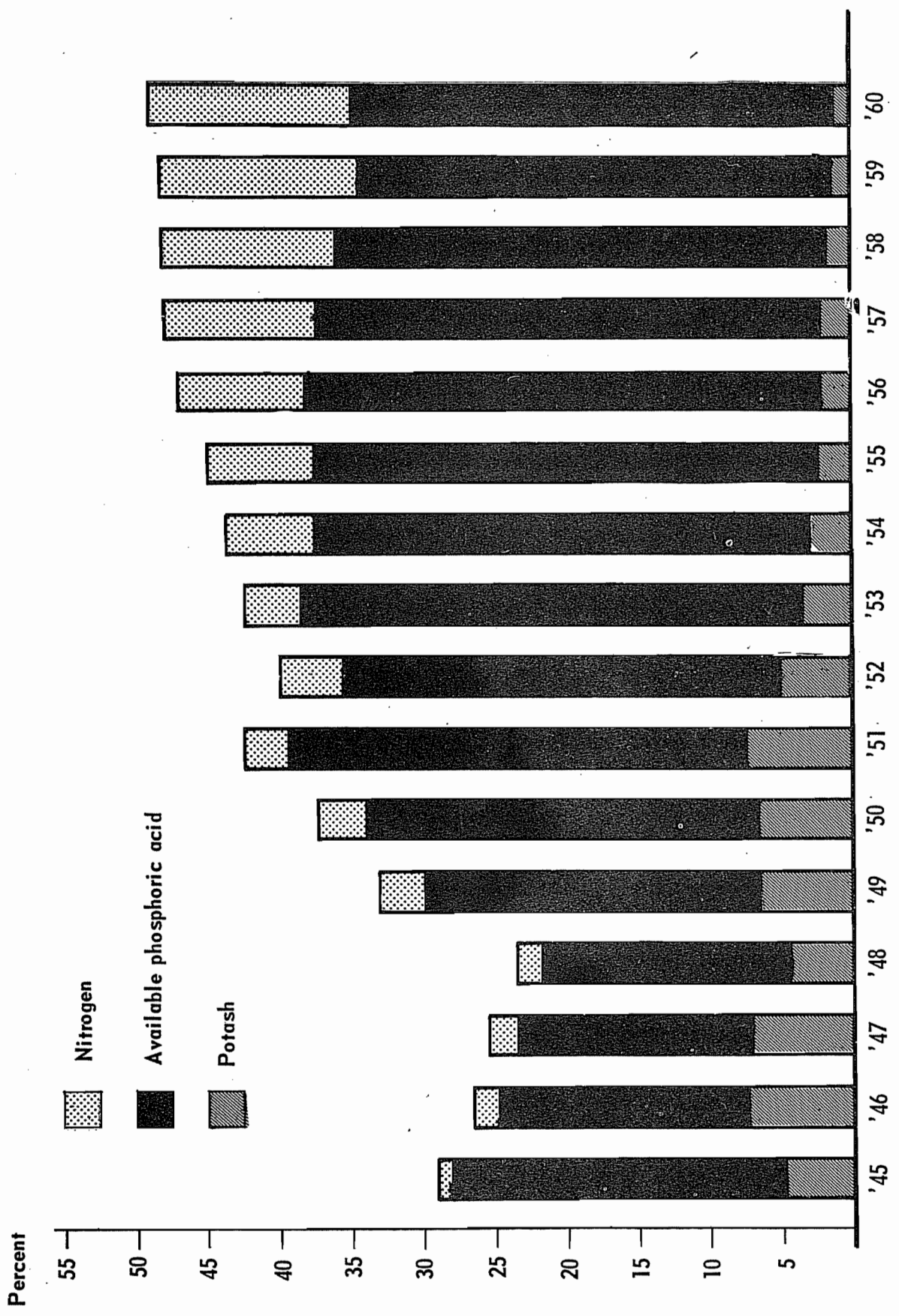


Table 3. - Amount of primary plant nutrients as percent of total fertilizer consumption in North Dakota by years, 1945 to 1960

Year ending June 30	N	P ₂ O ₅	K ₂ O	Total primary plant nutrients
	<u>Percent</u>	<u>Percent</u>	<u>Percent</u>	<u>Percent</u>
1945-----	1.0	23.4	4.8	29.2
1946-----	1.7	17.4	7.3	26.4
1947-----	2.2	16.3	7.0	25.5
1948-----	1.9	17.2	4.4	23.5
1949-----	3.1	23.5	6.4	33.0
1950-----	3.2	27.4	6.5	37.1
1951-----	4.0	30.9	7.3	42.2
1952-----	4.4	30.5	5.0	39.9
1953-----	4.0	34.8	3.5	42.3
1954-----	6.1	34.7	2.7	43.5
1955-----	7.3	35.4	2.2	44.9
1956-----	8.8	36.0	2.1	46.9
1957-----	10.3	35.3	2.0	47.6
1958-----	12.1	34.2	1.6	47.9
1959-----	13.7	33.1	1.2	48.0
1960-----	14.2	33.5	1.1	48.8

Source: Compiled from data given in table 2.

Estimates of Fertilizer Consumption by Specified
Crops, 1954 and 1959

After the fertilizer estimates became available from the 1959 U. S. Census of Agriculture, a committee of USDA and state experiment station agronomists and agricultural economists was appointed in each state to make estimates of: (1) The fertilized acreage of each crop included in the "all other crops" grouping; and (2) the total tons of N, P₂O₅, and K₂O applied on each of the six basic crop groups as well as on each individual crop included in the "all other crops" category.⁴

A similar procedure had been followed in developing the detailed estimates of fertilizer use by individual crops, based on 1954 Census data.⁵ For purposes of this report, the preliminary 1954 estimates have been revised in accordance with information that subsequently became available.

Methodology employed in estimating fertilizer consumption by individual crops. -- In estimating the fertilizer consumption for each individual crop, the committee supplemented the Census data and the ARS statewide estimates with information on application rates and analyses used for each kind of crop from farm-management surveys and the members' general knowledge of farm practices in different parts of the state. Information was gleaned from the following farm-management surveys: (1) A 1955 study of the effect of acreage allotments on grain farms in eight central North Dakota counties, made by the Production Economics Research Branch, ARS; (2) a 1957 input-output study of livestock farms on the Lower Yellowstone and Buford-Trenton Reclamation Projects, made by the North Dakota Agricultural Experiment Station; (3) a survey of 1958 expenditures on grain farms in eight central North Dakota counties, made by Production Economics Research Branch, ARS; (4) a 1959 study of contracts and allotments in sugar beet production in the Red River Valley made by Economic Research Service, USDA, in cooperation with the North Dakota Agricultural Experiment Station; (5) a study of 1960 costs of producing potatoes in the Red River Valley, made by the North Dakota Agricultural Experiment Station; and (6) a survey of 1960 expenditures on grain farms in eight central North Dakota counties, made by Economic Research Service. Some of the most useful information on fertilization of corn and cereal crops came from data on the amount and analyses of fertilizer used on nearly 1,000 fields, located in all parts of the state, on which the operators keep detailed annual records of farm practices, field operations,

⁴The committee which made the 1959 estimates of fertilizer use in North Dakota was composed of Stanley W. Voelker, Agricultural Economist, Economic Research Service, USDA; Enoch B. Norum, Chairman of the Soils Department, N. Dak. Agricultural Experiment Station; Marvin T. Nordbo, Assistant Agricultural Economist, N. Dak. Agricultural Experiment Station; and Virgil L. Weiser, Soils Specialist, North Dakota Agricultural Extension Service.

⁵The estimates for all states were published in "Fertilizer Used on Crops and Pasture in the United States," Agricultural Research Service, USDA Statis. Bul. 216, Washington, D. C. (processed) August 1957.

growing conditions, and yields.⁶

The state was divided into three agricultural subregions and the estimates for these areas were added together to derive the state totals. The agricultural subregions are as follows: (1) the 5 counties in the Red River Valley, (2) the 14 Missouri Slope counties south and west of the Missouri River, and (3) the 34 counties on the Till Plains between the Red River Valley counties and the Missouri River. These subregions are shown on the cover page.

Separate estimates were made for irrigated crops and nonirrigated crops and these were totaled to derive the estimate for each subregion. The estimates for wheat and barley were built up from separate estimates for fallowed and nonfallowed land. The estimates for hay and cropland pasture were built up from separate estimates for alfalfa, grain hay, other tame hay, and cropland pasture.

Acreeage of each crop fertilized. -- The estimated fertilized acreage of each crop in the three agricultural subregions during 1954 and 1959 is shown in table 4. It will be noted that a larger acreage of wheat was fertilized than of any other crop in both 1954 and 1959 in all three subregions. Wheat accounted for 45.6 percent of the total fertilized acreage in 1954 and 52.8 percent in 1959. Barley was the second most important crop in terms of fertilized acreage, accounting for 28 percent of the fertilized acreage in 1954 and 30.9 percent in 1959.

The total fertilized acreage in North Dakota increased from 1,682,000 acres in 1954 to about 5,232,000 acres in 1959. Wheat and barley together accounted for 88 percent of this increased fertilized acreage.

Percentage of each crop fertilized. -- The 1954 and 1959 fertilized acreages of each crop, expressed as a percentage of their respective harvested acreages in each agricultural subregion, are shown in table 5. These percentages provide a convenient measure of the relative importance of fertilizer for each crop.

For the state as a whole, practically all of the sugar beet acreage, 86 percent of the potato acreage, 43 percent of the wheat and barley acreage, and 19 percent of the oat acreage were fertilized in 1959. Only relatively small proportions of the other crops received fertilizer.

There are marked differences among the three agricultural subregions in the extent to which the various crops were fertilized in 1954 and 1959. Use of fertilizer was a well-accepted practice in the Red River Valley by 1954, whereas it was a relatively new and untried practice in the Missouri Slope and the western part of the Till Plains subregions, except in the irrigated areas. Because of this, the increase

⁶These records are kept for the Soils Survey and Interpretation Project of the North Dakota Agricultural Experiment Station in cooperation with the Soil Conservation Service, USDA.

in use of fertilizer between 1954 and 1959 was less spectacular in the Red River Valley than in the other two subregions. At the same time, the proportion of each crop receiving fertilizer in 1959 was much higher in the Red River Valley than in the other subregions. *

Amount of fertilizer and primary plant nutrients applied to each crop. -- The estimated amounts of fertilizer and primary plant nutrients applied to each crop in North Dakota during 1954 and 1959 are given in table 6. The corresponding estimates for each agricultural subregion are shown in tables 7, 8, and 9.

The total quantity of fertilizer used in North Dakota increased from about 54,000 tons in 1954 to nearly 157,000 tons in 1959, an increase of 189 percent. During this 5-year period, the amount used for sugar beets increased 44 percent; for potatoes, 80 percent; and for corn, 95 percent. The increases in tonnage of fertilizer used on these row crops, although quite substantial, were rather modest compared with the increases for the cereal crops -- wheat, 257 percent; barley, 244 percent; and oats, 162 percent. *

Between 1954 and 1959, the tonnage of P_2O_5 applied by North Dakota farmers increased by 176 percent and the tonnage of nitrogen increased by 545 percent. Wheat and barley together accounted for 80 percent of the increased amount of nitrogen and for 87 percent of the increased amount of P_2O_5 .

Percentage distribution of fertilizer consumption among specified crops. -- The amounts of fertilizer applied to each crop, expressed as percentages of total fertilizer consumption in each agricultural subregion during 1954 and 1959, are given in table 10. These data are shown graphically for the state as a whole in figure 4.

Over 77 percent of the total tonnage of fertilizer used in 1959 was applied on wheat and barley. About 15 percent of the total was applied on row crops (corn, potatoes, and sugar beets) and the remaining 8 percent on other grain and forage crops.

The percentage of the total fertilizer tonnage applied on wheat and barley increased between 1954 and 1959 in all three subregions, while the percentage applied on most of the other crops decreased.

Average application rates per acre. -- The average amount of fertilizer applied per acre on each specified crop within each agricultural subregion during 1954 and 1959 is shown in table 11.

For potatoes and sugar beets, the average application rate per acre increased substantially between 1954 and 1959 in all three agricultural subregions. In the Red River Valley, there were slight increases in average application rates for corn and cereal grains. In the Till Plains subregion there was a slight decrease in the average application rate for corn, but the average application rates for wheat and barley increased substantially.

In 1954, a high proportion of the fertilized acreage of corn and wheat in the Missouri Slope subregion was irrigated. The increase in fertilization of corn and wheat between 1954 and 1959 occurred mainly on nonirrigated farms, hence the average application rates for this subregion declined.

Average amount of plant nutrients per acre. -- The average application per acre of N, available P_2O_5 , and K_2O on each specified crop in the three agricultural subregions is given in tables 12, 13, and 14, respectively.

There were big increases in the average amount of nitrogen applied per acre. With a few minor exceptions, this was true on all crops in all three agricultural subregions. X

A big increase occurred between 1954 and 1959 in the average amount of P_2O_5 applied per acre on sugar beets in all three agricultural subregions. For all other crops, however, the changes between 1954 and 1959 in average application rates were not very great and the general tendency was for average rates to decrease.

The average amount of potash applied per acre declined considerably between 1954 and 1959. This was true for all crops in all subregions. X

Use of fertilizer on irrigated crops. -- A total of 39,000 acres was irrigated in North Dakota during 1959. This amounted to only 0.2 percent of the total harvested cropland and improved pasture acreage. Most of the irrigated acreage is in the Missouri Slope and Till Plains subregions -- only a few acres are irrigated in the Red River Valley counties.

The estimates of fertilizer used on irrigated crops in North Dakota during 1954 and 1959 are shown in tables 15 and 16. It will be noted that in most cases application rates per acre were higher on irrigated than on nonirrigated land.

Table 4. - Estimated fertilized acreage of specified crops and pasture, by agricultural subregions of North Dakota, 1954 and 1959

Specified crops and pasture	Red River Valley subregion		Till Plains subregion		Missouri-Slope subregion		State totals	
	1954	1959	1954	1959	1954	1959	1954	1959
	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres
Corn, all purposes-----	54.3	87.7	69.6	173.1	9.5	31.9	133.4	292.7
Potatoes-----	54.3	82.9	4.6	1.5	0.5	1.3	59.4	85.7
Sugar beets-----	31.6	33.5	1.3	1.1	3.4	3.5	36.3	38.1
Wheat and durum-----	343.5	553.7	391.0	1,658.4	33.2	549.3	767.7	2,761.4
Barley-----	278.9	599.8	189.8	936.8	1.5	80.6	470.2	1,617.2
Oats-----	36.3	77.9	69.4	214.2	1.7	12.2	107.4	304.3
Rye-----	0	0.6	0	3.1	0	0.5	0	4.2
Flax-----	30.4	29.3	32.3	28.1	0	0.8	62.7	58.2
Soybeans-----	0	2.5	0	3.1	0	0	0	5.6
Tame hay and cropland pasture-----	15.5	12.3	20.0	36.3	2.6	7.0	38.1	55.6
Other crops-----	0	4.7	0	0	0	0	0	4.7
Improved permanent open pasture-----	3.2	1.0	2.6	3.3	1.2	0.6	7.0	4.9
Total crops and improved pasture-----	848.0	1,485.9	780.6	3,059.0	53.6	687.7	1,682.2	5,232.6

Source: Estimates based on data from U. S. Census of Agriculture, 1954 and 1959.

Table 5. - Fertilized acreage in percent of harvested acreage, specified crops and pasture by agricultural subregions of North Dakota, 1954 and 1959

Specified crops and pasture	Red River Valley subregion		Till Plains subregion		Missouri-Slope subregion		State totals	
	1954	1959	1954	1959	1954	1959	1954	1959
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Corn, all purposes-----	37.8	63.4	9.8	23.7	2.6	7.2	10.9	22.3
Potatoes-----	64.2	88.9	57.8	26.9	23.9	1/118.0	62.8	85.7
Sugar beets-----	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Wheat and durum-----	38.7	73.6	7.7	38.2	2.1	41.0	10.1	42.9
Barley-----	39.0	75.4	9.0	35.0	0.7	28.0	15.4	43.0
Oats-----	14.2	32.2	4.5	18.3	0.6	6.5	5.1	19.0
Rye-----	0	5.0	0	2.0	0	2.0	0	2.2
Flax-----	7.0	10.0	1.4	2.0	0	2.0	2.0	3.3
Soybeans-----	0	3.0	0	2.5	0	0	0	2.7
Tame hay and cropland pasture-----	5.8	5.7	1.3	2.3	0.5	0.8	1.6	2.1
Other crops 2/-----	0	17.3	0	0	0	0	0	3.3
Improved permanent open pasture-----	45.7	20.4	3.8	4.8	3.4	1.3	6.4	4.0
Total crops and improved pasture 2/-----	29.3	55.3	5.7	24.7	1.5	21.1	8.4	28.6

1/ Fertilized acreage exceeds harvested acreage, possibly because of crop failure.
 2/ Excludes acreage of wild hay.

Source: Estimates based on data from U. S. Census of Agriculture, 1954 and 1959.

Table 6. - Estimated amounts of commercial fertilizer and plant nutrients applied to specified crops and pasture, North Dakota, 1954 and 1959

Specified crops and pasture	1954						1959					
	Amount of fertilizer		Quantity of plant nutrients				Amount of fertilizer		Quantity of plant nutrients			
	Tons	of fertilizer	N	Available P ₂ O ₅	K ₂ O	Tons	of fertilizer	N	Available P ₂ O ₅	K ₂ O	Tons	of plant nutrients
Corn, all purposes-----	5,363		376	1,682	95	10,481	1,690	3,216	18			
Potatoes-----	5,295		428	1,211	697	9,526	1,705	1,823	747			
Sugar beets-----	2,587		87	986	80	3,721	202	1,373	33			
Wheat and durum-----	20,752		1,196	8,505	196	74,172	8,150	29,582	301			
Barley-----	13,655		728	4,277	360	46,905	8,202	12,205	709			
Oats-----	2,858		154	967	23	7,478	963	2,282	0			
Rye-----	0		0	0	0	108	12	48	0			
Flax-----	1,495		145	472	0	1,462	204	456	0			
Soybeans-----	0		0	0	0	183	20	88	0			
Tame hay and cropland pasture-----	1,836		83	699	0	2,531	202	887	0			
Other crops-----	0		0	0	0	117	19	56	0			
Improved permanent open pasture-----	407		131	0	0	294	97	0	0			
Total crops and improved pasture-----	54,248		3,328	18,829	1,451	156,978	21,466	52,016	1,808			

Source: Based on data from U. S. Census of Agriculture for 1954 and 1959. See text for methods used in making estimates.

Table 7. - Estimated amount of commercial fertilizer and plant nutrients applied to specified crops and pasture, Red River Valley subregion of North Dakota, 1959

Specified crops and pasture	1954						1959									
	Amount of fertilizer		Quantity of plant nutrients			Amount of fertilizer	Quantity of plant nutrients			Amount of fertilizer	Quantity of plant nutrients					
	Tons		N	Available P ₂ O ₅	K ₂ O		Tons		N		Available P ₂ O ₅	K ₂ O	Tons		N	Available P ₂ O ₅
Corn, all purposes-----	2,276		214	635	60	3,715		522	1,035	9						
Potatoes-----	4,998		395	1,172	678	9,283		1,663	1,754	738						
Sugar beets-----	2,294		44	901	79	2,892		86	1,181	32						
Wheat and durum-----	11,084		601	4,614	177	19,398		2,480	7,309	277						
Barley-----	9,039		488	2,574	341	19,848		3,796	4,244	619						
Oats-----	1,171		64	334	23	2,337		273	467	0						
Rye-----	0		0	0	0	17		2	6	0						
Flax-----	761		76	228	0	879		140	176	0						
Soybeans-----	0		0	0	0	74		8	35	0						
Tame hay and cropland pasture-----	894		32	326	0	634		39	231	0						
Other crops-----	0		0	0	0	117		19	56	0						
Improved permanent open pasture-----	222		71	0	0	72		24	0	0						
Total crops and improved pasture-----	32,739		1,985	10,784	1,358	59,266		9,052	16,494	1,675						

Source: Based on data from U. S. Census of Agriculture for 1954 and 1959. See text for methods used in making estimates.

Table 8. - Estimated amount of commercial fertilizer and plant nutrients applied to specified crops and pasture, Till Plains subregion of North Dakota, 1954 and 1959

Specified crops and pasture	1954						1959							
	Amount of fer-tilizer		Quantity of plant nutrients				Amount of fer-tilizer		Quantity of plant nutrients					
	Tons	Tons	N	Available P ₂ O ₅	K ₂ O	Tons	Tons	Tons	Tons	N	Available P ₂ O ₅	K ₂ O	Tons	Tons
Corn, all purposes-----	2,511	139	751	35	5,942	1,032	1,944	9						
Potatoes-----	264	27	57	19	126	21	27	9						
Sugar beets-----	84	10	26	1	174	32	49	1						
Wheat and durum-----	8,752	547	3,499	19	42,567	4,641	16,902	24						
Barley-----	4,578	237	1,689	19	25,083	4,208	7,159	90						
Oats-----	1,649	87	618	0	4,864	654	1,707	0						
Rye-----	0	0	0	0	78	9	37	0						
Flax-----	734	69	244	0	562	62	270	0						
Soybeans-----	0	0	0	0	109	12	53	0						
Tame hay and crop-land pasture-----	824	50	320	0	1,608	151	533	0						
Other crops-----	0	0	0	0	0	0	0	0						
Improved permanent open pasture-----	155	50	0	0	152	50	0	0						
Total crops and improved pasture-----	19,551	1,216	7,204	93	81,265	10,872	28,681	133						

Source: Based on data from U. S. Census of Agriculture for 1954 and 1959. See text for methods used in making estimates.

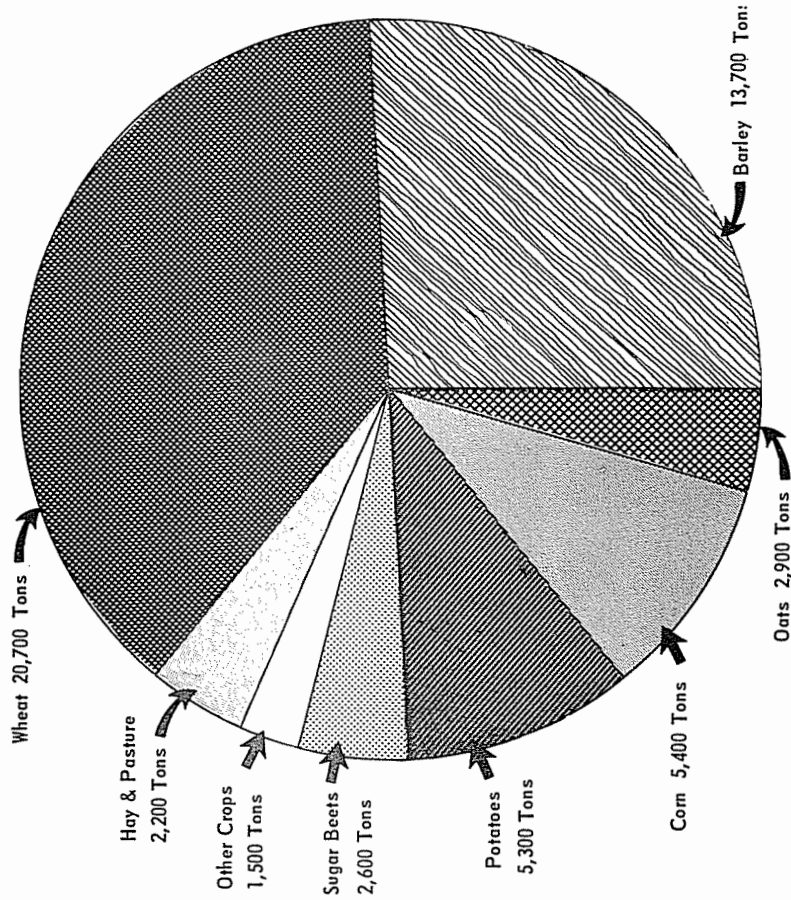
Table 9. - Estimated amount of commercial fertilizer and plant nutrients applied to specified crops and pasture, Missouri Slope subregion of North Dakota, 1954 and 1959

Specified crops and pasture	1954						1959								
	Amount of fer-tilizer		Quantity of plant nutrients			Amount of fer-tilizer	Quantity of plant nutrients			Amount of fer-tilizer	Quantity of plant nutrients				
	Tons		N	Available P ₂ O ₅	K ₂ O		Tons		N		Available P ₂ O ₅	K ₂ O	Tons		N
Corn, all purposes-----	576		23	296	0	824		136	237	0			136	237	0
Potatoes-----	33		6	12	0	117		21	42	0			21	42	0
Sugar beets-----	209		33	59	0	655		84	143	0			84	143	0
Wheat and durum-----	916		48	392	0	12,207		1,029	5,371	0			1,029	5,371	0
Barley-----	38		3	14	0	1,974		198	802	0			198	802	0
Oats-----	38		3	15	0	277		36	108	0			36	108	0
Rye-----	0		0	0	0	13		1	5	0			1	5	0
Flax-----	0		0	0	0	21		2	10	0			2	10	0
Soybeans-----	0		0	0	0	0		0	0	0			0	0	0
Tame hay and cropland pasture-----	118		1	53	0	289		12	123	0			12	123	0
Other crops-----	0		0	0	0	0		0	0	0			0	0	0
Improved permanent open pasture-----	30		10	0	0	70		23	0	0			23	0	0
Total crops and improved pasture-----	1,958		127	841	0	16,447		1,542	6,841	0			1,542	6,841	0

Source: Based on data from U. S. Census of Agriculture for 1954 and 1959. See text for methods used in making estimates.

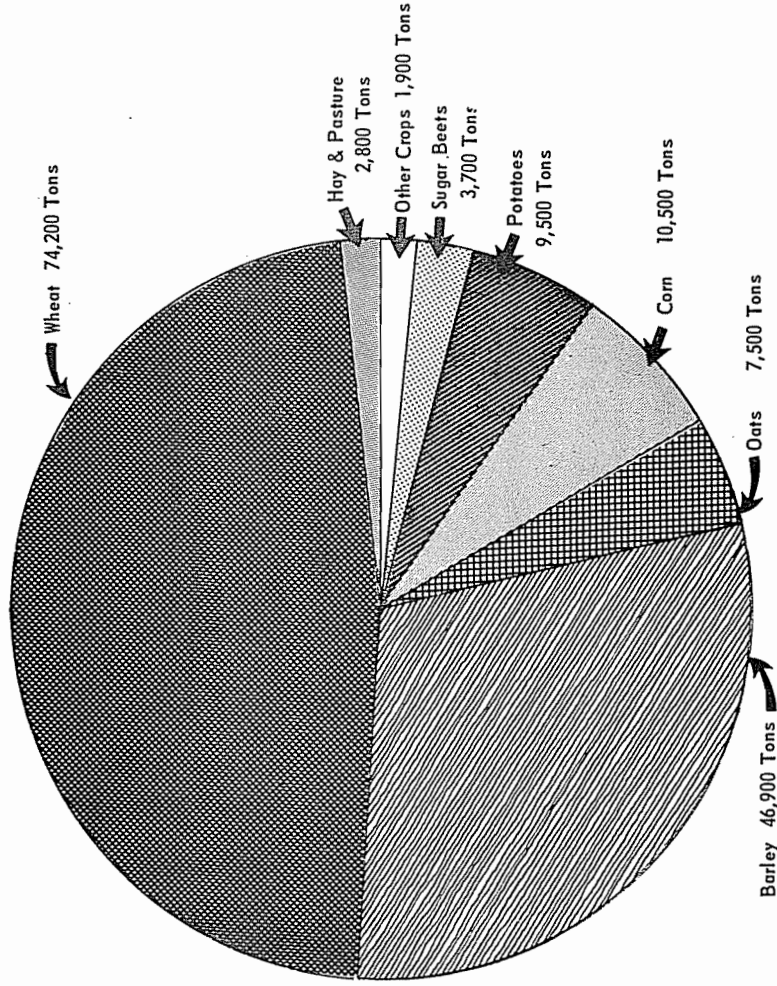
Fig. 4 - Tons of commercial fertilizer used in North Dakota on various crops, 1954 and 1959. (Estimates based on data from U. S. Census of Agriculture and other sources).

1954



Total all crops 54,300 Tons

1959



Total all crops 157,000 Tons

Table 10. - Amount of fertilizer applied to specified crops and pasture in percent of total consumption, by agricultural subregions of North Dakota, 1954 and 1959

Specified crops and pasture	Red River Valley subregion		Till-Plains subregion		Missouri-Slope subregion		State totals	
	1954	1959	1954	1959	1954	1959	1954	1959
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Corn, all purposes-----	7.0	6.3	12.8	7.3	29.4	5.0	9.9	6.7
Potatoes-----	15.3	15.7	1.4	0.1	1.7	0.7	9.8	6.0
Sugar beets-----	7.0	4.9	0.4	0.2	10.7	4.0	4.8	2.4
Wheat and durum-----	33.8	32.7	44.8	52.4	46.8	74.2	38.2	47.2
Barley-----	27.6	33.5	23.4	30.9	2.0	12.0	25.2	29.9
Oats-----	3.6	3.9	8.4	6.0	1.9	1.7	5.3	4.8
Rye-----	0	1/	0	0.1	0	0.1	0	0.1
Flax-----	2.3	1.5	3.8	0.7	0	0.1	2.7	0.9
Soybeans-----	0	0.1	0	0.1	0	0	0	0.1
Tame hay and cropland pasture-----	2.7	1.1	4.2	2.0	6.0	1.8	3.4	1.6
Other crops-----	0	0.2	0	0	0	0	0	0.1
Improved permanent open pasture-----	0.7	0.1	0.8	0.2	1.5	0.4	0.7	0.2
Total crops and improved pasture-----	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

1/ Less than 0.5 percent.

Source: Compiled from data in tables 6, 7, 8, and 9.

Table 11. - Average amount of fertilizer applied per fertilized acre on specified crops and pasture, by agricultural subregions of North Dakota, 1954 and 1959

Specified crops and pasture	Red River Valley subregion		Till-Plains subregion		Missouri-Slope subregion		State of North Dakota	
	1954	1959	1954	1959	1954	1959	1954	1959
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Corn, all purposes-----	83.8	84.7	72.2	68.6	120.5	51.7	80.4	71.6
Potatoes-----	184.2	223.8	114.4	166.8	130.2	183.8	178.4	222.2
Sugar beets-----	145.0	172.4	130.8	305.5	124.5	380.0	142.6	195.2
Wheat and durum-----	64.5	70.1	44.8	51.3	55.2	44.4	54.1	53.7
Barley-----	64.8	66.2	48.2	53.6	48.3	49.0	58.1	58.0
Oats-----	64.5	60.0	47.5	45.4	45.6	45.4	53.2	49.1
Rye-----	0	60.0	0	50.0	0	50.0	0	51.6
Flax-----	50.0	60.0	45.5	40.0	0	50.0	47.7	50.2
Soybeans-----	0	60.0	0	70.0	0	0	0	65.6
Tame hay and cropland pasture-----	115.0	103.5	82.4	88.6	91.4	82.3	96.3	91.1
Other crops-----	0	50.0	0	0	0	0	0	50.0
Improved permanent open pasture-----	139.5	148.9	120.6	92.6	49.6	231.4	116.9	121.1
Total crops and improved pasture-----	77.2	79.8	50.1	53.1	73.0	47.8	64.5	60.0

Source: Estimates based on data from U. S. Census of Agriculture for 1954 and 1959. See text for methods used in making estimates.

Table 12. - Average amount of nitrogen applied per fertilized acre on specified crops and pasture, by agricultural subregions of North Dakota, 1954 and 1959

Specified crops and pasture	Red River Valley subregion		Till-Plains subregion		Missouri-Slope subregion		State of North Dakota	
	Pounds		Pounds		Pounds		Pounds	
	1954	1959	1954	1959	1954	1959	1954	1959
Corn, all purposes-----	7.9	11.9	4.0	11.9	4.8	8.5	5.6	11.5
Potatoes-----	14.6	40.1	11.5	28.0	22.0	33.1	14.4	39.8
Sugar beets-----	2.8	5.1	15.6	56.2	19.9	48.7	4.8	10.6
Wheat and durum-----	3.5	9.0	2.8	5.6	2.9	3.7	3.1	5.9
Barley-----	3.5	12.7	2.5	9.0	3.7	4.9	3.1	10.1
Oats-----	3.5	7.0	2.5	6.1	3.2	5.9	2.9	6.3
Rye-----	0	8.7	0	5.5	0	3.9	0	5.7
Flax-----	5.0	9.6	4.3	4.4	0	5.5	4.6	7.0
Soybeans-----	0	6.6	0	7.7	0	0	0	7.2
Tame hay and cropland pasture-----	4.1	6.5	5.0	8.3	0.4	3.4	4.4	7.3
Other crops-----	0	8.0	0	0	0	0	0	8.0
Improved permanent open pasture-----	44.6	49.1	38.6	30.6	16.4	76.4	37.6	40.0
Total crops and improved pasture-----	4.7	12.2	3.1	7.1	4.7	4.5	4.0	8.2

Source: Estimates based on data from U. S. Census of Agriculture for 1954 and 1959. See text for methods used in making estimates.

Table 13. - Average amount of available P₂O₅ applied per fertilized acre on specified crops and pasture, by agricultural subregions of North Dakota, 1954 and 1959

Specified crops and pasture	Red River Valley subregion		Till-Plains subregion		Missouri-Slope subregion		State of North Dakota	
	Pounds		Pounds		Pounds		Pounds	
	1954	1959	1954	1959	1954	1959	1954	1959
Corn, all purposes-----	23.4	23.6	21.6	22.5	61.9	14.9	25.2	22.0
Potatoes-----	43.2	42.3	24.5	36.0	46.0	66.2	41.8	42.5
Sugar beets-----	57.0	70.4	40.5	86.0	34.9	83.0	54.3	72.0
Wheat and durum-----	26.9	26.4	17.9	20.4	23.6	19.6	22.2	21.4
Barley-----	18.5	14.2	17.8	15.3	17.4	19.9	18.2	15.1
Oats-----	18.4	12.0	17.8	15.9	20.2	17.7	18.0	15.0
Eye-----	0	22.9	0	24.0	0	20.8	0	22.9
Flax-----	15.0	12.0	15.1	19.2	0	24.0	15.1	15.7
Soybeans-----	0	28.8	0	33.6	0	0	0	31.5
Tame hay and cropland pasture-----	41.9	37.7	32.0	29.4	41.1	35.0	36.7	31.9
Other crops-----	0	24.0	0	0	0	0	0	24.0
Improved permanent open pasture-----	0	0	0	0	0	0	0	0
Total crops and improved pasture-----	25.4	22.2	18.5	18.8	31.4	19.9	22.4	19.9

Source: Estimates based on data from U. S. Census of Agriculture for 1954 and 1959. See text for methods used in making estimates.

Table 14. - Average amount of potash (K₂O) applied per fertilized acre on specified crops and pasture, by agricultural subregions of North Dakota, 1954 and 1959

Specified crops and pasture	Red River Valley subregion		Till-Plains subregion		Missouri-Slope subregion		State of North Dakota	
	1954	1959	1954	1959	1954	1959	1954	1959
	Pounds		Pounds		Pounds		Pounds	
Corn, all purposes-----	2.2	0.2	1.0	0.1	0	0	1.4	0.1
Potatoes-----	25.0	17.8	8.2	11.4	0	0	23.5	17.4
Sugar beets-----	5.0	1.9	1.1	0.7	0	0	4.4	1.7
Wheat and durum-----	1.0	1.0	0.1	0.03	0	0	0.5	0.2
Barley-----	2.4	2.1	0.2	0.2	0	0	1.5	0.9
Oats-----	1.3	0	0	0	0	0	0.4	0
Rye-----	0	0	0	0	0	0	0	0
Flax-----	0	0	0	0	0	0	0	0
Soybeans-----	0	0	0	0	0	0	0	0
Tame hay and cropland pasture-----	0	0	0	0	0	0	0	0
Other crops-----	0	0	0	0	0	0	0	0
Improved permanent open pasture-----	0	0	0	0	0	0	0	0
Total crops and improved pasture-----	3.2	2.3	0.2	0.1	0	0	1.7	0.7

Source: Estimates based on data from U. S. Census of Agriculture for 1954 and 1959. See text for methods used in making estimates.

Table 15.- Estimated use of fertilizer on irrigated crops in North Dakota, 1959

Specified irrigated crops and pasture	Fertilized acreage		Percentage of acreage fertilized		Amount of fertilizer used		Average amount of fertilizer per acre		Plant nutrients used	
	Acres	Percent	Tons	Pounds	Tons	Pounds	N	P ₂ O ₅		
Corn, all purposes-----	1,777	58.1	199	224.0	39	37				
Potatoes-----	73	36.7	6	164.4	1	2				
Sugar beets-----	4,369	100.0	808	369.9	115	184				
Wheat and durum-----	4,200	63.1	256	121.9	34	86				
Barley-----	497	33.6	46	185.1	7	10				
Oats-----	559	32.1	40	143.1	4	12				
Dry beans-----	0	0	0	0	0	0				
Tame hay and cropland pasture <u>1/</u>	5,238	28.8	327	124.9	4	141				
Other crops <u>1/</u> -----	0	0	0	0	0	0				
Total irrigated crops and pasture <u>1/</u> -----	16,713	42.9	1,682	201.3	204	472				

1/ Excludes wild hay.

Source: Estimates based on 1959 U. S. Census of Agriculture, Annual Crop Census of Federal Reclamation Projects made by U. S. Bureau of Reclamation and various survey data. See text for methods used in making estimates.

Table 16. - Estimated use of fertilizer on irrigated crops in North Dakota, 1954

Specified irrigated crops and pasture	Fertilized acreage	Percentage of acreage fertilized	Amount of fertilizer used	Average amount of fertilizer per acre	Plant nutrients used		
					Tons	Pounds	Tons
	<u>Acres</u>	<u>Percent</u>	<u>Tons</u>	<u>Pounds</u>	<u>Tons</u>	<u>Tons</u>	
Corn, all purposes-----	501	65.9	50	199.6	2	16	
Potatoes-----	178	37.5	14	157.3	3	5	
Sugar beets-----	4,279	100.0	267	124.8	42	75	
Wheat and durum-----	2,044	47.2	144	140.9	16	49	
Barley-----	289	28.2	10	69.2	2	3	
Oats-----	360	26.1	12	66.7	2	5	
Dry beans-----	0	0	0	0	0	0	
Tame hay and cropland pasture <u>1/</u> -----	3,382	22.7	176	104.1	0	71	
Other crops <u>1/</u> -----	0	0	0	0	0	0	
Total irrigated crops and pasture <u>1/</u> -----	11,033	29.3	673	122.0	67	224	

1/ Excludes wild hay.

Source: Estimates based on 1954 U. S. Census of Agriculture, annual crop census of Federal Reclamation Projects made by U. S. Bureau of Reclamation, and various survey data. See text for methods used in making estimates.

Census Data on Fertilizer Use by Counties,
1954 and 1959

The tables in this section contain the basic county data on fertilizer use from the U. S. Census of Agriculture for 1954 and 1959 (tables 17 - 23). Also included are computations of the percentage of acreage fertilized and average application rates per acre in each county, for the convenience of the reader in making intercounty comparisons. In each table, the counties are arranged alphabetically by agricultural subregions.

Two maps have been included to show the relative intensity of fertilizer use among the various counties. Figure 5 shows the percentage of total crop acreage fertilized in each county; figure 6, the percentage of wheat acreage fertilized. The highest concentrations of fertilized acreage are in the Red River Valley and adjacent counties, while the lowest concentrations generally are among the counties in the south-central and northwest parts of the state.

Table 17. - Summary of fertilizer use in North Dakota, by counties and agricultural subregions, 1954 and 1959

Agricultural subregion and county	Number of farms using fertilizer		Fertilized acreage		Fertilized acreage in percent of harvested acreage		Total amount of fertilizer used	
	Number	Number	Acres	Acres	Percent	Percent	Tons	Tons
	1954	1959	1954	1959	1954	1959	1954	1959
Red River Valley:								
Cass	773	1,390	120,586	346,936	13.9	42.4	4,163	11,114
Grand Forks	1,052	1,355	210,004	355,674	34.6	65.4	9,339	16,501
Pembina	860	1,035	227,008	294,761	50.1	67.8	8,122	12,166
Trail	539	808	74,223	152,527	17.9	38.7	2,708	5,312
Walsh	1,033	1,374	216,227	335,984	39.1	67.7	8,407	14,173
Total, Red River Valley	4,257	5,962	848,048	1,485,882	29.3	55.3	32,739	59,266
Till Plains:								
Barnes	316	832	53,460	202,212	9.0	36.9	1,342	6,022
Benson	170	474	26,664	101,060	6.0	24.7	623	2,771
Bottineau	192	484	41,719	109,204	7.1	24.2	864	2,554
Burke	47	223	5,473	49,361	1.9	20.5	106	1,059
Burleigh	27	384	1,989	65,508	0.6	20.0	45	1,708
Cavalier	634	847	136,700	237,713	26.2	47.9	2,737	5,626
Dickey	56	211	5,798	28,681	1.5	8.0	433	777
Divide	61	113	7,522	19,246	2.4	7.5	147	354
Eddy	101	222	14,670	50,559	7.5	29.5	352	1,265
Emmons	13	444	1,004	69,798	0.2	16.3	23	1,822
Foster	117	370	20,922	107,925	8.7	51.8	566	3,090
Griggs	220	349	24,175	65,376	9.4	30.1	661	1,646
Kidder	22	128	1,952	18,724	0.7	7.4	48	467
LaMoure	70	404	9,669	59,985	2.1	14.5	247	2,164

-Continued

Table 17. - Summary of fertilizer used in North Dakota, by counties and agricultural subregions, 1954 and 1959 - Continued

Agricultural subregion and county	Number of farms using fertilizer		Fertilized acreage		Fertilized acreage in percent of harvested acreage		Total amount of fertilizer used	
	1954	1959	1954	1959	1954	1959	1954	1959
	Number	Number	Acres	Acres	Percent	Percent	Tons	Tons
<u>Till Plains (continued):</u>								
Logan-----	12	154	317	23,204	0.1	8.7	13	593
McHenry-----	80	597	9,644	106,287	1.8	23.6	279	2,542
McIntosh-----	11	107	276	11,625	0.1	3.6	18	394
McLean-----	69	657	7,722	142,775	1.2	23.5	168	3,170
Mountrail-----	28	308	3,400	64,769	0.9	19.3	65	1,320
Nelson-----	385	695	62,064	183,654	17.6	55.1	1,475	5,295
Pierce-----	94	385	9,634	70,344	2.6	20.5	218	1,604
Ramsey-----	178	442	26,992	119,164	6.8	27.9	604	3,252
Ransom-----	109	300	7,204	44,191	2.2	16.2	284	1,351
Renville-----	169	258	32,649	60,019	10.3	23.2	632	1,308
Richland-----	708	1,052	70,354	183,305	10.7	29.3	2,450	6,686
Rolette-----	119	179	21,514	44,062	9.1	23.0	482	972
Sargent-----	97	213	8,570	29,003	2.5	9.7	271	1,043
Sheridan-----	34	141	2,063	23,964	0.8	10.1	45	529
Steele-----	319	600	52,849	145,087	18.1	50.7	1,500	3,872
Stutsman-----	93	666	11,947	144,668	1.7	22.8	406	4,417
Towner-----	208	366	38,962	101,929	10.7	29.1	848	2,618
Ward-----	144	760	26,253	174,331	4.0	32.2	590	3,872
Wells-----	175	484	22,867	108,823	4.8	25.4	548	3,117
Williams-----	113	388	13,555	92,516	2.9	24.6	461	1,985
Total, Till Plains-----	5,191	14,237	780,553	3,059,072	5.7	24.7	19,551	81,265

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Table 17. - Summary of fertilizer use in North Dakota, by counties and agricultural subregions, 1954 and 1959 -Continued

Agricultural subregion and county	Number of farms using fertilizer		Fertilized acreage		Fertilized acreage in percent of harvested acreage ^{1/}		Total amount of fertilizer used	
	1954	1959	1954	1959	1954	1959	1954	1959
	Number	Number	Acres	Acres	Percent	Percent	Tons	Tons
Missouri Slope:								
Adams-----	12	190	736	44,549	0.3	18.7	24	939
Billings-----	13	65	653	7,687	0.7	10.0	21	184
Bowman-----	31	151	4,346	44,695	1.8	21.2	154	945
Dunn-----	74	271	5,600	44,197	1.8	14.3	120	1,213
Golden Valley-----	59	144	10,053	33,195	6.5	23.0	240	782
Grant-----	24	265	3,252	39,852	0.9	11.8	181	923
Hettinger-----	41	415	6,963	125,204	1.9	36.2	125	2,487
McKenzie-----	141	448	10,342	92,795	3.4	33.8	675	2,652
Mercer-----	14	296	1,906	37,954	0.8	16.7	38	914
Morton-----	50	541	2,045	68,236	0.5	19.4	87	1,982
Oliver-----	20	148	765	17,976	0.5	12.9	25	443
Sioux-----	5	22	405	3,452	0.4	3.9	15	89
Slope-----	18	129	2,030	36,071	1.1	21.7	102	834
Stark-----	42	495	4,520	91,832	1.3	26.7	151	2,060
Total,								
Missouri Slope-----	544	3,580	53,616	687,695	1.5	21.1	1,958	16,447
State total-----	9,992	23,779	1,682,217	5,232,649	8.4	28.6	54,248	156,978

^{1/} "Harvested acreage" includes acreage of cropland pasture and improved permanent open pasture, but excludes harvested acreage of wild hay.

Table 18. - Fertilization of corn in North Dakota, by counties and agricultural subregions, 1954 and 1959

Agricultural subregion and county	1954						1959					
	Fertilized acreage	Fertilized acreage in percent of harvested acreage	Amount of fertilizer used	Average amount of fertilizer per acre	Fertilized acreage	Fertilized acreage in percent of harvested acreage	Amount of fertilizer used	Average amount of fertilizer per acre	Fertilized acreage	Fertilized acreage in percent of harvested acreage	Amount of fertilizer used	Average amount of fertilizer per acre
	Acres	Percent	Tons	Pounds	Acres	Percent	Tons	Pounds	Acres	Percent	Tons	Pounds
Red River Valley:												
Cass	27,486	33.8	977	71.1	63,964	68.9	2,462	77.0				
Grand Forks	13,134	51.1	671	102.2	12,047	68.1	768	127.5				
Pembina	5,152	81.8	224	87.0	805	23.3	38	94.4				
Trails	6,830	32.5	324	94.9	8,945	44.5	349	78.0				
Walsh	1,689	18.1	80	94.7	1,941	46.2	98	101.0				
Total, Red River Valley	54,291	37.8	2,276	83.8	87,702	63.4	3,715	84.7				
Till Plains:												
Barnes	4,820	13.6	165	68.5	9,676	27.6	387	80.0				
Benson	930	5.8	28	60.2	1,186	9.0	39	65.8				
Bottineau	2,110	22.5	58	55.0	2,488	26.7	62	49.8				
Burke	165	11.4	7	84.8	180	14.4	6	66.7				
Burlingame	1,090	2.5	21	38.5	6,196	13.7	173	55.8				
Cavalier	197	11.7	5	50.8	150	26.5	6	80.0				
Dickey	2,095	4.9	122	116.5	7,037	15.3	182	51.7				
Divide	100	7.9	6	120.0	75	3.7	3	80.0				
Eddy	1,837	13.2	61	66.4	1,892	21.7	58	61.3				
Emmons	853	2.2	19	44.5	4,710	9.4	130	55.2				
Foster	1,062	6.6	30	56.5	5,339	42.6	181	67.8				
Griggs	3,084	26.7	107	69.4	1,705	19.6	49	57.5				
Kidder	110	0.6	2	36.4	1,768	8.5	41	46.4				
LaMoure	3,054	8.2	78	51.1	6,218	16.1	180	57.9				

Continued

Table 18. - Fertilization of corn in North Dakota, by counties and agricultural subregions, 1954 and 1959 -Continued

Agricultural subregion and county	1954				1959			
	Fertilized acreage	Fertilized acreage in percent of harvested acreage	Amount of fertilizer used	Average amount of fertilizer per acre	Fertilized acreage	Fertilized acreage in percent of harvested acreage	Amount of fertilizer used	Average amount of fertilizer per acre
	Acres	Percent	Tons	Pounds	Acres	Percent	Tons	Pounds
<u>Till Plains (continued)</u>								
Logan-----	140	0.9	6	85.7	722	5.3	24	66.5
McHenry-----	587	2.6	29	98.8	4,307	15.1	117	54.3
McIntosh-----	50	0.3	10	400.0	895	6.8	28	62.6
McLean-----	455	1.6	15	65.9	7,399	19.3	135	36.5
Mountrail-----	0	0	0	0	582	9.6	13	44.7
Nelson-----	1,056	10.7	44	83.3	1,489	27.4	62	83.3
Pierce-----	475	4.5	11	46.3	1,997	17.5	58	58.1
Ramsey-----	1,605	19.1	40	49.8	1,146	21.5	37	64.6
Ransom-----	2,834	7.3	101	71.3	11,862	29.8	437	73.7
Renville-----	90	2.6	6	133.3	880	15.3	24	54.5
Richland-----	28,951	28.6	1,142	78.9	65,185	56.8	2,510	77.0
Rolette-----	341	16.7	10	58.7	645	37.9	20	62.0
Sargent-----	3,190	7.7	129	80.9	9,461	22.5	371	78.4
Sheridan-----	296	2.4	5	33.8	630	4.6	31	98.4
Steele-----	2,360	18.7	82	69.5	4,510	42.8	138	61.2
Stutsman-----	2,183	5.2	69	63.2	4,924	12.6	192	78.0
Towner-----	215	14.2	6	55.8	300	21.7	9	60.0
Ward-----	255	1.6	9	70.6	4,473	22.2	124	55.4
Wells-----	2,695	9.9	81	60.1	2,017	9.5	63	62.5
Williams-----	283	5.7	7	49.5	1,086	15.7	52	95.8
Total, Till Plains-----	69,568	9.8	2,511	72.2	173,130	23.7	5,942	68.6

-Continued

Table 18. - Fertilization of corn in North Dakota, by counties and agricultural subregions, 1954 and 1959 -Continued

Agricultural subregion and county	1954						1959					
	Fertilized acreage	Fertilized acreage in percent of harvested acreage	Amount of fertilizer used	Average amount of fertilizer per acre	Fertilized acreage	Percent	Amount of fertilizer used	Fertilized in percent of harvested acreage	Amount of fertilizer used	Percent	Average amount of fertilizer per acre	
	Acres	Percent	Tons	Pounds	Acres	Percent	Tons	Percent	Tons	Percent	Pounds	
Missouri Slope:												
Adams	542	2.1	17	62.7	2,055	7.5	40	7.5	40	7.5	38.9	
Hillings	119	1.5	4	67.2	114	1.4	2	1.4	2	1.4	35.1	
Bowman	325	1.2	8	49.2	920	3.4	28	3.4	28	3.4	60.9	
Dunn	1,415	3.2	34	48.1	5,187	9.0	155	9.0	155	9.0	59.8	
Golden Valley	574	2.7	12	41.8	610	2.8	23	2.8	23	2.8	75.4	
Grant	285	0.7	5	35.1	2,713	5.6	57	5.6	57	5.6	42.0	
Hettinger	582	2.2	13	44.7	4,734	14.0	129	14.0	129	14.0	54.5	
McKenzie	3,563	22.6	384	215.5	5,752	33.5	156	33.5	156	33.5	54.2	
Mercer	646	2.0	22	68.1	2,654	6.3	69	6.3	69	6.3	52.0	
Morton	888	1.9	40	90.1	1,337	2.6	48	2.6	48	2.6	71.8	
Oliver	30	0.1	1	66.7	1,491	5.9	40	5.9	40	5.9	53.7	
Sioux	70	0.6	3	85.7	0	0	0	0	0	0	0	
Slope	0	0	0	0	1,906	11.2	24	11.2	24	11.2	25.2	
Stark	520	1.3	33	126.9	2,390	4.6	53	4.6	53	4.6	44.4	
Total, Missouri-Slope	9,559	2.6	576	120.5	31,863	7.2	824	7.2	824	7.2	51.7	
State total	133,418	10.9	5,363	80.4	292,695	22.3	10,481	22.3	10,481	22.3	71.6	

Source: U. S. Census of Agriculture for 1954 and 1959.

Table 19. - Fertilization of potatoes in North Dakota, by counties and agricultural subregions, 1954 and 1959

Agricultural subregion and county	1954				1959			
	Fertilized acreage	Fertilized acreage in percent of harvested acreage	Amount of fertilizer used Tons	Average amount of fertilizer per acre Pounds	Fertilized acreage	Fertilized acreage in percent of harvested acreage	Amount of fertilizer used Tons	Average amount of fertilizer per acre Pounds
Red River Valley:								
Cass-----	2/1,100	2/118.8	60	109.1	795	93.4	42	105.7
Grand Forks-----	16,892	79.6	1,820	215.5	21,604	94.7	2,597	240.4
Pembina-----	14,189	67.0	1,306	184.1	25,593	86.5	3,001	234.5
Traill-----	1,187	28.5	72	121.3	3,525	64.6	375	212.8
Walsh-----	20,897	56.4	1,740	166.5	31,437	90.7	3,268	207.9
Total, Red River Valley-----	54,265	64.2	4,998	184.2	82,954	88.9	9,283	223.8
Total, Till Plains 3/-----	4,617	57.8	264	114.4	1,511	26.9	126	166.8
Total, Missouri-Slope 3/-----	476	23.9	33	138.7	2/1,273	2/118.0	117	183.8
State total-----	59,358	62.8	5,295	178.4	85,738	85.7	9,526	222.2

1/ May include a small acreage of fruits and vegetables.

2/ The fertilized acreage exceeds the harvested acreage. This is probably due to abandonment of part of the planted acreage prior to harvest.

3/ Data for each county in this subregion are not given because of the small acreages involved.

Source: U. S. Census of Agriculture, 1954 and 1959.

Table 20. - Fertilization of wheat 1/ in North Dakota, by counties and agricultural subregions, 1954 and 1959

Agricultural subregion and county	1954				1959			
	Fertilized acreage	Fertilized acreage in percent of harvested acreage	Amount of fertilizer used	Average amount of fertilizer per acre	Fertilized acreage	Fertilized acreage in percent of harvested acreage	Amount of fertilizer used	Average amount of fertilizer per acre
	Acres	Percent	Tons	Pounds	Acres	Percent	Tons	Pounds
Red River Valley:								
Cass	37,530	18.3	1,132	60.3	108,357	61.1	3,328	61.4
Grand Forks	82,858	44.3	3,043	73.5	138,458	87.8	5,537	80.0
Pembina	102,627	58.8	3,088	60.2	120,563	77.2	4,204	69.7
Trail	26,012	24.3	852	65.5	56,288	60.7	1,884	66.9
Walsh	94,503	44.0	2,969	62.8	130,070	77.2	4,445	68.3
Total, Red River Valley	343,530	38.7	11,084	64.5	553,736	73.6	19,398	70.1
Till Plains:								
Barnes	27,580	14.7	622	45.1	102,434	61.7	3,026	59.1
Benson	14,220	7.0	313	44.0	62,525	38.0	1,649	52.7
Bottineau	26,238	10.0	531	40.5	68,627	32.7	1,572	45.8
Burke	3,825	3.0	67	35.0	38,953	32.4	828	42.5
Burleigh	620	0.7	18	58.1	36,032	48.9	954	53.0
Cavalier	68,436	29.2	1,401	40.9	95,075	47.9	2,310	48.6
Dickey	1,216	1.7	88	144.7	9,275	17.3	266	57.4
Divide	6,466	3.7	116	35.9	15,831	10.2	289	36.5
Eddy	8,696	14.3	183	42.1	29,667	62.5	757	51.0
Emmons	131	0.1	3	45.8	42,392	33.1	1,111	52.4
Foster	8,538	11.9	204	47.8	46,228	88.7	1,292	55.9
Griggs	11,240	15.8	297	52.8	31,998	58.9	834	52.1
Kidder	711	0.9	15	42.2	10,052	16.3	254	50.5
LaMoure	4,080	3.0	108	52.9	39,694	34.5	1,527	76.9

-Continued

Table 20. - Fertilization of wheat 1/ in North Dakota, by counties and agricultural subregions, 1954 and 1959 -Continued

Agricultural subregion and county	1954				1959			
	Fertilized acreage	Fertilized acreage in percent of harvested acreage	Amount of fertilizer used	Average amount of fertilizer per acre	Fertilized acreage	Fertilized acreage in percent of harvested acreage	Amount of fertilizer used	Average amount of fertilizer per acre
	Acres	Percent	Tons	Pounds	Acres	Percent	Tons	Pounds
Till Plains (continued)								
Logan-----	128	0.1	4	62.5	16,867	18.1	441	52.3
McHerry-----	6,992	3.5	159	45.5	76,404	47.1	1,830	47.9
McIntosh-----	225	0.2	8	71.1	7,305	6.8	259	70.9
McLean-----	5,968	2.2	125	41.9	99,082	40.8	2,266	45.7
Mountrail-----	3,325	1.6	64	38.5	52,864	27.5	1,060	40.1
Nelson-----	25,862	20.1	589	45.5	77,896	76.2	2,247	57.7
Pierce-----	7,236	4.6	166	45.9	48,684	36.7	1,080	44.4
Ramsey-----	17,504	9.9	383	43.8	59,657	34.2	1,633	54.7
Ransom-----	1,980	2.9	66	66.7	13,133	25.6	371	56.5
Renville-----	22,569	17.5	433	38.4	39,765	35.4	868	43.7
Richland-----	7,572	9.0	208	54.9	30,342	37.3	1,005	66.2
Rolette-----	14,524	12.6	321	44.2	26,017	31.8	571	43.9
Sargent-----	2,955	3.7	71	48.1	8,468	14.1	290	68.5
Sheridan-----	1,417	1.4	32	45.2	17,412	18.6	376	43.2
Steele-----	20,467	24.3	578	56.5	58,673	79.7	1,666	56.8
Stutsman-----	5,229	2.1	139	53.2	93,423	45.1	2,859	61.2
Towner-----	25,350	13.1	538	42.4	54,592	33.2	1,412	51.7
Ward-----	19,094	7.2	424	44.4	114,362	48.5	2,500	43.7
Wells-----	9,942	5.4	228	45.9	61,966	40.8	1,695	54.7
Williams-----	10,651	3.9	250	46.9	72,692	32.9	1,469	40.4
Total, Till Plains-----	390,987	7.7	8,752	44.8	1,658,387	38.2	42,567	51.3

-Continued

Table 20. - Fertilization of wheat 1/ in North Dakota, by counties and agricultural subregions, 1954 and 1959 -Continued

Agricultural subregion and county	1954				1959			
	Fertilized acreage	Fertilized acreage in percent of harvested acreage	Amount of fertilizer used	Average amount of fertilizer per acre	Fertilized acreage	Fertilized acreage in percent of harvested acreage	Amount of fertilizer used	Average amount of fertilizer per acre
	Acres	Percent	Tons	Pounds	Acres	Percent	Tons	Pounds
Missouri-Slope:								
Adams-----	134	0.1	5	74.6	39,098	32.3	828	42.4
Billings-----	344	0.9	8	46.5	6,603	24.7	154	46.6
Bowman-----	3,313	2.7	108	65.2	37,901	35.3	793	41.8
Dunn-----	3,284	2.6	63	38.4	32,209	28.9	770	47.8
Golden Valley-----	7,829	9.8	165	42.2	26,410	39.6	519	39.3
Grant-----	1,472	1.1	138	187.5	31,012	28.1	732	47.2
Hettinger-----	5,881	3.0	104	35.4	101,741	55.0	1,946	38.3
McKenzie-----	3,318	2.2	81	48.8	65,891	48.8	1,414	42.9
Mercer-----	785	0.8	11	28.0	30,566	35.7	733	48.0
Morton-----	889	0.5	29	65.2	55,340	57.9	1,565	56.6
Oliver-----	706	1.2	23	65.2	13,653	33.0	337	49.4
Sioux-----	210	0.5	10	95.2	2,861	10.4	76	53.1
Slope-----	1,700	1.9	80	94.1	30,725	35.3	699	45.5
Stark-----	3,299	2.0	91	55.2	75,318	54.3	1,641	43.6
Total, Missouri-Slope-----	33,164	2.1	916	55.2	549,328	41.0	12,207	44.4
State total-----	767,681	10.1	20,752	54.1	2,761,451	42.9	74,172	53.7

1/ Includes durum.

Source: U. S. Census of Agriculture for 1954 and 1959.

Table 21. - Fertilization of tame hay 1/ and cropland pasture in North Dakota by counties and agricultural subregions, 1954 and 1959

Agricultural subregion and county	1954						1959			
	Fertilized acreage	Fertilized percent of harvested acreage	Amount of fertilizer used	Average amount of fertilizer per acre	Fertilized acreage	Fertilized percent of harvested acreage	Amount of fertilizer used	Fertilized percent of harvested acreage	Average amount of fertilizer per acre	
	Acres	Percent	Tons	Pounds	Acres	Percent	Tons	Percent	Pounds	
<u>Red River Valley:</u>										
Cass-----	3,770	4.3	235	124.7	3,896	5.6	216	5.6	110.9	
Grand Forks-----	4,735	6.8	304	128.4	4,942	9.1	290	9.1	117.4	
Pembina-----	1,516	4.8	76	100.3	330	1.3	16	1.3	97.0	
Trail-----	3,535	7.7	208	117.7	895	2.5	54	2.5	120.7	
Walsh-----	1,996	6.5	71	71.1	2,190	7.6	58	7.6	53.0	
Total, Red River Valley-----	15,552	5.8	894	115.0	12,253	5.7	634	5.7	103.5	
<u>Till Plains:</u>										
Barnes-----	4,152	7.2	136	65.5	2,019	4.1	83	4.1	82.2	
Benson-----	180	0.4	2	22.2	310	0.6	8	0.6	51.6	
Bottineau-----	125	0.2	6	96.0	482	1.1	21	1.1	87.1	
Burke-----	0	0	0	0	590	2.8	22	2.8	74.6	
Burleigh-----	189	0.3	4	42.3	385	0.4	6	0.4	31.2	
Cavalier-----	210	0.5	4	38.1	500	1.9	22	1.9	88.0	
Dickey-----	4	2/	3/	3/	544	0.9	11	0.9	40.4	
Divide-----	20	0.1	1	100.0	0	0	0	0	0	
Eddy-----	535	1.6	15	56.1	649	1.9	22	1.9	67.8	
Emmons-----	0	0	0	0	20	2/	1	2/	100.0	
Foster-----	778	2.3	35	90.0	2,265	6.7	86	6.7	75.9	
Griggs-----	620	1.6	25	80.6	595	1.8	20	1.8	67.2	
Kidder-----	0	0	0	0	345	0.4	9	0.4	52.2	
LaMoure-----	100	0.2	6	120.0	760	1.4	18	1.4	47.4	

-Continued

Table 21. - Fertilization of tame hay 1/ and cropland pasture in North Dakota by counties and agricultural subregions, 1954 and 1959 -Continued

Agricultural subregion and county	1954				1959			
	Fertilized acreage	Fertilized acreage in percent of harvested acreage	Amount of fertilizer used	Average amount of fertilizer per acre	Fertilized acreage	Fertilized acreage in percent of harvested acreage	Amount of fertilizer used	Average amount of fertilizer per acre
	Acres	Percent	Tons	Pounds	Acres	Percent	Tons	Pounds
Till Plains: (continued)								
Logan-----	0	0	0	0	308	0.9	12	77.9
McHenry-----	285	0.3	12	84.2	1,160	1.3	27	46.6
McIntosh-----	0	0	0	0	50	0.2	2	80.0
McLean-----	195	0.3	4	41.0	371	0.4	7	37.7
Mountrail-----	0	0	0	0	115	0.3	4	69.6
Nelson-----	990	2.7	38	76.8	2,300	6.2	78	67.8
Pierce-----	0	0	0	0	110	0.2	2	36.4
Ramsey-----	40	0.1	2	100.0	1,210	3.5	36	59.5
Ransom-----	530	0.9	30	113.2	1,530	3.3	63	82.4
Renville-----	600	2.4	10	33.3	0	0	0	0
Richland-----	6,562	7.7	308	93.9	10,027	16.8	752	150.0
Rolette-----	1,060	2.9	12	22.6	770	2.9	27	70.1
Sargent-----	470	0.9	21	89.4	212	0.5	10	94.3
Sheridan-----	0	0	0	0	20	0.1	1	100.0
Steele-----	330	1.4	14	84.8	1,040	4.3	33	63.5
Stutsman-----	61	0.1	3	98.4	1,173	0.9	27	46.0
Towner-----	0	0	0	0	441	2.1	13	59.0
Ward-----	1,200	1.9	80	133.3	4,221	6.8	92	43.6
Wells-----	190	0.4	7	73.7	560	1.1	39	139.3
Williams-----	575	1.3	49	170.4	1,235	2.9	54	87.4
Total, Till Plains-----	20,001	1.3	824	82.4	36,317	2.3	1,608	88.6

-Continued

Table 21. - Fertilization of tame hay 1/ and cropland pasture in North Dakota by counties and agricultural subregions, 1954 and 1959 -Continued

Agricultural subregion and county	1954				1959			
	Fertilized acreage	Fertilized acreage in percent of harvested acreage	Amount of fertilizer used	Average amount of fertilizer per acre	Fertilized acreage	Fertilized acreage in percent of harvested acreage	Amount of fertilizer used	Average amount of fertilizer per acre
	Acres	Percent	Tons	Pounds	Acres	Percent	Tons	Pounds
Missouri-Slope:								
Adams-----	20	0.1	1	100.0	170	0.3	4	47.1
Billings-----	115	0.6	4	69.6	265	1.0	10	75.5
Bowman-----	121	0.4	10	165.3	105	0.3	3	57.1
Dunn-----	0	0	0	0	715	0.8	62	173.4
Golden Valley-----	250	1.3	5	40.0	240	1.1	11	91.7
Grant-----	210	0.3	5	47.6	990	0.9	38	76.8
Hettinger-----	0	0	0	0	67	0.1	2	59.7
McKenzie-----	1,097	1.8	50	91.2	2,209	3.0	83	75.1
Mercer-----	0	0	0	0	760	1.4	16	42.1
Morton-----	86	0.1	8	186.0	808	0.6	34	84.2
Oliver-----	20	0.1	1	100.0	0	0	0	0
Sioux-----	125	1.0	2	32.0	0	0	0	0
Slope-----	220	0.6	17	154.5	140	0.4	4	57.1
Stark-----	318	0.6	15	94.3	553	0.7	22	79.6
Total, Missouri-Slope-----	2,582	0.5	118	91.4	7,022	0.8	289	82.3
State total-----	38,135	1.6	1,836	96.3	55,592	2.1	2,531	91.1

1/ Does not include wild hay.

2/ Less than 0.5 percent.

3/ Amount not available; probably less than 1/2 ton.

Source: U. S. Census of Agriculture for 1954 and 1959.

Table 22. - Fertilization of other crops l/ in North Dakota, by counties and agricultural subregions, 1954 and 1959

Agricultural subregion and county	1954						1959																																																																																																																																																																																																																																																																																						
	Fertilized acreage		Amount of fertilizer used		Average amount of fertilizer per acre		Fertilized acreage in percent of harvested acreage		Amount of fertilizer used		Average amount of fertilizer per acre																																																																																																																																																																																																																																																																																		
	Acres	Percent	Tons	Pounds	Acres	Percent	Tons	Pounds	Acres	Percent	Tons	Pounds																																																																																																																																																																																																																																																																																	
Red River Valley:													Cass	50,653	10.4	1,757	69.4	169,459	35.7	5,031	59.4					Grand Forks	90,034	29.7	3,320	73.7	178,518	61.6	7,299	81.8					Pembina	103,054	47.1	3,411	66.2	147,470	66.8	4,907	66.5					Trail	36,519	15.5	1,242	68.0	82,652	34.6	2,631	63.7					Walsh	96,967	37.4	3,535	72.9	170,171	65.7	6,296	74.0					Total, Red River Valley	377,227	25.1	13,265	70.3	748,270	50.4	26,164	69.9					Till Plains:													Barnes	16,778	5.4	404	48.2	88,053	29.7	2,524	57.3					Benson	11,194	6.2	276	49.3	36,844	21.1	1,042	56.6					Bottineau	12,091	4.6	209	34.6	37,155	20.1	888	47.8					Burke	1,483	1.1	32	43.2	9,638	9.8	203	42.1					Burleigh	90	0.1	2	44.4	22,895	19.3	575	50.2					Cavalier	66,972	27.6	1,265	37.8	141,958	52.7	3,285	46.3					Dickey	2,180	1.0	162	148.6	11,825	5.9	318	53.8					Divide	936	0.8	24	51.3	3,340	4.1	62	37.1					Eddy	3,392	4.0	87	51.3	18,351	22.8	428	46.6					Emmons	20	2/----	1	100.0	22,521	12.0	573	50.9					Foster	10,404	8.7	289	55.6	53,693	50.1	1,516	56.5					Griggs	9,207	6.8	231	50.2	31,078	25.9	743	47.8					Kidder	1,131	0.9	31	54.8	6,489	7.8	159	49.0					LaMoure	2,435	1.1	55	45.2	13,033	6.4	425	65.2				
Cass	50,653	10.4	1,757	69.4	169,459	35.7	5,031	59.4					Grand Forks	90,034	29.7	3,320	73.7	178,518	61.6	7,299	81.8					Pembina	103,054	47.1	3,411	66.2	147,470	66.8	4,907	66.5					Trail	36,519	15.5	1,242	68.0	82,652	34.6	2,631	63.7					Walsh	96,967	37.4	3,535	72.9	170,171	65.7	6,296	74.0					Total, Red River Valley	377,227	25.1	13,265	70.3	748,270	50.4	26,164	69.9					Till Plains:													Barnes	16,778	5.4	404	48.2	88,053	29.7	2,524	57.3					Benson	11,194	6.2	276	49.3	36,844	21.1	1,042	56.6					Bottineau	12,091	4.6	209	34.6	37,155	20.1	888	47.8					Burke	1,483	1.1	32	43.2	9,638	9.8	203	42.1					Burleigh	90	0.1	2	44.4	22,895	19.3	575	50.2					Cavalier	66,972	27.6	1,265	37.8	141,958	52.7	3,285	46.3					Dickey	2,180	1.0	162	148.6	11,825	5.9	318	53.8					Divide	936	0.8	24	51.3	3,340	4.1	62	37.1					Eddy	3,392	4.0	87	51.3	18,351	22.8	428	46.6					Emmons	20	2/----	1	100.0	22,521	12.0	573	50.9					Foster	10,404	8.7	289	55.6	53,693	50.1	1,516	56.5					Griggs	9,207	6.8	231	50.2	31,078	25.9	743	47.8					Kidder	1,131	0.9	31	54.8	6,489	7.8	159	49.0					LaMoure	2,435	1.1	55	45.2	13,033	6.4	425	65.2																	
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Burke	1,483	1.1	32	43.2	9,638	9.8	203	42.1					Burleigh	90	0.1	2	44.4	22,895	19.3	575	50.2					Cavalier	66,972	27.6	1,265	37.8	141,958	52.7	3,285	46.3					Dickey	2,180	1.0	162	148.6	11,825	5.9	318	53.8					Divide	936	0.8	24	51.3	3,340	4.1	62	37.1					Eddy	3,392	4.0	87	51.3	18,351	22.8	428	46.6					Emmons	20	2/----	1	100.0	22,521	12.0	573	50.9					Foster	10,404	8.7	289	55.6	53,693	50.1	1,516	56.5					Griggs	9,207	6.8	231	50.2	31,078	25.9	743	47.8					Kidder	1,131	0.9	31	54.8	6,489	7.8	159	49.0					LaMoure	2,435	1.1	55	45.2	13,033	6.4	425	65.2																																																																																																																																																			
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Table 22. - Fertilization of other crops 1/ in North Dakota, by counties and agricultural subregions, 1954 and 1959 -Continued

Agricultural subregion and county	1954				1959			
	Fertilized acreage	Fertilized acreage in percent of harvested acreage	Amount of fertilizer used	Average amount of fertilizer per acre	Fertilized acreage	Fertilized acreage in percent of harvested acreage	Amount of fertilizer used	Average amount of fertilizer per acre
	Acres	Percent	Tons	Pounds	Acres	Percent	Tons	Pounds
Till Plains (continued)								
Logan	49	2/ ---	3	122.4	5,305	4.3	116	43.7
McHenry	1,688	0.8	58	68.7	24,336	14.8	564	46.4
McIntosh	1	2/ ---	3/ ---	3/ ---	3,375	2.0	105	62.2
McLean	1,104	0.4	24	43.5	35,838	15.9	756	42.2
Mountrail	75	0.1	1	26.7	11,208	11.6	243	43.4
Nelson	33,891	19.3	798	47.1	101,654	54.1	2,901	57.1
Pierce	1,903	1.1	40	42.0	19,553	12.8	464	47.5
Ramsey	7,743	4.5	177	45.7	57,131	27.1	1,545	54.1
Ransom	1,730	1.1	70	80.9	17,410	13.3	443	50.9
Renville	9,390	6.0	183	39.0	19,334	16.3	414	42.8
Richland	25,689	6.7	749	58.3	77,466	21.1	2,399	61.9
Rolette	5,589	6.9	139	49.7	16,520	20.4	348	42.1
Sargent	1,935	1.2	48	49.6	10,832	6.9	371	68.5
Sheridan	350	0.3	8	45.7	5,902	6.4	121	41.0
Steele	29,135	17.3	763	52.4	80,349	45.5	2,008	50.0
Stutsman	4,069	1.3	168	82.6	45,008	17.7	1,324	58.8
Towner	13,097	10.2	289	44.1	46,156	28.7	1,139	49.4
Ward	5,004	1.6	73	29.2	50,475	22.7	1,141	45.2
Wells	10,010	4.6	231	46.2	44,280	21.6	1,320	59.6
Williams	2,045	1.4	155	151.6	17,440	16.8	407	46.7
Total, Till Plains	292,810	4.6	7,045	48.1	1,186,445	21.1	30,870	52.0

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Table 22. - Fertilization of other crops 1/ in North Dakota, by counties and agricultural subregions, 1954 and 1959 -Continued

Agricultural subregion and county	1954				1959			
	Fertilized acreage	Fertilized acreage in percent of harvested acreage	Amount of fertilizer used	Average amount of fertilizer per acre	Fertilized acreage	Fertilized acreage in percent of harvested acreage	Amount of fertilizer used	Average amount of fertilizer per acre
	Acres	Percent	Tons	Pounds	Acres	Percent	Tons	Pounds
Missouri-Slope:								
Adams-----	40	0.1	1	50.0	3,226	9.2	67	41.5
Billings-----	70	0.3	4	114.3	705	4.9	18	51.1
Bowman-----	587	1.0	28	95.4	5,729	16.4	120	41.9
Dunn-----	900	1.1	22	48.9	5,876	12.6	174	59.2
Golden Valley-----	939	2.9	28	59.6	4,705	17.3	116	49.3
Grant-----	85	0.1	3	70.6	5,137	8.0	96	37.4
Hettinger-----	500	0.4	8	32.0	18,577	25.0	405	43.6
McKenzie-----	2,354	3.0	160	135.9	18,873	39.9	993	105.2
Mercer-----	475	0.7	5	21.1	3,974	9.3	96	48.3
Morton-----	173	0.1	9	104.0	10,629	18.6	330	62.1
Oliver-----	9	2/-----	3/-----	3/-----	2,832	9.7	66	46.6
Sioux-----	0	0	0	0	591	2.8	13	44.0
Slope-----	110	0.2	5	90.9	3,300	12.5	107	64.8
Stark-----	383	0.4	12	62.7	13,450	20.1	339	50.4
Total, Missouri-Slope-----	6,625	0.7	285	86.0	97,604	16.6	2,940	60.2
State total-----	676,662	7.7	20,595	60.9	2,032,319	26.5	59,974	59.0

1/ Crops other than corn, wheat, potatoes, hay and pasture. Included in "other crops" are barley, oats, rye, flax, soybeans, dry beans, dry peas, safflower, sunflowers, sorghum, sugar beets, fruits, vegetables, nursery products, and field seed crops.

2/ Less than 0.5 percent.

3/ Amount of fertilizer not available -- probably less than 1/2 ton.

Source: U. S. Census of Agriculture, 1954 and 1959.

Table 23. - Fertilization of improved open pasture 1/ in North Dakota, by counties and agricultural subregions, 1954 and 1959

Agricultural subregion and county	1954					1959						
	Fertilized acreage	Fertilized acreage in percent of total acreage	Amount of fertilizer used	Average amount of fertilizer per acre	Fertilized acreage	Fertilized acreage in percent of total acreage	Amount of fertilizer used	Average amount of fertilizer per acre	Fertilized acreage	Fertilized acreage in percent of total acreage	Amount of fertilizer used	Average amount of fertilizer per acre
	Acres	Percent	Tons	Pounds	Acres	Percent	Tons	Pounds	Acres	Percent	Tons	Pounds
Red River Valley:												
Cass	47	1.7	2	85.1	465	21.9	35	150.5				
Grand Forks	2,351	2/145.8	181	154.0	105	10.8	10	190.5				
Pembina	470	61.4	17	72.3	0	0	0	0				
Trail	140	24.4	10	142.9	222	41.3	19	171.2				
Walsh	175	14.7	12	137.1	175	19.3	8	91.4				
Total, Red River Valley	3,183	45.7	222	139.5	967	20.4	72	148.9				
Till Plains:												
Barnes	0	0	0	0	30	1.5	2	133.3				
Benson	0	0	0	0	175	8.8	31	354.3				
Bottineau	1,155	44.9	60	103.9	452	18.4	11	48.7				
Burke	0	0	0	0	0	0	0	0				
Burleigh	0	0	0	0	0	0	0	0				
Cavalier	0	0	0	0	0	0	0	0				
Dickey	300	8.4	60	400.0	0	0	0	0				
Divide	0	0	0	0	0	0	0	0				
Eddy	0	0	0	0	0	0	0	0				
Emmons	0	0	0	0	90	3.9	4	88.9				
Foster	75	24.6	6	160.0	400	15.6	15	75.0				
Griggs	24	1.4	1	83.3	0	0	0	0				
Kidder	0	0	0	0	70	1.1	4	114.3				
LaMoure	0	0	0	0	280	19.3	14	100.0				

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Table 23. - Fertilization of improved open pasture 1/ in North Dakota by counties and agricultural subregions, 1954 and 1959 -Continued

Agricultural subregion and county	1954				1959			
	Fertilized acreage	Fertilized acreage percent of total acreage	Amount of fertilizer used	Average amount of fertilizer per acre	Fertilized acreage	Fertilized acreage percent of total acreage	Amount of fertilizer used	Average amount of fertilizer per acre
	Acres	Percent	Tons	Pounds	Acres	Percent	Tons	Pounds
<u>Till Plains (continued)</u>								
Logan-----	0	0	0	0	0	0	0	0
McHenry-----	0	0	0	0	80	1.2	4	100.0
McIntosh-----	0	0	0	0	0	0	0	0
McLean-----	0	0	0	0	85	2.3	6	141.2
Mountrail-----	0	0	0	0	0	0	0	0
Nelson-----	25	2.5	2	160.0	315	27.1	7	44.4
Pierce-----	0	0	0	0	0	0	0	0
Ramsey-----	0	0	0	0	20	1.8	1	100.0
Ransom-----	0	0	0	0	40	1.3	5	250.0
Renville-----	0	0	0	0	40	4.5	2	100.0
Richland-----	920	43.9	23	50.0	285	14.3	20	140.4
Rolette-----	0	0	0	0	0	0	0	0
Sargent-----	0	0	0	0	30	1.7	1	66.7
Sheridan-----	0	0	0	0	0	0	0	0
Steele-----	50	6.5	2	80.0	50	20.0	2	80.0
Stutsman-----	21	0.4	1	95.2	40	0.9	8	400.0
Towner-----	0	0	0	0	0	0	0	0
Ward-----	0	0	0	0	800	36.9	15	37.5
Wells-----	0	0	0	0	0	0	0	0
Williams-----	0	0	0	0	0	0	0	0
Total, Till Plains-----	2,570	3.8	155	120.6	3,282	4.8	152	92.6

-Continued

Table 23. - Fertilization of improved open pasture 1/ in North Dakota by counties and agricultural subregions, 1954 and 1959 -Continued

Agricultural subregion and county	1954				1959			
	Fertilized acreage	Fertilized acreage in percent of total acreage	Amount of fertilizer used	Average amount of fertilizer per acre	Fertilized acreage	Fertilized acreage in percent of total acreage	Amount of fertilizer used	Average amount of fertilizer per acre
	Acres	Percent	Tons	Pounds	Acres	Percent	Tons	Pounds
Missouri-Slope:								
Adams-----	0	0	0	0	0	0	0	0
Billings-----	0	0	0	0	0	0	0	0
Bowman-----	0	0	0	0	40	2.8	1	50.0
Dunn-----	0	0	0	0	210	3.8	52	495.2
Golden Valley-----	0	0	0	0	30	0.4	2	133.3
Grant-----	1,200	26.9	30	50.0	0	0	0	0
Hettinger-----	0	0	0	0	85	1.7	5	117.6
McKenzie-----	10	0.7	3/---	3/---	40	2.2	4	200.0
Mercer-----	0	0	0	0	0	0	0	0
Morton-----	0	0	0	0	110	1.9	3	54.5
Oliver-----	0	0	0	0	0	0	0	0
Sioux-----	0	0	0	0	0	0	0	0
Slope-----	0	0	0	0	0	0	0	0
Stark-----	0	0	0	0	90	1.1	3	66.7
Total, Missouri-Slope-----	1,210	3.4	30	49.6	605	1.3	70	231.4
State total-----	6,963	6.4	407	116.9	4,854	4.0	294	121.1

1/ "Improved open pasture" is pasture land that is not cropland nor woodland on which one or more of the following practices have been used: liming, fertilizing, seeding, irrigating, draining, or clearing of weed or brush growth.

2/ Acreage fertilized exceeds total acreage reported. It is not known whether this is due to an error in editing and tabulating the original schedules for this county or to some aberration in the sampling procedure used.

3/ Amount not available -- probably less than 1/2 ton.

Source: U. S. Census of Agriculture for 1954 and 1959.

