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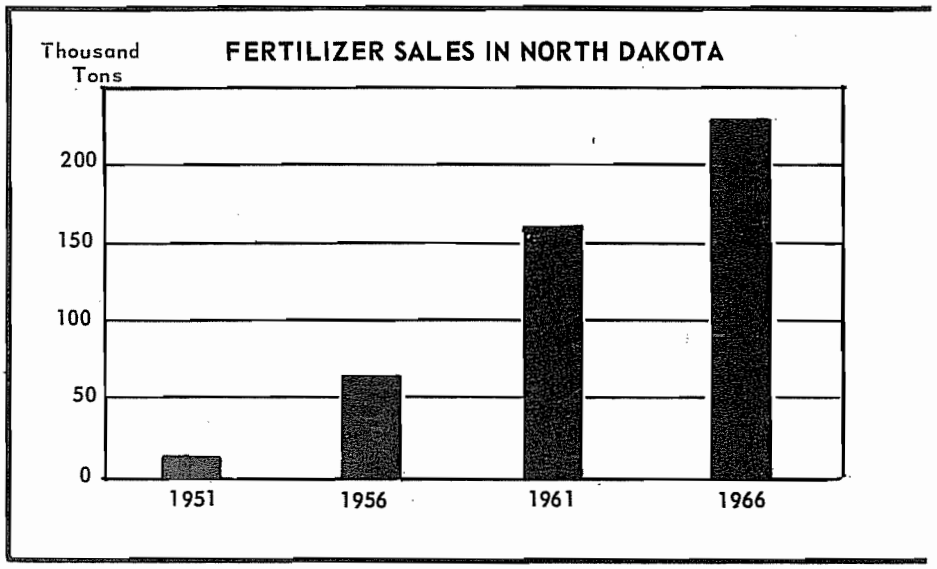
STATISTICS ON FERTILIZER CONSUMPTION in North Dakota 1951 to 1966



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IN COOPERATION WITH
ECONOMIC RESEARCH SERVICE
UNITED STATES DEPARTMENT OF AGRICULTURE

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FERTILIZER CONSUMPTION IN NORTH DAKOTA, 1951 TO 1966

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Introduction

This report summarizes estimates of fertilizer-consumption trends from 1951 to 1966, made by various agencies. In addition, it presents original estimates of 1964 fertilizer applications on each crop within each of the seven economic areas of the state. These estimates were developed for a national effort to estimate amounts of fertilizer and plant nutrients applied to each crop within each state and agricultural subregion. The national project was conducted by the Economic Research Service, the Statistical Reporting Service, and the Agricultural Research Service of the United States Department of Agriculture, in cooperation with the state agricultural experiment stations.

Statistics on Fertilizer Consumption for the State as a Whole

Sources of Fertilizer Consumption Statistics. Statistics from three sources provide approximations of the annual amounts of fertilizer consumed in North Dakota: (1) the semi-annual summaries of fertilizer tonnage compiled by the North Dakota State Laboratories Department; (2) annual estimates of fertilizer consumption in each state, made by the Statistical Reporting Service, U. S. Department of Agriculture;[2] and (3) the estimates of fertilizer used on farms, made by the U. S. Census of Agriculture in 1954, 1959, and 1964. For sake of brevity, these three sources are indicated in this report as "NDSLD," "USDA," and "Census," respectively.

The "NDSLD" estimates are compiled from reports of the tonnage of each analysis or grade sold during each six-month period, ending June 30 and December 31, submitted to the North Dakota State Laboratories Department by fertilizer "registrants." The North Dakota fertilizer law requires each brand and analysis of fertilizer sold in the state to be registered with the Laboratories

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[2]The fertilizer statistical activity formerly was handled by the Soil and Water Conservation Research Division of the Agricultural Research Service. This function was transferred to the Statistical Reporting Service in November, 1965.

The assistance of Dr. Enoch B. Norum, Chairman, Department of Soils, North Dakota Agricultural Experiment Station, and Virgil L. Weiser, Soils Specialist, North Dakota Cooperative Extension Service, is gratefully acknowledged.

Department. Most of the registrants are either national manufacturers or regional distributors, although some are local blenders and retailers.

USDA reports include estimated tonnages of each primary plant nutrient (N, P_2O_5, and K_2O) as well as total tonnages of mixed fertilizers and fertilizer materials. These estimates, available for each state by 12-month periods ending June 30, are based on fertilizer shipments to each state reported to USDA by fertilizer manufacturers and distributors throughout the country, supplemented by data compiled by state agencies.

The census fertilizer-consumption data for 1954, 1959, and 1964 were based on returns from samples of farms, composed of all farms of 1,000 acres or more and 20 percent of all farms smaller than 1,000 acres. The North Dakota sample amounted to 33 percent of all farms in 1954, 36 percent in 1959, and 41 percent in 1964. The census data included acreage fertilized and tons of material applied to six groups of crops in each county. The six groups in North Dakota were: (1) corn for all purposes; (2) wheat and durum; (3) potatoes; (4) hay and cropland pasture; (5) noncropland pasture; and (6) all other crops, the most important of which were barley, oats, rye, flaxseed, soybeans, sugar beets, tame mustard, sunflowers, safflower, and millet.

Trends in Annual Fertilizer Consumption. Both the NDSLD and USDA statistics indicate a steeply rising trend of fertilizer consumption since 1951 (Figure 1 and Table 1). These two series are in close agreement for all years except 1957. The USDA series are essentially tonnages shipped to North Dakota by manufacturers and regional distributors, while the NDSLD data are summarizations of amounts of each brand and analysis sold in the state. For some brands, the reported sales were those of manufacturers to distributors and retailers; for other brands, the sales were of distributors to retailers; and for still other brands the reported sales were of retailers and local blenders to consumers. The small differences between the USDA and NDSLD data probably are due to year-to-year variations in the July 1 inventories of distributors, retailers, and local blenders.

The census estimates should provide reasonably accurate figures on farm consumption because of the large sample size, the approximate random design of the 20 percent portion of the sample, and the statistical methods used to derive the final estimates from the sample data. Census estimates were 14.1 percent larger than the NDSLD figures in 1954, 20.4 percent larger in 1959, and 2.9 percent smaller in 1964. Several reasons for these discrepancies are: (1) Census figures include only farm consumption, while the NDSLD and USDA estimates also include nonfarm uses (such as lawns, gardens, golf courses, parks, and cemeteries). Total nonfarm use is estimated to have been 1,126 tons in 1964. Estimates of nonfarm use are not available for 1954 and 1959, but likely were smaller than in 1964. (2) Census estimates are supposed to represent applications during the calendar year, including fall applications for crops to be harvested the following year. The USDA estimates, on the other hand, generally are given for 12-month periods ending June 30 in an attempt to relate fertilizer shipments and retail sales to the crop year, on the assumption that most of the fertilizer shipped to retailers between July 1 and December 31 would be applied to crops harvested during the following calendar year. Where fertilizer usage has increased very rapidly, as it has in North Dakota, use of the July 1 to June 30 period tends to understate the amount applied by farmers in any given calendar year.

(3) USDA and NDSLD data are affected by changes in the end of season fertilizer inventories of farmers, while census data are not. Operators who have storage facilities frequently buy fertilizer in the fall to take advantage of price reductions, to offset year-to-year fluctuations in farm income and to smooth out fluctuations in net farm income for income-tax purposes.

The above factors, however, do not explain all the discrepancies between the census estimates and the NDSLD and USDA data for 1954 and 1959. If census estimates of farm consumption for these years were reasonably accurate, then some of the fertilizer used by North Dakota farmers must have been included in the statistics for other states in the reports from the fertilizer industry to USDA and NDSLD. Interstate retail sales of fertilizer and fertilizer carried as a backhaul by trucks used to transport agricultural products to terminal markets contribute to the problem of crediting fertilizer to the state where it is consumed.

The 1964 census data on farm consumption, however, agree closely with the estimates based on shipment and sales data, after allowance is made for nonfarm use. The reason for the changed situation between 1959 and 1964 is not readily apparent. Possibly the fertilizer industry itself has devised more accurate procedures for apportioning data on fertilizer shipments and sales between states for their reports to federal and state agencies. Changes in retail-trade patterns (as might have been occasioned by the advent of bulk-mixing plants in North Dakota) may have resulted in a smaller proportion of the fertilizer being trucked into the state.

Despite these discrepancies among the three series of estimates used to measure consumption of fertilizer materials and mixtures, the three sets of estimates agree on the following points: (1) annual fertilizer consumption in North Dakota increased rapidly between 1951 and 1963, (2) decreased during 1963, and (3) has increased rapidly since 1963 (Figure 1 and Table 1).

Trends in Consumption of Plant Nutrients. Nigrogen, phosphorus, and potassium are the most important plant nutrients in commercial fertilizer. Standardized analytical procedures to measure the amounts of these nutrients in fertilizer materials and mixtures have been adopted by the fertilizer industry and state regulatory agencies for quality-control and guarantee purposes, under which amounts of the primary plant nutrients are expressed in terms of elemental nitrogen (N), available phosphoric oxide (P_2O_5), and water soluable potash (K_2O). Until recently, almost all fertilizer statistics have been in terms of elemental nitrogen and the oxide equivalents of phosphorus and potassium.

There is a growing tendency, particularly among research people, to express amounts of phosphorus and potassium in fertilizer as elemental P and K rather than as oxides. State regulatory agencies and the fertilizer industry eventually may adopt this newer system of expression. In this report, estimated amounts of phosphorus and potassium are given in terms of both the elemental and oxide forms.

Phosphorus has been the most important of the three fertilizer elements, accounting for 47 to 69 percent of the total tonnage of fertilizer elements used annually in North Dakota (Figure 2). Phosphate fertilizers are used

extensively on all crops except grass hay and pasture. Use of nitrogen increased much faster than use of other elements between 1951 and 1965, with a forty-seven-fold increase, compared with an eighteen-fold increase for phosphorus. One reason for the rapidly increasing use of nitrogen has been the increasing practice of fertilizing nonfallowed land. Only small amounts of nitrogen, if any, are used for crops planted on fallow. Nonleguminous crops planted on nonfallowed land, however, generally respond to nitrogen applications in conjunction with phosphorus.

The place for potassium for North Dakota conditions is less well defined, but its use is increasing. The rate of increase in potassium consumption has been much lower than that of either phosphorus or nitrogen--only three-fold. Potassium usually is included in fertilization of potatoes and sugar beets in the Red River Valley. Some is used for wheat, barley, and corn in localized areas.

The quantity of plant nutrients used in North Dakota has increased faster than the total tonnage of commercial fertilizer because of the trend towards higher analysis fertilizers. Before 1949, the total tonnage of nitrogen, phosphorus, and potassium never was more than 17 percent of the total fertilizer tonnage used in North Dakota. Between 1949 and 1959, this percentage increased steadily and has since remained at a high level of about 30 percent (Table 3 and Figure 3).

Technological advances by the fertilizer industry made the use of high-analysis fertilizers both physically possible and economically feasible. This trend towards higher analysis has been general throughout the country, but high-analysis fertilizers are especially important to North Dakota 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.

Estimates of Fertilizer Consumption By Specified Crops in 1964

The estimated acreage of each crop fertilized in 1964 and the tonnage of fertilizer and primary plant nutrients applied to each crop were based on the 1964 census estimates for the six crop groupings and the USDA statewide estimates of fertilizer consumption, after adjustments for nonfarm use of fertilizer. The proportion of each crop fertilized and rates of fertilizer application were estimated from data obtained from: (1) various farm management surveys; (2) annual records of farm practices and production inputs kept by farm operators on nearly 1,400 fields;[3] and the authors' general knowledge of farm practices in different parts of the state.

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[3]These fields are located in all parts of the state. The 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.

These estimates were made initially for seven groups of counties, known as Census Economic Areas (Figure 4).

Acreage of Each Crop Fertilized. Estimated acreages of the more important crops fertilized during 1964 in the seven economic areas are given in Table 4. Wheat was by far the leading crop fertilized, accounting for 59 percent of the fertilized acreage for the state as a whole.

Barley accounted for 21 percent of the fertilized acreage and oats for 8 percent. These three were the leading crops fertilized in all economic areas except Area 3C, in which the large acreage of corn fertilized was exceeded only by that of wheat.

Percentage of Each Crop Fertilized. The 1964 fertilized acreages of each crop, expressed as a percentage of their respective harvested acreages in each of the seven economic areas, are shown in Table 5. These percentages provide a convenient measure of the relative use of fertilizer for each crop.

For the state as a whole, practically all the sugar beet and commercial-potato acreage, 52 percent of the wheat acreage, 46 percent of the barley acreage, 26 percent of the corn acreage, and 22 percent of the oats acreage received fertilizer in 1964. There were wide differences among the seven different economic areas in the proportion of each crop fertilized. For example, only 19 percent of the wheat acreage was fertilized in south central North Dakota (Economic Area 2B), compared with 84 percent in the Red River Valley (Economic Area 4).

Amount of Fertilizer Applied to Each Crop. Estimated tonnage of commercial fertilizer applied to each crop in each economic area is given in Table 6, and the percentage of the total tonnage is given in Table 7. For the state as a whole, 50 percent of the total tonnage was applied to wheat, 21 percent to barley, 7 percent to oats, and 17 percent to row crops (corn, potatoes, sugar beets, and soybeans). These percentages varied greatly from one economic area to another. The percentage applied on wheat, for example, ranged from 28 percent in Economic Area 3C to about 75 percent in the two western-most economic areas, 1 and 2A.

Average Application Rates Per Acre. Average amounts of fertilizer applied per acre tended to be highest in the eastern, more humid areas of the state and lowest in the western, drier areas (Table 8). This east-west variation in average application rates, roughly in accordance with average annual precipitation, is especially noticeable in the case of corn and cereal grains. However, the highest of fertilizer application rates, for potatoes and sugar beets, are found in the three western-most economic areas, 1, 2A, and 2B, where all of the sugar beets and most of the potatoes are grown under irrigation.

Average Amounts of Plant Nutrients Per Acre. The average amounts of nitrogen, phosphorus, and potassium used per acre for each specified crop in each of the seven economic areas are given in Tables 9, 10, 11, 12, and 13, respectively. The phosphorus and potassium amounts are given on the basis of both oxides and elements. Average application rates for nitrogen and phosphate

tend to vary from east to west roughly in accordance with precipitation zones (Tables 9 and 10). Very little potassium, however, is used in the three western-most, less humid economic areas, except for potatoes (Tables 12 and 13).

Changes In Fertilizer-Consumption Patterns Between 1959 and 1964

The acreage of each crop fertilized in 1959 and the tonnage of fertilizer and plant nutrients applied to each crop were estimated from 1959 census data and other information by procedures quite similar to those described above for the 1964 estimates.[5]

The 1959 estimates were developed for three "economic subregions" of the state, instead of for the seven census economic areas. The Missouri Slope agricultural subregion comprises the same counties as Economic Area 1, and the Red River Valley agricultural subregion consists of the same counties as Economic Area 4. The Till Plains agricultural subregion includes the counties in census economic areas 2A, 2B, 3A, 3B, and 3C.

Changes In Fertilized Acreage. The total fertilized acreage in North Dakota increased nearly 31 percent, from 4,232,000 acres in 1959 to 5,539,000 acres in 1964. Most of this increase resulted from substantial increases in the fertilized acreage of wheat in all three agricultural subregions (Table 14). The fertilized acreage of barley, on the other hand, decreased 467,000 acres, largely because of the reductions in barley acreage as a result of the feed-grain program. In addition, some farmers in the eastern third of the state may have reduced the use of nitrogen on malting barley because of high-protein problems. The fertilized acreage of corn, tame hay, and cropland pasture also declined during this five-year period, while that of other crops increased.

Fertilized acreage, expressed as a percentage of harvested acreage, increased for all crops except improved permanent open pasture (Table 15). Generally speaking, this increase in the percentage of each crop fertilized occurred in all agricultural subregions.

Changes In Amount of Fertilizer Used. The total quantity of fertilizer used on farms increased 14 percent, from 157,000 tons in 1959 to over 179,000 tons in 1964 (Table 16). The increase in total tonnage of fertilizer used amounted to 21 percent for wheat, 75 percent for oats, 86 percent for sugar beets, and 23 percent for potatoes. The amount of fertilizer used on barley and flax, however, declined by 21 percent and 8 percent, respectively. The

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[5]These estimates were reported in "Statistics on Fertilizer Consumption in North Dakota," by Stanley W. Voelker, and Marvin T. Nordbo, Agricultural Economics Department Report Number 25, North Dakota Agricultural Experiment Station, Mimeographed, September, 1962. Inasmuch as the 1959 report is out of print, most of the 1959 data and estimates are included in this report.

relatively large increases in amount of fertilizer used on "other crops" were due to the increased acreage of several minor crops--sorghum, grass-legume silage, proso millet, sunflower seed, mustard seed, and pinto beans--some of which were almost unknown in North Dakota in 1959.

Changes In the Amounts of Primary Plant Nutrients. The tonnage of nitrogen used by North Dakota farmers increased by 12 percent between 1959 and 1964 (Table 17). About one-third less nitrogen was used on barley in 1964 than in 1959, but the amount used on all other crops increased.

The amount of phosphorus used on all crops increased 25 percent during the five-year period (Table 18). There was a slight decrease in the amount used on corn, but increases of varying amounts on all other crops.

The total amount of potassium used on farms increased 27 percent (Table 19). A decreased amount used on barley was more than offset by substantial increases in the amounts used for corn and potatoes.

Changes In Application Rates. The average amount of fertilizer applied per acre increased about 8 percent between 1959 and 1964 (Table 20). Average application rates increased for all crops except rye, flax, and improved permanent open pasture. Generally speaking, the largest increases in average application rates occurred in the Red River Valley subregion. Application rates for potatoes and sugar beets in the Missouri Slope subregion increased substantially, but for other crops there were either very modest increases or decreases.

The average amount of nitrogen, phosphrus, and potassium applied per acre to specified crops in the three agricultural subregions in 1959 and 1964 is shown in Tables 21, 22, and 23.

Census Data on Fertilizer Use By Counties, 1959 and 1964

The tables in this section contain basic county data on fertilizer use from the U. S. Census of Agriculture for 1959 and 1964 (Tables 24 through 29). 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 census economic areas.

Two maps of North Dakota 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 gives the percentage of wheat acreage fertilized. The highest concentrations of fertilized acreage occur in the Red River Valley and adjacent counties, while the lowest concentrations generally are among the counties in the south central and northwestern parts of the state.

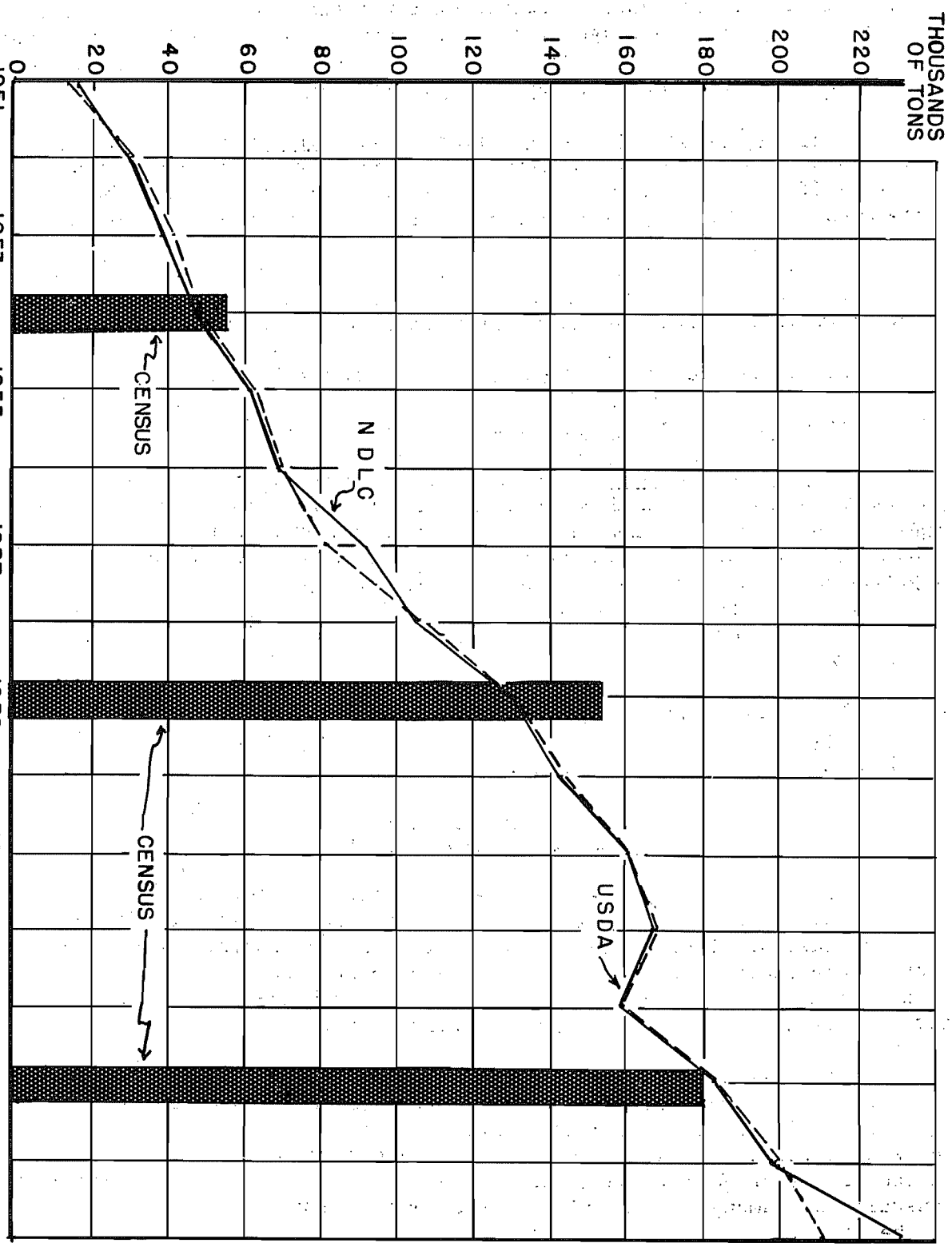


Figure 1. Various Estimates of Amount of Fertilizer Used in North Dakota, 1951 to 1966

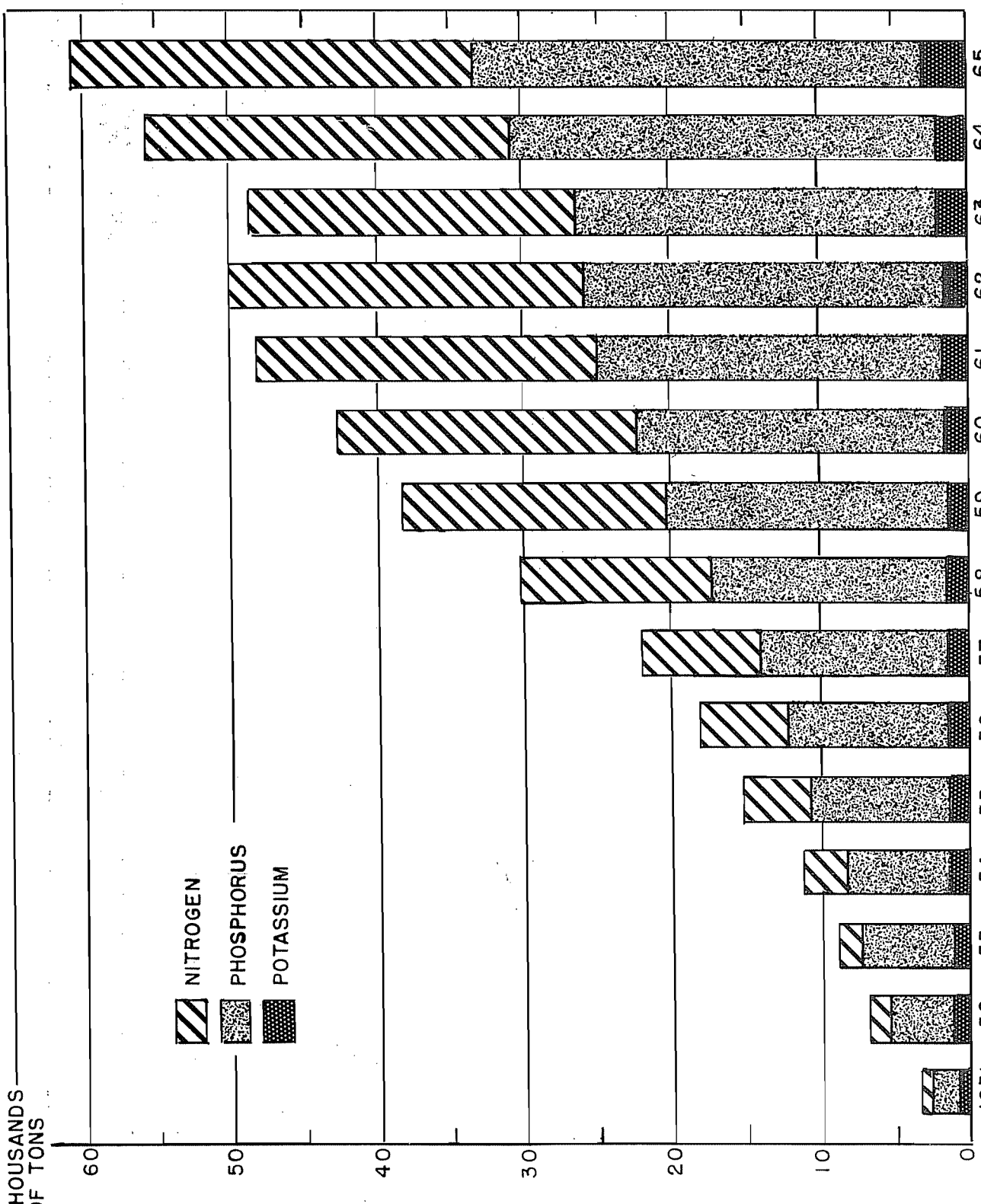


Figure 2. Amounts of Elemental Nitrogen, Phosphorus, and Potassium in Commercial Fertilizer Consumed in North Dakota, 1951 to 1965

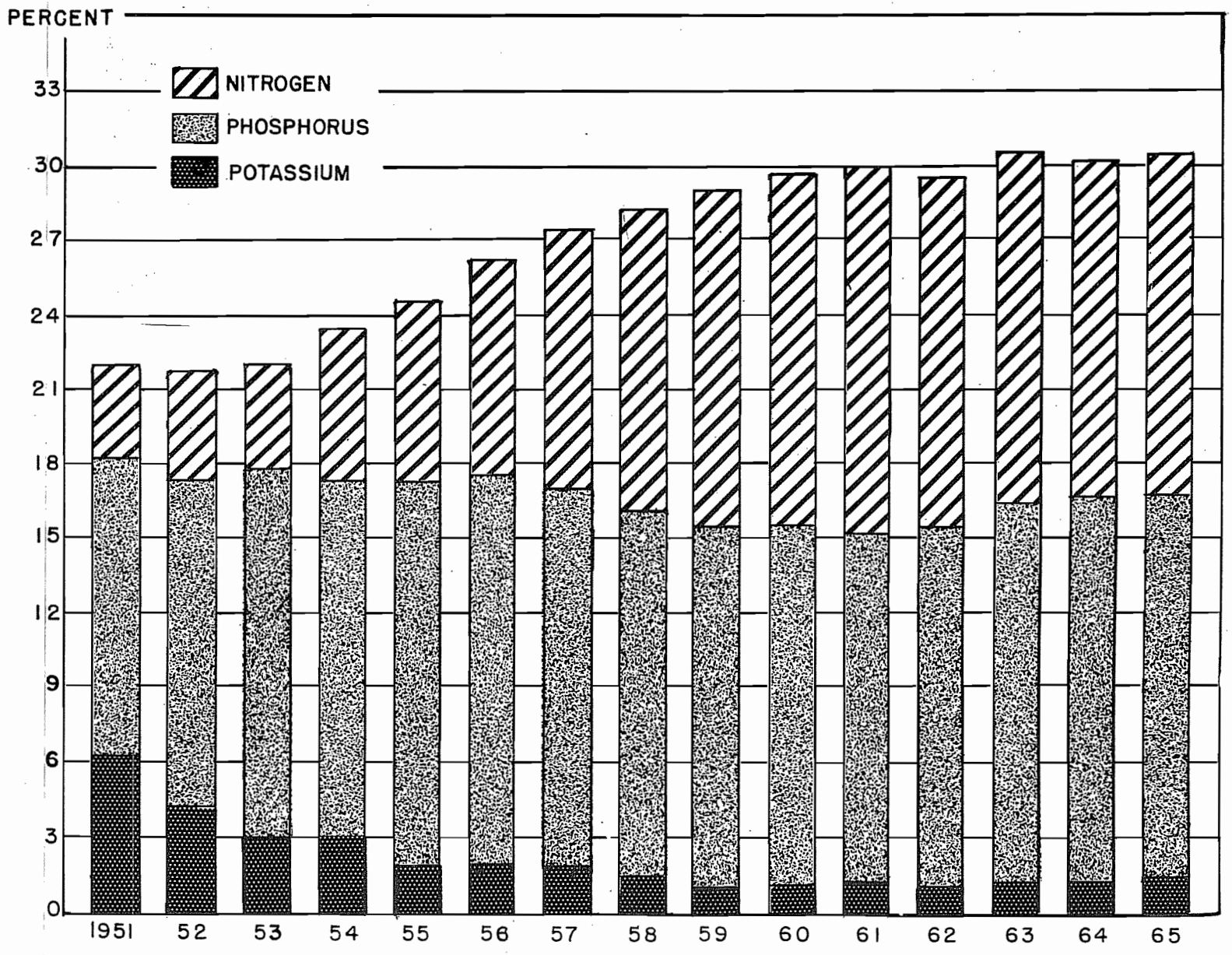


Figure 3. Amount of Elemental Nitrogen, Phosphorus, and Potassium in Per Cent of Total Fertilizer Consumption in North Dakota, 1951 to 1965

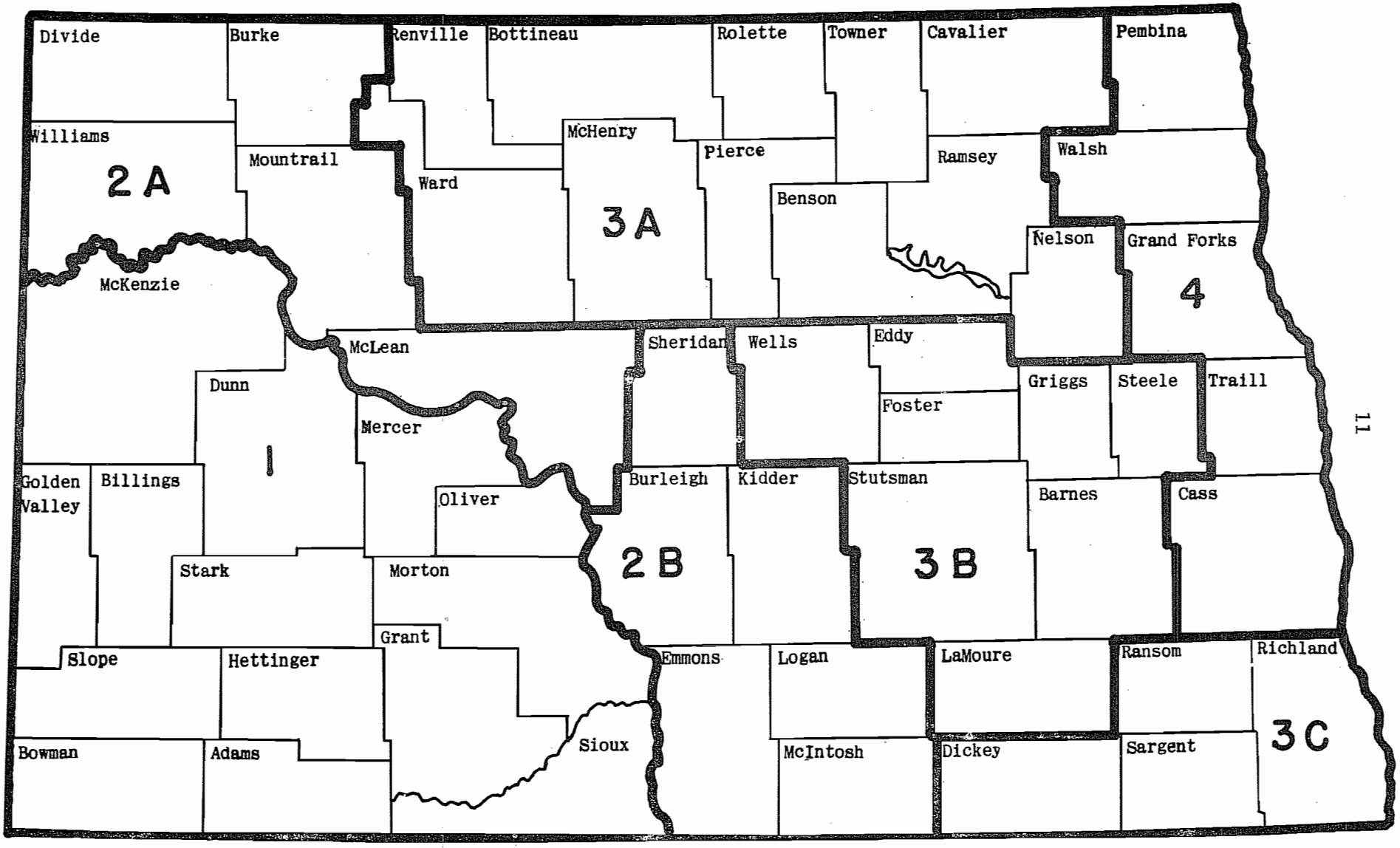
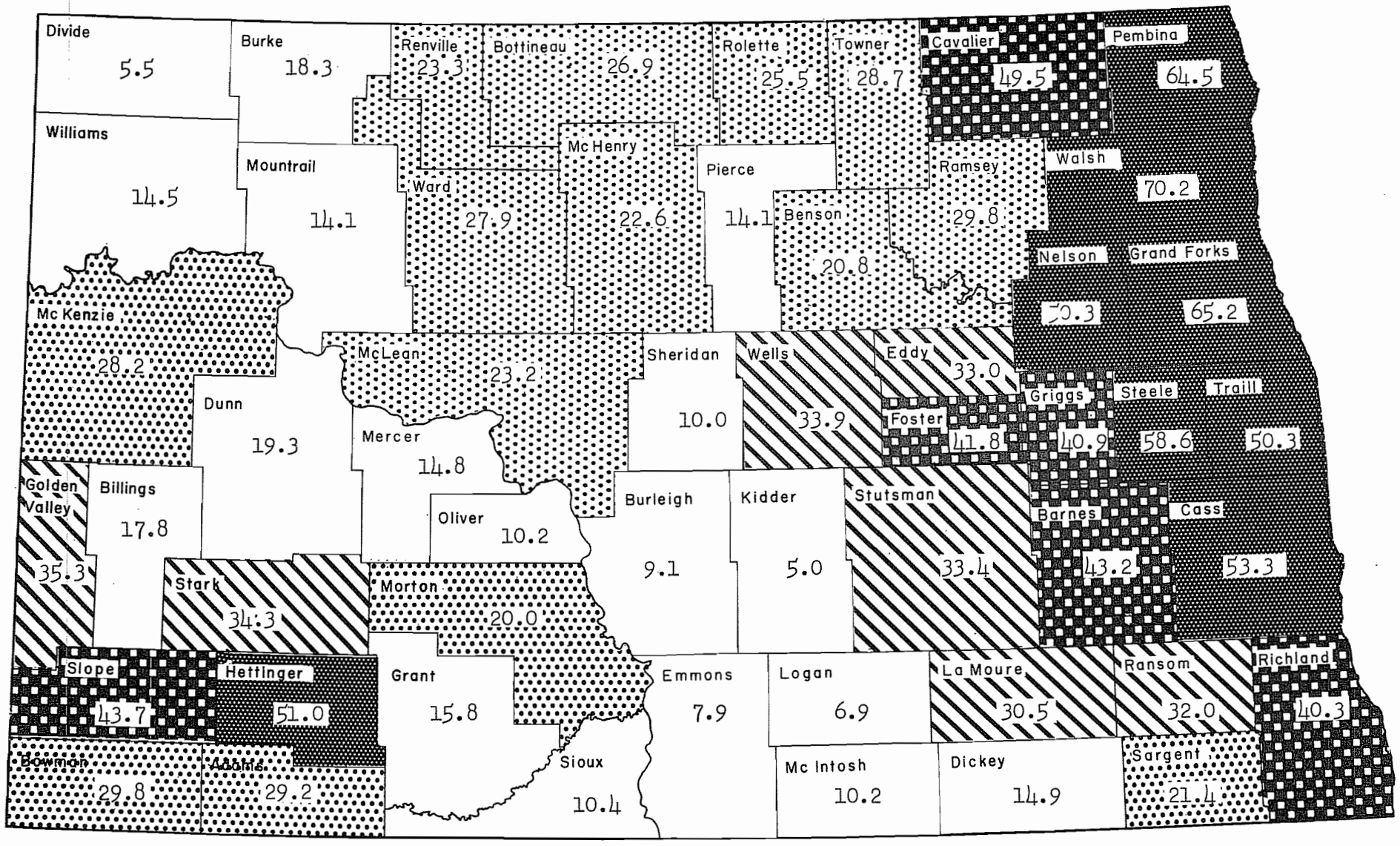


Figure 4. Economic Areas, North Dakota



Source: U. S. Census of Agriculture, 1964

Figure 5. Total Fertilized Acreage As A Per Cent of Harvested Acreage of All Crops, 1964

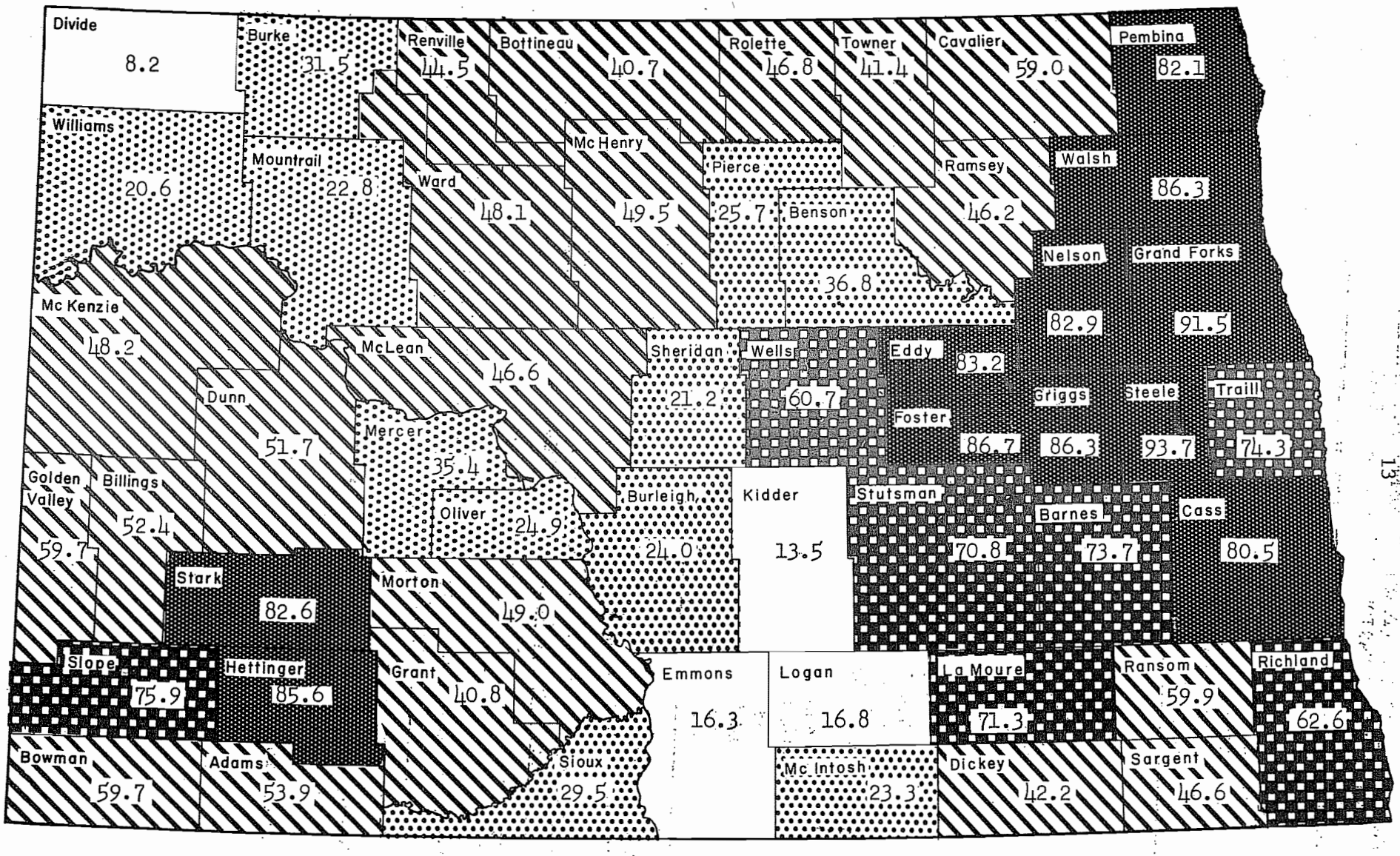


Figure 6. Percentage of Harvested Wheat Acreage Fertilized in 1964

TABLE 1. ANNUAL CONSUMPTION (TONS) OF COMMERCIAL FERTILIZER IN NORTH DAKOTA, 1951 TO 1966, AS INDICATED BY VARIOUS STATISTICAL SERIES

Year	Total consumption, by 12-month periods, ending June 30		Farm consumption during calendar year, as estimated by U. S. Census of Agriculture[c]
	As compiled by N. D. State Laboratories Dept.[a]	As estimated by U. S. Dept. of Agriculture[b]	
		tons	
1951	17,017	14,205	---
1952	30,642	31,148	---
1953	38,380	40,495	---
1954	47,271	47,677	54,248
1955	62,644	63,010	---
1956	69,010	69,168	---
1957	92,621	81,745	---
1958	105,426	106,742	---
1959	130,425	131,834	156,978
1960	142,733	143,977	---
1961	160,974	160,816	---
1962	166,795	168,052	---
1963	158,412	158,851	---
1964	183,657	183,630	179,222
1965	197,515	199,097	---
1966	230,955	210,945[d]	---

[a]Compiled from semi-annual reports of the North Dakota State Laboratories Department, Bismarck, North Dakota.

[b]United States Department of Agriculture, Statistical Reporting Service, Consumption of Commercial Fertilizers and Primary Plant Nutrients in the United States, 1850-1964, and by States, 1945-1964, Statistical Bulletin No. 375, Washington, D. C., June, 1966, p. 18.

United States Department of Agriculture, Statistical Reporting Service, Consumption of Commercial Fertilizers and Primary Plant Nutrients in the United States, Year Ended June 30, 1965, SpCr 7(6-66), Washington, D. C., June, 1966, p. 7.

[c]Compiled from 1959 and 1964 United States Census of Agriculture for North Dakota.

[d]Preliminary.

TABLE 2. TONNAGE OF PRIMARY PLANT NUTRIENTS IN COMMERCIAL FERTILIZERS CONSUMED IN NORTH DAKOTA, 1951 TO 1965, WITH PHOSPHORUS AND POTASSIUM EXPRESSED BOTH AS OXIDES AND ELEMENTS

Year ending June 30	Total amount of fertilizer mixtures and materials	N	Phosphorus and Potassium as oxides		Total N, P_2O_5, and K_2O	Phosphorus and Potassium as elements		Total N, P, and K
			P_2O_5	K_2O		P[a]	K[b]	
	tons	tons				tons		
1951	14,205	573	3,898	1,038	5,509	1,701	862	3,136
1952	31,148	1,356	9,515	1,560	12,431	4,153	1,295	6,804
1953	40,495	1,614	14,088	1,437	17,139	6,148	1,193	8,955
1954	47,677	2,924	16,541	1,275	20,740	7,219	1,058	11,201
1955	63,010	4,598	22,329	1,359	28,286	9,745	1,128	15,471
1956	69,168	6,101	24,935	1,446	32,482	10,882	1,200	18,183
1957	81,745	8,458	28,858	1,626	38,942	12,594	1,350	22,402
1958	106,742	12,923	36,483	1,674	51,080	15,922	1,390	30,235
1959	131,843	18,033	43,697	1,519	63,249	19,070	1,261	38,364
1960	143,977	20,456	48,192	1,588	70,236	21,032	1,318	42,806
1961	160,816	23,884	52,226	1,869	77,979	22,792	1,552	48,228
1962	168,052	23,921	56,038	1,539	81,498	24,456	1,278	49,655
1963	158,851	22,459	56,176	1,982	80,617	24,516	1,645	48,620
1964	183,630	24,871	66,059	2,373	93,303	28,829	1,970	55,670
1965	199,097	27,206	70,342	3,294	100,842	30,699	2,735	60,640

[a] P_2O_5 times 0.43642 = P.

[b] K_2O times 0.83016 = K.

Source: United States Department of Agriculture, Statistical Reporting Service, Consumption of Commercial Fertilizers and Primary Plant Nutrients in the United States, 1850-1964, and by States, 1945-1964, Statistical Bulletin No. 375, Washington, D. C., June, 1966, p. 18.

United States Department of Agriculture, Statistical Reporting Service, Consumption of Commercial Fertilizers and Primary Plant Nutrients in the United States, Year Ended June 30, 1965, SpCr 7 (6-66), Washington, D. C., June, 1966, p. 18.

TABLE 3. AMOUNT OF PRIMARY PLANT NUTRIENTS IN PERCENT OF TOTAL FERTILIZER CONSUMPTION IN NORTH DAKOTA, 1951 TO 1965, WITH PHOSPHORUS AND POTASSIUM EXPRESSED BOTH AS OXIDES AND ELEMENTS

Year ending June 30	N	Phosphorus and Potassium as oxides		Total N, P_2O_5, and K_2O	Phosphorus and Potassium as elements		Total N, P, and K
		P_2O_5	K_2O		P	K	
	percent				percent		
1951	4.0	27.4	7.3	38.7	12.0	6.1	22.1
1952	4.4	30.5	5.0	39.9	13.3	4.1	21.8
1953	4.0	34.8	3.5	42.3	15.2	2.9	22.1
1954	6.1	34.7	2.7	43.5	15.2	2.2	23.5
1955	7.3	35.4	2.2	44.9	15.5	1.8	24.6
1956	8.8	36.0	2.1	46.9	15.7	1.8	26.3
1957	10.3	35.3	2.0	47.6	15.4	1.7	27.4
1958	12.1	34.2	1.6	47.9	14.9	1.3	28.3
1959	13.7	33.1	1.2	48.0	14.5	0.9	29.1
1960	14.2	33.5	1.1	48.8	14.6	0.9	29.7
1961	14.8	32.5	1.2	48.5	14.2	1.0	30.0
1962	14.2	33.4	0.9	48.5	14.6	0.8	29.6
1963	14.1	35.4	1.2	50.7	15.5	1.0	30.6
1964	13.5	36.0	1.3	50.8	15.7	1.1	30.3
1965	13.7	35.3	1.7	50.7	15.4	1.4	30.5

Source: Compiled from data in Table 2.

TABLE 4. ESTIMATED FERTILIZED ACREAGE OF SPECIFIED CROPS AND PASTURE BY CENSUS ECONOMIC AREAS OF NORTH DAKOTA, 1964

Specified crop or pasture	Census economic areas							State total
	1	2A	2B	3A	3B	3C	4	
	1,000 acres							
Corn, all purposes	15.7	3.9	8.7	13.5	42.5	110.7	58.4	253.4
Potatoes	0.9	0.1	0.0	2.4	0.2	0.3	94.6	98.5
Sugar beets	5.4	2.3	c	0.0	0.1	1.7	42.9	52.4
Wheat and durum	724.5	243.2	108.8	798.0	632.4	140.2	627.3	3,274.4
Barley	57.0	24.7	12.2	259.9	283.5	69.8	442.6	1,149.7
Oats	32.5	4.8	8.7	52.3	94.8	67.8	170.6	431.5
Rye	1.1	0.3	0.9	43.6	20.7	3.3	7.8	77.7
Flax	0.5	1.4	7.9	13.3	7.5	3.4	27.5	61.5
Soybeans	0.0	0.0	0.0	0.0	0.0	12.0	4.6	16.6
Tame hay and cropland pasture[a]	7.7	1.5	2.3	3.4	13.5	15.3	9.5	53.2
Other crops[b]	6.1	2.0	0.1	3.4	9.6	4.4	33.8	59.4
Improved permanent open pasture	2.0	0.6	0.8	0.9	2.3	2.2	2.1	10.9
Total crops and improved permanent pasture	853.4	284.8	150.4	1,190.7	1,107.1	431.1	1,521.7	5,539.2

[a]Summations of separate estimates made for alfalfa and alfalfa-grass mixtures, clover and clover-grass mixtures, grain hay, other tame hay (mostly grasses), and cropland pasture.

[b]Summations of separate estimates made for sorghums (all purposes), vegetables, safflower seed, sunflower seed, tame mustard seed, proso millet, dry field beans, and grass-legume silage. Does not include wild hay.

[c]Less than 50 acres.

Source: Estimates based on data from 1964 United States Census of Agriculture for North Dakota.

TABLE 5. FERTILIZED ACREAGE IN PERCENT OF HARVESTED ACREAGE OF SPECIFIED CROPS AND PASTURE BY CENSUS ECONOMIC AREAS OF NORTH DAKOTA, 1964

Specified crop or pasture	Census economic areas							State average
	1	2A	2B	3A	3B	3C	4	
	percent							
Corn, all purposes	5.5	12.5	5.9	19.3	27.7	53.8	65.8	25.9
Potatoes	104.9[c]	41.5	33.0	75.8	22.2	88.5	104.3[c]	102.4[c]
Sugar beets	101.5[c]	103.6[c]	100.0	0.0	100.0	102.8[c]	103.0[c]	102.9[c]
Wheat and durum	57.5	27.5	19.3	46.9	74.5	53.9	83.7	52.2
Barley	29.3	10.5	10.0	30.1	70.4	69.3	79.2	46.4
Oats	10.1	3.6	3.3	15.5	27.5	23.7	58.0	21.8
Rye	3.4	0.4	2.0	25.1	23.5	7.9	38.1	15.9
Flax	1.5	1.5	2.9	4.2	1.5	3.1	10.7	3.9
Soybeans	0.0	0.0	0.0	0.0	0.0	10.9	5.8	8.8
Tame hay and cropland pasture[a]	1.0	0.8	0.7	0.8	3.1	6.6	4.9	2.1
Other crops[b]	25.0	15.8	1.3	12.7	37.7	5.8	38.1	22.4
Improved permanent open pasture	1.3	1.8	1.8	1.9	4.8	6.8	14.2	2.9
Total crops and improved permanent pasture	26.6	16.4	8.2	29.6	38.4	29.2	60.2	31.3

[a]Summations of separate estimates made for alfalfa and alfalfa-grass mixtures, clover and clover-grass mixtures, grain hay, other tame hay (mostly grasses), and cropland pasture.

[b]Summations of separate estimates made for sorghums (all purposes), vegetables, safflower seed, sunflower seed, tame mustard seed, proso millet, dry field beans, and grass-legume silage. Does not include wild hay.

[c]Fertilized acreage exceeds harvested acreage because some of the fertilized acreage was not harvested.

Source: Estimates based on data from 1964 United States Census of Agriculture for North Dakota.

TABLE 6. TONNAGE OF FERTILIZER APPLIED TO SPECIFIED CROPS AND PASTURE BY CENSUS ECONOMIC AREAS OF NORTH DAKOTA, 1964

Specified corn or pasture	Census economic areas							State total
	1	2A	2B	3A	3B	3C	4	
	tons							
Corn, all purposes	599	160	348	464	1,786	4,939	3,048	11,344
Potatoes	118	7	5	216	18	33	11,305	11,702
Sugar beets	1,164	647	8	0	15	189	4,910	6,933
Wheat and durum	15,156	5,112	2,682	19,735	18,294	4,524	24,047	89,550
Barley	1,458	618	364	7,610	8,166	2,306	16,709	37,231
Oats	807	119	258	1,226	2,642	2,204	5,800	13,056
Rye	27	9	22	926	582	105	293	1,964
Flax	12	35	191	330	162	67	554	1,351
Soybeans	0	0	0	0	0	348	133	481
Tame hay and cropland pasture[a]	375	83	156	207	733	887	562	3,003
Other crops[b]	214	61	9	88	303	192	1,159	2,026
Improved permanent open pasture	69	26	45	27	95	107	122	491
Total crops and improved permanent pasture	19,999	6,877	4,088	30,829	32,796	15,901	68,642	179,132

[a]Summations of separate estimates made for alfalfa and alfalfa-grass mixtures, clover and clover-grass mixtures, grain hay, other tame hay (mostly grasses), and cropland pasture.

[b]Summations of separate estimates made for sorghums (all purposes), vegetables, safflower seed, sunflower seed, tame mustard seed, proso millet, dry field beans, and grass-legume silage. Does not include wild hay.

Source: Estimates based on data from 1964 United States Census of Agriculture for North Dakota.

TABLE 7. AMOUNT OF FERTILIZER APPLIED TO SPECIFIED CROPS AND PASTURE IN PERCENT OF TOTAL CONSUMPTION BY CENSUS ECONOMIC AREAS OF NORTH DAKOTA, 1964

Specified crop or pasture	Census economic areas							State average
	1	2A	2B	3A	3B	3C	4	
	percent							
Corn, all purposes	3.0	2.3	8.5	1.5	5.4	31.1	4.4	6.3
Potatoes	0.6	0.1	0.1	0.7	0.1	0.2	16.5	6.5
Sugar beets	5.8	9.4	0.2	0.0	c	1.2	7.2	3.9
Wheat and durum	75.8	74.4	65.6	64.0	55.8	28.4	35.0	50.0
Barley	7.3	9.0	8.9	24.7	24.9	14.5	24.3	20.8
Oats	4.0	1.7	6.3	4.0	8.1	13.9	8.5	7.3
Rye	0.1	0.1	0.6	3.0	1.8	0.6	0.4	1.1
Flax	0.1	0.5	4.7	1.0	0.5	0.4	0.8	0.7
Soybeans	0.0	0.0	0.0	0.0	0.0	2.2	0.2	0.3
Tame hay and cropland pasture[a]	1.9	1.2	3.8	0.7	2.2	5.6	0.8	1.7
Other crops[b]	1.1	0.9	0.2	0.3	0.9	1.2	1.7	1.1
Improved permanent open pasture	0.3	0.4	1.1	0.1	0.3	0.7	0.2	0.3
Total crops and improved permanent pasture	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

[a]Summations of separate estimates made for alfalfa and alfalfa-grass mixtures, clover and clover-grass mixtures, grain hay, other tame hay (mostly grasses), and cropland pasture.

[b]Summations of separate estimates made for sorghums (all purposes), vegetables, safflower seed, sunflower seed, tame mustard seed, proso millet, dry field beans, and grass-legume silage. Does not include wild hay.

[c]Less than 0.05 percent.

Source: Estimates based on data from 1964 United States Census of Agriculture for North Dakota.

TABLE 8. AVERAGE POUNDS OF FERTILIZER APPLIED PER FERTILIZED ACRE OF SPECIFIED CROPS AND PASTURE BY CENSUS ECONOMIC AREAS, 1964

Specified crop or pasture	Census economic areas							State average
	1	2A	2B	3A	3B	3C	4	
	pounds							
Corn, all purposes	76.3	82.8	79.7	68.8	84.1	89.3	104.5	89.5
Potatoes	260.2	237.3	277.8	178.7	176.5	258.8	239.0	237.6
Sugar beets	430.0	550.3	398.0	0.0	228.0	228.0	228.8	264.6
Wheat and durum	41.7	42.0	49.3	49.5	57.9	64.5	76.7	54.7
Barley	51.1	50.0	59.5	58.6	57.6	66.0	73.9	64.8
Oats	49.6	50.0	59.5	46.9	55.7	65.0	66.4	60.5
Rye	47.6	50.0	50.0	42.5	56.3	64.0	75.6	50.6
Flax	45.9	50.0	48.0	50.0	43.1	40.0	38.7	43.9
Soybeans	0.0	0.0	0.0	0.0	0.0	58.0	58.1	58.0
Tame hay and cropland pasture[a]	97.6	113.5	136.4	121.6	108.4	115.8	118.8	112.9
Other crops[b]	69.7	60.2	135.3	52.1	63.4	86.8	68.7	68.2
Improved permanent open pasture	68.2	84.6	119.0	58.9	82.5	98.8	117.0	90.1
Total crops and improved permanent pasture	46.9	48.3	54.3	51.8	59.2	73.8	90.2	64.7

[a]Summations of separate estimates made for alfalfa and alfalfa-grass mixtures, clover and clover-grass mixtures, grain hay, other tame hay (mostly grasses), and cropland pasture.

[b]Summations of separate estimates made for sorghums (all purposes), vegetables, safflower seed, sunflower seed, tame mustard seed, proso millet, dry field beans, and grass-legume silage. Does not include wild hay.

Source: Estimates based on data from 1964 United States Census of Agriculture for North Dakota.

TABLE 9. AVERAGE POUNDS OF NITROGEN APPLIED PER FERTILIZED ACRE OF SPECIFIED CROPS AND PASTURE BY CENSUS ECONOMIC AREAS OF NORTH DAKOTA, 1964

Specified crop or pasture	Census economic areas							State average
	1	2A	2B	3A	3B	3C	4	
	pounds							
Corn, all purposes	13.7	10.8	14.3	15.8	14.3	14.3	21.9	16.0
Potatoes	49.4	49.8	44.4	28.6	28.2	41.4	38.2	38.1
Sugar beets	94.6	99.0	91.5	0.0	5.8	5.8	6.9	20.1
Wheat and durum	3.3	0.4	7.9	3.6	7.4	12.0	13.8	6.5
Barley	6.6	2.0	8.3	5.9	8.1	9.2	13.3	9.5
Oats	5.0	7.5	10.7	7.5	10.0	9.2	13.3	10.5
Rye	3.2	5.5	8.0	2.1	12.4	1.2	8.3	5.5
Flax	5.0	0.0	7.7	15.0	11.2	6.0	4.3	7.9
Soybeans	0.0	0.0	0.0	0.0	0.0	1.2	10.0	3.6
Tame hay and cropland pasture[a]	7.6	20.7	13.7	33.7	9.1	3.8	20.0	11.4
Other crops[b]	6.3	2.7	24.1	15.0	3.9	17.9	12.2	10.6
Improved permanent open pasture	22.5	34.7	65.5	19.4	27.2	32.6	38.6	32.0
Total crops and improved permanent pasture	4.5	1.8	8.9	4.7	8.2	11.1	15.1	8.7

[a]Summations of separate estimates made for alfalfa and alfalfa-grass mixtures, clover and clover-grass mixtures, grain hay, other tame hay (mostly grasses), and cropland pasture.

[b]Summations of separate estimates made for sorghums (all purposes), vegetables, safflower seed, sunflower seed, tame mustard seed, proso millet, dry field beans, and grass-legume silage. Does not include wild hay.

Source: Estimates based on data from 1964 United States Census of Agriculture for North Dakota.

TABLE 10. AVERAGE POUNDS OF PHOSPHORUS, EXPRESSED AS OXIDE (P_2O_5), APPLIED PER FERTILIZED ACRE ON SPECIFIED CROPS AND PASTURE BY CENSUS ECONOMIC AREAS OF NORTH DAKOTA, 1964

Specified crop or pasture	Census economic areas							State average
	1	2A	2B	3A	3B	3C	4	
	pounds							
Corn, all purposes	17.5	32.3	28.7	23.0	26.9	25.0	26.1	25.2
Potatoes	49.4	49.8	44.4	28.6	28.2	41.4	38.2	38.1
Sugar beets	111.8	99.0	115.4	0.0	98.1	98.1	98.4	99.8
Wheat and durum	18.8	19.7	18.7	22.3	23.0	22.6	27.1	22.3
Barley	18.5	17.6	22.0	22.9	20.7	23.4	24.5	22.7
Oats	18.0	17.0	17.0	18.7	22.0	22.8	22.7	21.5
Rye	18.8	18.1	17.0	20.0	14.1	22.4	26.3	19.1
Flax	22.0	22.5	9.6	20.0	15.0	18.0	18.6	17.4
Soybeans	0.0	0.0	0.0	0.0	0.0	19.1	25.0	20.8
Tame hay and cropland pasture[a]	35.6	14.4	52.9	33.1	40.9	48.3	27.7	39.2
Other crops[b]	23.9	22.9	34.6	19.3	24.9	20.2	24.6	23.9
Improved permanent open pasture	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total crops and improved permanent pasture	19.5	20.3	19.6	22.2	22.5	24.4	28.3	23.5

[a]Summations of separate estimates made for alfalfa and alfalfa-grass mixtures, clover and clover-grass mixtures, grain hay, other tame hay (mostly grasses), and cropland pasture.

[b]Summations of separate estimates made for sorghums (all purposes), vegetables, safflower seed, sunflower seed, tame mustard seed, proso millet, dry field beans, and grass-legume silage. Does not include wild hay.

Source: Estimates based on data from 1964 United States Census of Agriculture for North Dakota.

TABLE 11. AVERAGE POUNDS OF PHOSPHORUS, EXPRESSED AS ELEMENT (P), APPLIED PER FERTILIZED ACRE ON SPECIFIED CROPS AND PASTURE BY CENSUS ECONOMIC AREAS OF NORTH DAKOTA, 1964

Specified crop or pasture	Census economic areas							State average
	1	2A	2B	3A	3B	3C	4	
	pounds							
Corn, all purposes	7.6	14.1	12.5	10.0	11.7	10.9	11.4	11.0
Potatoes	21.6	21.7	19.4	12.5	12.3	18.1	16.7	16.6
Sugar beets	48.8	43.2	50.4	0.0	42.8	42.8	42.9	43.6
Wheat and durum	8.2	8.6	8.2	9.7	10.0	9.9	11.8	9.7
Barley	8.1	7.7	9.6	10.0	9.0	10.2	10.7	9.9
Oats	7.9	7.4	7.4	8.2	9.6	10.0	9.9	9.4
Rye	8.2	7.9	7.4	8.7	6.2	9.8	11.5	8.3
Flax	9.6	9.8	4.2	8.7	6.5	7.9	8.1	7.6
Soybeans	0.0	0.0	0.0	0.0	0.0	8.3	10.9	9.1
Tame hay and cropland pasture[a]	15.5	6.3	23.1	14.4	17.8	21.1	12.1	17.1
Other crops[b]	10.4	10.0	15.1	8.4	10.9	8.8	10.7	10.4
Improved permanent open pasture	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

[a]Summations of separate estimates made for alfalfa and alfalfa-grass mixtures, clover and clover-grass mixtures, grain hay, other tame hay (mostly grasses), and cropland pasture.

[b]Summations of separate estimates made for sorghums (all purposes), vegetables, safflower seed, sunflower seed, tame mustard seed, proso millet, dry field beans, and grass-legume silage. Does not include wild hay.

Source: Figures in Table 10 times .43642.

TABLE 12. AVERAGE POUNDS OF POTASSIUM, EXPRESSED AS OXIDE (K_2O), APPLIED PER FERTILIZED ACRE ON SPECIFIED CROPS AND PASTURE BY CENSUS ECONOMIC AREAS OF NORTH DAKOTA, 1964

Specified crop or pasture	Census economic areas							State average
	1	2A	2B	3A	3B	3C	4	
	pounds							
Corn, all purposes	0.0	0.0	0.0	0.0	0.0	3.6	3.1	2.3
Potatoes	20.8	14.2	22.2	14.3	14.1	20.7	19.1	19.0
Sugar beets	0.0	0.0	0.0	0.0	1.5	1.5	1.6	1.4
Wheat and durum	0.0	0.0	0.0	0.1	0.1	0.3	0.7	0.2
Barley	0.0	0.0	0.0	0.1	0.2	0.9	2.2	1.0
Oats	0.0	0.0	0.0	0.2	0.1	0.3	1.3	0.6
Rye	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flax	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Soybeans	0.0	0.0	0.0	0.0	0.0	6.4	0.0	4.6
Tame hay and cropland pasture[a]	0.0	0.0	0.0	0.0	0.0	0.0	0.1	c
Other crops[b]	0.1	0.3	4.5	0.0	0.1	1.0	0.1	0.1
Improved permanent open pasture	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total crops and improved permanent pasture	2.3	0.5	0.9	0.1	0.1	1.4	2.4	0.8

[a]Summations of separate estimates made for alfalfa and alfalfa-grass mixtures, clover and clover-grass mixtures, grain hay, other tame hay (mostly grasses), and cropland pasture.

[b]Summations of separate estimates made for sorghums (all purposes), vegetables, safflower seed, sunflower seed, tame mustard seed, proso millet, dry field beans, and grass-legume silage. Does not include wild hay.

[c]Less than .05 pounds per acre.

Source: Estimates based on data from 1964 United States Census of Agriculture for North Dakota.

TABLE 13. AVERAGE POUNDS OF POTASSIUM, EXPRESSED AS ELEMENT (K), APPLIED PER FERTILIZED ACRE ON SPECIFIED CROPS AND PASTURE BY CENSUS ECONOMIC AREAS OF NORTH DAKOTA, 1964

Specified crop or pasture	Census economic areas							State average
	1	2A	2B	3A	3B	3C	4	
	pounds							
Corn, all purposes	0.0	0.0	0.0	0.0	0.0	3.0	2.6	1.9
Potatoes	17.3	11.8	18.4	11.9	11.7	17.2	15.9	15.8
Sugar beets	0.0	0.0	0.0	0.0	1.2	1.2	1.3	1.2
Wheat and durum	0.0	0.0	0.0	0.1	0.1	0.2	0.6	0.2
Barley	0.0	0.0	0.0	0.1	0.2	0.7	1.8	0.8
Oats	0.0	0.0	0.0	0.2	0.1	0.2	1.1	0.5
Rye	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flax	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Soybeans	0.0	0.0	0.0	0.0	0.0	5.3	0.0	3.8
Tame hay and cropland pasture[a]	0.0	0.0	0.0	0.0	0.0	0.0	0.1	[c]
Other crops[b]	0.1	0.2	3.7	0.0	0.1	0.8	0.1	0.1
Improved permanent open pasture	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

[a]Summations of separate estimates made for alfalfa and alfalfa-grass mixtures, clover, and clover-grass mixtures, grain hay, other tame hay (mostly grasses), and cropland pasture.

[b]Summations of separate estimates made for sorghums (all purposes), vegetables, safflower seed, sunflower seed, tame mustard seed, proso millet, dry field beans, and grass-legume silage. Does not include wild hay.

[c]Less than .05 pounds per acre.

Source: Figures in Table 12 times .83016.

TABLE 14. ESTIMATED FERTILIZED ACREAGE OF SPECIFIED CROPS AND PASTURE BY AGRICULTURAL SUBREGIONS OF NORTH DAKOTA, 1959 AND 1964

Specified crop or pasture	Missouri Slope subregion[a]		Till Plains subregion[b]		Red River Valley subregion[c]		State total	
	1959	1964	1959	1964	1959	1964	1959	1964
	1,000 acres							
Corn, all purposes	31.9	15.7	173.1	179.2	87.7	58.4	292.7	253.3
Potatoes	1.3	0.9	1.5	3.0	82.9	94.6	85.7	98.5
Sugar beets	3.5	5.4	1.1	4.2	33.5	42.9	38.1	52.5
Wheat and durum	549.3	724.5	1,658.4	1,922.5	553.7	627.3	2,761.4	3,274.3
Barley	80.6	57.0	936.8	650.3	599.8	442.6	1,617.2	1,149.9
Oats	12.2	32.5	214.2	228.5	77.9	170.6	304.3	431.6
Rye	0.5	1.1	3.1	68.7	0.6	7.8	4.2	77.6
Flax	0.8	0.5	28.1	33.6	29.3	27.5	58.2	61.6
Soybeans	0.0	0.0	3.1	12.0	2.5	4.6	5.6	16.6
Tame hay and cropland pasture	7.0	7.7	36.3	36.0	12.3	9.4	55.6	53.1
Other crops	0.0	6.3	0.0	19.4	4.7	33.7	4.7	59.4
Improved permanent open pasture	0.6	2.0	3.3	6.8	1.0	2.1	4.9	10.9
Total crops and improved permanent pasture	687.7	853.6	3,059.0	3,164.2	1,485.9	1,521.5	5,232.6	5,539.3

[a] Same geographic area as Census Economic Area 1.

[b] The combined area of Census Economic Areas 2A, 2B, 3A, 3B, and 3C.

[c] Same geographic area as Census Economic Area 4.

Source: Estimates based on data from 1959 and 1964 United States Census of Agriculture for North Dakota.

TABLE 15. FERTILIZED ACREAGE IN PERCENT OF HARVESTED ACREAGE, SPECIFIED CROPS AND PASTURE BY AGRICULTURAL SUBREGIONS OF NORTH DAKOTA, 1959 AND 1964

Specified crop or pasture	Missouri Slope subregion[a]		Till Plains subregion[b]		Red River Valley subregion[c]		State total	
	1959	1964	1959	1964	1959	1964	1959	1964
	percent							
Corn, all purposes	7.2	5.5	23.7	29.5	63.4	65.8	22.3	25.9
Potatoes	118.0[d]	104.9[d]	26.9	63.9	88.9	104.3[d]	85.7	102.4[d]
Sugar beets	100.0	101.5[d]	100.0	103.1[d]	100.0	103.1[d]	100.0	102.9[d]
Wheat and durum	41.0	57.5	38.2	45.1	73.6	83.7	42.9	52.2
Barley	28.0	29.3	35.0	37.7	75.4	79.2	43.0	46.4
Oats	6.5	10.1	18.3	16.8	32.2	58.0	19.0	21.8
Rye	2.0	3.4	2.0	15.8	5.0	38.1	2.2	15.9
Flax	2.0	1.5	2.0	2.6	10.0	10.7	3.3	3.9
Soybeans	0.0	0.0	2.5	10.9	3.0	5.8	2.7	8.8
Tame hay and cropland pasture	0.8	1.0	2.3	2.2	5.7	4.9	2.1	2.1
Other crops	0.0	25.2	0.0	14.0	17.3	43.5	3.3	24.6
Improved permanent open pasture	1.3	1.3	4.8	3.3	20.4	14.2	4.0	2.9
Total crops and improved permanent pasture	21.1	27.8	24.7	26.9	55.3	61.7	28.6	32.0

[a]Same geographic area as State Economic Area 1.

[b]Combined area of State Economic Area 2A, 2B, 3A, 3B, and 3C.

[c]Same geographic area as State Economic Area 4.

[d]Fertilized acreage exceeds harvested acreage because some of the fertilized acreage was not harvested.

Source: Estimates based on data from 1959 and 1964 United States Census of Agriculture for North Dakota

TABLE 16. ESTIMATED TONS OF COMMERCIAL FERTILIZER APPLIED TO SPECIFIED CROPS BY AGRICULTURAL SUBREGIONS OF NORTH DAKOTA, 1959 AND 1964

Specified crop or pasture	Missouri Slope subregion		Till Plains subregion		Red River Valley subregion		State total	
	1959	1964	1959	1964	1959	1964	1959	1964
	tons							
Corn, all purposes	824	599	5,942	7,697	3,715	3,048	10,481	11,344
Potatoes	117	118	126	279	9,283	11,305	9,526	11,702
Sugar beets	655	1,164	174	859	2,892	4,910	3,721	6,933
Wheat and durum	12,207	15,156	42,567	50,347	19,398	24,047	74,172	89,550
Barley	1,974	1,458	25,083	19,064	19,848	16,709	46,905	37,231
Oats	277	807	4,864	6,449	2,337	5,800	7,478	13,056
Rye	13	27	78	1,644	17	293	108	1,964
Flax	21	12	562	785	879	554	1,462	1,351
Soybeans	0	0	109	348	74	133	183	481
Tame hay and cropland pasture	289	375	1,608	2,066	634	562	2,531	3,003
Other crops	0	214	0	653	117	1,159	117	2,026
Improved permanent open pasture	70	69	152	300	72	122	294	491
Total crops and improved permanent pasture	16,447	19,999	81,265	90,491	59,266	68,642	156,978	179,132[a]

[a]This figure differs from the total given in the Census because of adjustment in the tonnage of fertilizer used for potatoes.

Source: Estimates based on data from 1959 and 1964 United States Census of Agriculture for North Dakota.

TABLE 17. ESTIMATED TONNAGE OF NITROGEN APPLIED TO SPECIFIED CROPS BY AGRICULTURAL SUBREGIONS OF NORTH DAKOTA, 1959 AND 1964

Specified crop or pasture	Missouri Slope subregion		Till Plains subregion		Red River Valley subregion		State total	
	1959	1964	1959	1964	1959	1964	1959	1964
	tons							
Corn, all purposes	136	108	1,032	1,285	522	639	1,690	2,032
Potatoes	21	22	21	45	1,663	1,807	1,705	1,874
Sugar beets	84	256	32	123	86	148	202	527
Wheat and durum	1,029	1,196	4,641	5,103	2,480	4,328	8,150	10,627
Barley	198	188	4,208	2,312	3,796	2,943	8,202	5,443
Oats	36	81	654	1,047	273	1,134	963	2,262
Rye	1	2	9	180	2	32	12	214
Flax	2	1	62	183	140	59	204	243
Soybeans	0	0	12	7	8	23	20	30
Tame hay and cropland pasture	12	29	151	179	39	95	202	303
Other crops	0	20	0	88	19	207	19	315
Improved permanent open pasture	23	23	50	111	24	40	97	174
Total crops and improved permanent pasture	1,542	1,926	10,872	10,663	9,052	11,455	21,466	24,044

Source: Estimates based on data from 1959 and 1964 United States Census of Agriculture for North Dakota.

TABLE 18. ESTIMATED TONNAGE OF PHOSPHORUS, EXPRESSED BOTH AS OXIDE AND ELEMENT, APPLIED TO SPECIFIED CROPS BY AGRICULTURAL SUBREGIONS OF NORTH DAKOTA, 1959 AND 1964

Specified crop or pasture	Missouri Slope subregion		Till Plains subregion		Red River Valley subregion		State total	
	1959	1964	1959	1964	1959	1964	1959	1964
	tons							
Expressed As Oxide:								
Corn, all purposes	237	138	1,944	2,296	1,035	762	3,216	3,196
Potatoes	42	22	27	47	1,754	1,807	1,823	1,876
Sugar beets	143	303	49	206	1,181	2,112	1,373	2,621
Wheat and durum	5,371	6,811	16,902	21,167	7,309	8,485	29,582	36,463
Barley	802	528	7,159	7,079	4,244	5,422	12,205	13,029
Oats	108	293	1,707	2,419	467	1,932	2,282	4,644
Rye	5	11	37	628	6	102	48	741
Flax	10	6	270	273	176	256	456	535
Soybeans	0	0	53	115	35	57	88	172
Tame hay and cropland pasture	123	137	533	774	231	131	887	1,042
Other crops	0	73	0	222	56	415	56	710
Improved permanent open pasture	0	0	0	0	0	0	0	0
Total crops and improved permanent pasture	6,841	8,322	28,681	35,226	16,494	21,481	52,016	65,029
Expressed As Element:								
Corn, all purposes	104	60	848	1,002	452	333	1,404	1,395
Potatoes	19	10	12	20	765	789	796	819
Sugar beets	62	132	22	90	515	922	599	1,144
Wheat and durum	2,344	2,972	7,376	9,238	3,190	3,703	12,910	15,913
Barley	350	231	3,125	3,089	1,852	2,366	5,327	5,686
Oats	47	128	745	1,056	204	843	996	2,027
Rye	2	5	16	274	3	44	21	323
Flax	4	2	118	119	77	112	199	233
Soybeans	0	0	23	50	15	25	38	75
Tame hay and cropland pasture	54	60	232	338	101	57	387	455
Other crops	0	32	0	97	24	181	24	310
Improved permanent open pasture	0	0	0	0	0	0	0	0
Total crops and improved permanent pasture	2,986	3,632	12,517	15,373	7,198	9,375	22,701	28,380

Source: Estimates based on data from 1959 and 1964 United States Census of Agriculture for North Dakota.

TABLE 19. ESTIMATED TONNAGE OF POTASSIUM EXPRESSED BOTH AS OXIDE AND ELEMENT, APPLIED TO SPECIFIED CROPS BY AGRICULTURAL SUBREGIONS OF NORTH DAKOTA, 1959 AND 1964

Specified crop or pasture	Missouri Slope subregion		Till Plains subregion		Red River Valley subregion		State total	
	1959	1964	1959	1964	1959	1964	1959	1964
	tons							
Expressed As Oxide:								
Corn, all purposes	0	0	9	195	9	91	18	286
Potatoes	0	9	9	22	738	904	747	935
Sugar beets	0	0	1	1	32	35	33	36
Wheat and durum	0	0	24	92	277	212	301	304
Barley	0	0	90	82	619	487	709	569
Oats	0	0	0	16	0	111	0	127
Rye	0	0	0	0	0	0	0	0
Flax	0	0	0	0	0	0	0	0
Soybeans	0	0	0	38	0	0	0	38
Tame hay and cropland pasture	0	0	0	0	0	1	0	1
Other crops	0	a	0	1	0	2	0	3
Improved permanent open pasture	0	0	0	0	0	0	0	0
Total crops and improved permanent pasture	0	9	133	447	1,675	1,843	1,808	2,299
Expressed As Element:								
Corn, all purposes	0	0	7	162	8	76	15	238
Potatoes	0	8	7	18	613	750	620	776
Sugar beets	0	0	1	1	26	29	27	30
Wheat and durum	0	0	20	76	230	176	250	252
Barley	0	0	75	68	514	404	589	472
Oats	0	0	0	13	0	92	0	105
Rye	0	0	0	0	0	0	0	0
Flax	0	0	0	0	0	0	0	0
Soybeans	0	0	0	32	0	0	0	32
Tame hay and cropland pasture	0	0	0	0	0	1	0	1
Other crops	0	a	0	1	0	2	0	3
Improved permanent open pasture	0	0	0	0	0	0	0	0
Total crops and improved permanent pasture	0	8	110	371	1,391	1,530	1,501	1,909

[a]Less than one-half ton.

Source: Estimates based on data from 1959 and 1964 United States Census of Agriculture for North Dakota.

TABLE 20. AVERAGE POUNDS OF FERTILIZER APPLIED PER FERTILIZED ACRE OF SPECIFIED CROPS AND PASTURE BY AGRICULTURAL SUBREGIONS OF NORTH DAKOTA, 1959 AND 1964

Specified crop or pasture	Missouri Slope subregion		Till Plains subregion		Red River Valley subregion		State total	
	1959	1964	1959	1964	1959	1964	1959	1964
	pounds							
Corn, all purposes	51.7	76.3	68.6	85.9	84.7	104.5	71.6	89.5
Potatoes	183.8	260.2	166.8	186.0	223.8	239.0	222.2	237.6
Sugar beets	380.0	430.0	305.5	409.0	172.4	228.8	195.2	264.6
Wheat and durum	44.4	41.7	51.3	52.4	70.1	76.7	53.7	54.7
Barley	49.0	51.1	53.6	58.6	66.2	73.9	58.0	64.8
Oats	45.4	49.6	45.4	56.4	60.0	66.4	49.1	60.5
Rye	50.0	47.6	50.0	47.9	60.0	75.6	51.6	50.6
Flax	50.0	45.9	40.0	46.7	60.0	38.7	50.2	43.9
Soybeans	0.0	0.0	70.0	58.0	60.0	58.1	65.6	58.0
Tame hay and cropland pasture	82.3	97.6	88.6	114.8	103.5	118.8	91.1	112.9
Other crops	0.0	69.7	0.0	67.3	50.0	68.7	50.0	68.2
Improved permanent open pasture	231.4	68.2	92.6	88.2	148.9	117.0	121.1	90.1
Total crops and improved permanent pasture	47.8	46.9	53.1	57.2	79.8	90.2	60.0	64.7

Source: Estimates based on data from 1959 and 1964 United States Census of Agriculture for North Dakota.

TABLE 21. AVERAGE POUNDS OF NITROGEN APPLIED PER FERTILIZED ACRE OF SPECIFIED CROPS AND PASTURE BY AGRICULTURAL SUBREGIONS OF NORTH DAKOTA, 1959 AND 1964

Specified crop of pasture	Missouri Slope subregion		Till Plains subregion		Red River Valley subregion		State total	
	1959	1964	1959	1964	1959	1964	1959	1964
	pounds							
Corn, all purposes	8.5	13.7	11.9	14.3	11.9	21.9	11.5	16.0
Potatoes	33.1	49.4	28.0	30.0	40.1	38.2	39.8	38.1
Sugar beets	48.7	94.6	56.2	58.6	5.1	6.9	10.6	20.1
Wheat and durum	3.7	3.3	5.6	5.3	9.0	13.8	5.9	6.5
Barley	4.9	6.6	9.0	7.1	12.7	13.3	10.1	9.5
Oats	5.9	5.0	6.1	9.2	7.0	13.3	6.3	10.5
Rye	3.9	3.2	5.5	5.2	8.7	8.3	5.7	5.5
Flax	5.5	5.0	4.4	10.9	9.6	4.3	7.0	7.9
Soybeans	0.0	0.0	7.7	1.2	6.6	10.0	7.2	3.6
Tame hay and cropland pasture	3.4	7.6	8.3	9.9	6.5	20.0	7.3	11.4
Other crops	0.0	6.3	0.0	9.1	8.0	12.2	8.0	10.6
Improved permanent open pasture	76.4	22.5	30.6	32.6	49.1	38.6	40.0	32.0
Total crops and improved permanent pasture	4.5	4.5	7.1	6.7	12.2	15.1	8.2	8.7

Source: Estimates based on data from 1959 and 1964 United States Census of Agriculture for North Dakota.

TABLE 22. AVERAGE POUNDS OF PHOSPHORUS, EXPRESSED AS OXIDE AND ELEMENT APPLIED PER FERTILIZED ACRE OF SPECIFIED CROPS AND PASTURE BY AGRICULTURAL SUBREGIONS OF NORTH DAKOTA, 1959 AND 1964

Specified crop or pasture	Missouri Slope subregion		Till Plains subregion		Red River Valley subregion		State total	
	1959	1964	1959	1964	1959	1964	1959	1964
	pounds							
Expressed As Oxide:								
Corn, all purposes	14.9	17.5	22.5	25.6	23.6	26.1	22.0	25.2
Potatoes	66.2	49.4	36.0	31.3	42.3	38.2	42.5	38.1
Sugar beets	83.0	111.8	86.0	98.1	70.4	98.4	72.0	99.8
Wheat and durum	19.6	18.8	20.4	22.0	26.4	27.1	21.4	22.3
Barley	19.9	18.5	15.3	21.8	14.2	24.5	15.1	22.7
Oats	17.7	18.0	15.9	21.2	12.0	22.7	15.0	21.5
Rye	20.8	18.8	24.0	18.3	22.9	26.3	22.9	19.1
Flax	24.0	22.0	19.2	16.3	12.0	18.6	15.7	17.4
Soybeans	0.0	0.0	33.6	19.2	28.8	25.0	31.5	20.8
Tame hay and cropland pasture	35.0	35.6	29.4	43.0	37.7	27.7	31.9	39.2
Other crops	0.0	23.9	0.0	22.9	24.0	24.6	24.0	23.9
Improved permanent open pasture	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total crops and improved permanent pasture	19.9	19.5	18.8	22.3	22.2	28.3	19.9	23.5
Expressed As Element:								
Corn, all purposes	6.5	7.6	9.8	11.2	10.3	11.4	9.6	11.0
Potatoes	28.9	21.6	15.7	13.7	18.5	16.7	18.5	16.6
Sugar beets	36.2	48.8	37.5	42.8	30.7	42.9	31.4	43.6
Wheat and durum	8.6	8.2	8.9	9.6	11.5	11.8	9.3	9.7
Barley	8.7	8.1	6.7	9.5	6.2	10.7	6.6	9.9
Oats	7.7	7.9	6.9	9.3	5.2	9.9	6.5	9.4
Rye	9.1	8.2	10.5	8.0	10.0	11.5	10.0	8.3
Flax	10.5	9.6	8.4	7.1	5.2	8.1	6.9	7.6
Soybeans	0.0	0.0	14.7	8.4	12.6	10.9	13.7	9.1
Tame hay and cropland pasture	15.3	15.5	12.8	18.8	16.5	12.1	13.9	17.1
Other crops	0.0	10.4	0.0	10.0	10.5	10.7	10.5	10.4
Improved permanent open pasture	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total crops and improved permanent pasture	8.7	8.5	8.2	9.7	9.7	12.4	8.7	10.3

Source: Estimates based on data from 1959 and 1964 United States Census of Agriculture for North Dakota.

TABLE 23. AVERAGE POUNDS OF POTASSIUM, EXPRESSED AS OXIDE AND ELEMENT, APPLIED PER FERTILIZED ACRE OF SPECIFIED CROPS AND PASTURE BY AGRICULTURAL SUBREGIONS OF NORTH DAKOTA, 1959 AND 1964

Specified crops or pasture	Missouri Slope subregion		Till Plains subregion		Red River Valley subregion		State total	
	1959	1964	1959	1964	1959	1964	1959	1964
	pounds							
Expressed As Oxide:								
Corn, all purposes	0.0	0.0	0.1	2.2	0.2	3.1	0.1	2.3
Potatoes	0.0	20.8	11.4	14.7	17.9	19.1	17.4	19.0
Sugar beets	0.0	0.0	0.7	0.5	1.9	1.6	1.7	1.4
Wheat and durum	0.0	0.0	a	0.1	1.0	0.7	0.2	0.2
Barley	0.0	0.0	0.2	0.3	2.1	2.2	0.9	1.0
Oats	0.0	0.0	0.0	0.1	0.0	1.3	0.0	0.6
Rye	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flax	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Soybeans	0.0	0.0	0.0	6.3	0.0	0.0	0.0	4.6
Tame hay and cropland pasture	0.0	0.0	0.0	0.0	0.0	0.1	0.0	a
Other crops	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1
Improved permanent open pasture	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total crops and improved permanent pasture	0.0	2.3	0.1	0.3	2.3	2.4	0.7	0.8
Expressed As Element:								
Corn, all purposes	0.0	0.0	0.1	1.8	0.2	2.6	0.1	1.9
Potatoes	0.0	17.3	9.5	12.2	14.8	15.9	14.4	15.8
Sugar beets	0.0	0.0	0.6	0.4	1.6	1.3	1.4	1.2
Wheat and durum	0.0	0.0	a	0.1	0.8	0.6	0.2	0.2
Barley	0.0	0.0	0.2	0.2	1.7	1.8	0.7	0.8
Oats	0.0	0.0	0.0	0.1	0.0	1.0	0.0	0.5
Rye	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flax	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Soybeans	0.0	0.0	0.0	5.2	0.0	0.0	0.0	3.8
Tame hay and cropland pasture	0.0	0.0	0.0	0.0	0.0	0.1	0.0	a
Other crops	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1
Improved permanent open pasture	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total crops and improved permanent pasture	0.0	1.9	0.1	0.2	1.9	2.0	0.6	0.7

[a]Less than .05 pound per acre.

Source: Estimates based on data from 1959 and 1964 United States Census of Agriculture for North Dakota.

TABLE 24. SUMMARY OF FERTILIZER USE IN NORTH DAKOTA BY COUNTIES AND CENSUS ECONOMIC AREAS, 1959 AND 1964

Census economic area and county	Number of farms using fertilizer		Fertilized acreage		Fertilized acreage in percent of harvested acreage[a]		Total amount of fertilizer used	
	1959	1964	1959	1964	1959	1964	1959	1964
	number		acres		percent		tons	
Economic Area 1	3,580	3,960	687,695	853,638	21.1	26.6	16,447	19,995
Adams	190	234	44,549	66,078	18.7	29.2	939	1,355
Billings	65	97	7,687	13,581	10.0	17.8	184	392
Bowman	151	207	44,695	65,479	21.2	29.8	945	1,421
Dunn	271	375	44,197	60,964	14.3	19.3	1,213	1,463
Golden Valley	144	132	33,195	46,267	23.0	35.3	782	968
Grant	265	331	39,852	52,777	11.8	15.8	923	1,180
Hettinger	415	467	125,204	158,150	36.2	51.0	2,487	2,992
McKenzie	448	393	92,795	75,965	33.8	28.2	2,652	2,619
Mercer	296	209	37,954	31,030	16.7	14.8	914	763
Morton	541	509	68,236	72,332	19.4	20.0	1,982	1,941
Oliver	148	121	17,976	14,980	12.9	10.2	443	469
Sioux	22	44	3,452	11,506	3.9	10.4	89	191
Slope	129	211	36,071	65,789	21.7	43.7	834	1,517
Stark	495	630	91,832	118,740	26.7	34.3	2,060	2,724
Economic Area 2A	1,689	1,363	368,667	284,816	20.3	16.4	7,888	6,876
Burke	223	173	49,361	41,407	20.5	18.3	1,059	854
Divide	113	84	19,246	13,420	7.5	5.5	354	323
McLean	657	613	142,775	128,406	23.5	23.2	3,170	2,819
Mountrail	308	216	64,769	47,621	19.3	14.1	1,320	1,036
Williams	388	277	92,516	53,962	24.6	14.5	1,985	1,844
Economic Area 2B	1,358	901	212,823	150,493	11.6	8.2	5,513	4,093
Burleigh	384	178	65,508	31,528	20.0	9.1	1,708	958
Emmons	444	183	69,798	32,054	16.3	7.9	1,822	778
Kidder	128	83	18,724	14,139	7.4	5.0	467	315
Logan	154	113	23,204	17,671	8.7	6.9	593	446
McIntosh	107	210	11,625	32,249	3.6	10.2	394	933
Sheridan	141	134	23,964	22,852	10.1	10.0	529	663
Economic Area 3A	5,487	4,956	1,307,767	1,190,777	30.8	29.6	32,414	30,862
Benson	474	384	101,060	76,803	24.7	20.8	2,771	1,994
Bottineau	484	469	109,204	120,550	24.2	26.9	2,554	3,094
Cavalier	847	837	237,713	239,101	47.9	49.5	5,626	6,226
McHenry	597	512	106,287	97,714	23.6	22.6	2,542	2,471
Nelson	695	647	183,654	155,525	55.1	50.3	5,295	4,520
Pierce	385	216	70,344	45,156	20.5	14.1	1,604	1,100
Ramsey	442	417	119,164	111,364	27.9	29.8	3,252	2,946
Renville	258	275	60,019	57,476	23.2	23.3	1,308	1,304
Rolette	179	222	44,062	49,340	23.0	25.5	972	1,139
Towner	366	345	101,929	92,097	29.1	28.7	2,618	2,533
Ward	760	632	174,331	145,651	32.2	27.9	3,872	3,535

continued

TABLE 24. SUMMARY OF FERTILIZER USE IN NORTH DAKOTA BY COUNTIES AND CENSUS ECONOMIC AREAS, 1959 AND 1964 (continued)

Census economic area and county	Number of farms using fertilizer		Fertilized acreage		Fertilized acreage in percent of harvested acreage[a]		Total amount of fertilizer used	
	1959	1964	1959	1964	1959	1964	1959	1964
	number		acres		percent		tons	
Economic Area 3B	3,927	4,552	884,635	1,106,896	30.4	38.4	25,593	32,812
Barnes	832	858	202,212	222,930	36.9	43.2	6,022	7,167
Eddy	222	279	50,559	55,432	29.5	33.0	1,265	1,438
Foster	370	366	107,925	98,384	51.8	41.8	3,090	2,999
Griggs	349	396	65,376	93,288	30.1	40.9	1,646	2,833
LaMoure	404	621	59,985	126,679	14.5	30.5	2,164	3,755
Steele	600	578	145,087	157,368	50.7	58.6	3,872	4,436
Stutsman	666	869	144,668	212,444	22.8	33.4	4,417	6,616
Wells	484	585	108,823	140,371	25.4	33.9	3,117	3,568
Economic Area 3C	1,776	2,192	285,180	430,780	18.3	29.2	9,857	15,896
Dickey	211	333	28,681	53,636	8.0	14.9	777	1,739
Ransom	300	384	44,191	81,414	16.2	32.0	1,351	2,299
Richland	1,052	1,133	183,305	236,701	29.3	40.3	6,686	9,681
Sargent	213	342	29,003	59,029	9.7	21.4	1,043	2,177
Economic Area 4	5,962	5,603	1,485,882	1,520,584	55.3	60.2	59,266	68,688
Cass	1,390	1,480	346,936	406,852	42.4	53.3	11,114	15,402
Grand Forks	1,355	1,205	355,674	337,434	65.4	65.2	16,501	17,007
Pembina	1,035	844	294,761	257,608	67.8	64.5	12,166	12,097
Traill	808	848	152,527	186,145	38.7	50.3	5,312	7,347
Walsh	1,374	1,226	335,984	332,545	67.7	70.2	14,173	16,835
State Total	23,779	23,527	5,232,649	5,537,984	28.6	31.3	156,978	179,222

[a]Harvested acreage includes cropland harvested, cropland used only for pasture, crop failure, and improved pasture. Wild hay cut is not included.

TABLE 25. FERTILIZATION OF CORN IN NORTH DAKOTA BY COUNTIES AND CENSUS ECONOMIC AREAS, 1959 AND 1964

Census economic area and county	Fertilized acreage		Fertilized acreage in percent of harvested acreage		Total amount of fertilizer used		Average pounds of fertilizer per acre	
	1959	1964	1959	1964	1959	1964	1959	1964
	acres		percent		tons		pounds	
Economic Area 1	31,863	15,709	7.2	5.5	824	599	51.7	76.3
Adams	2,055	1,136	7.5	6.2	40	41	38.9	72.2
Billings	114	0	1.4	0.0	2	0	35.1	0.0
Bowman	920	363	3.4	2.8	28	10	60.9	55.1
Dunn	5,187	2,295	9.0	5.7	155	52	59.8	45.3
Golden Valley	610	440	2.8	3.7	23	8	75.4	36.4
Grant	2,713	1,671	5.6	5.1	57	60	42.0	71.8
Hettinger	4,734	1,023	14.0	7.6	129	40	54.5	78.2
McKenzie	5,752	2,266	33.5	18.3	156	86	54.2	75.9
Mercer	2,654	1,568	6.3	5.2	69	42	52.0	53.6
Morton	1,337	2,644	2.6	6.6	48	134	71.8	101.4
Oliver	1,491	1,178	5.9	5.9	40	99	53.7	168.1
Sioux	0	180	0.0	0.0	0	4	0.0	44.4
Slope	1,906	225	11.2	3.2	24	9	25.2	80.0
Stark	2,390	720	4.6	2.5	53	14	44.4	38.9
Economic Area 2A	9,322	3,865	17.1	12.5	209	160	44.8	82.8
Burke	180	148	14.4	15.7	6	6	66.7	81.1
Divide	75	0	3.7	0.0	3	0	80.0	0.0
McLean	7,399	2,593	19.3	11.7	135	90	36.5	69.4
Mountrail	582	140	9.6	7.0	13	6	44.7	85.7
Williams	1,086	984	15.7	19.4	52	58	95.8	117.9
Economic Area 2B	14,921	8,732	9.5	5.9	427	348	57.2	75.8
Burleigh	6,196	4,015	13.7	11.0	173	184	55.8	83.2
Emmons	4,710	2,355	9.4	5.1	130	92	55.2	78.1
Kidder	1,768	837	8.5	4.0	41	19	46.4	45.4
Logan	722	490	5.3	2.8	24	18	66.5	73.5
McIntosh	895	550	6.8	3.7	28	18	62.6	65.5
Sheridan	630	485	4.6	4.0	31	17	98.4	70.1
Economic Area 3A	19,061	13,479	18.5	19.3	558	464	58.5	68.8
Benson	1,186	1,195	9.0	12.6	39	41	65.8	68.6
Bottineau	2,488	2,214	26.7	28.1	62	60	49.8	54.2
Cavalier	150	245	26.5	47.4	6	8	80.0	65.3
McHenry	4,307	3,115	15.1	15.9	117	112	54.3	71.9
Nelson	1,489	1,789	27.4	46.0	62	74	83.3	82.7
Pierce	1,997	1,114	17.5	12.9	58	41	58.1	73.6
Ramsey	1,146	1,428	21.5	39.5	37	52	64.6	72.8
Renville	880	283	15.3	8.5	24	8	54.5	56.5
Rolette	645	35	37.9	2.4	20	2	62.0	114.3
Towner	300	90	21.7	8.9	9	3	60.0	66.7
Ward	4,473	1,971	22.2	18.7	124	63	55.4	63.9

continued

TABLE 25. FERTILIZATION OF CORN IN NORTH DAKOTA BY COUNTIES AND CENSUS ECONOMIC AREAS, 1959 AND 1964 (continued)

Census economic area and county	Fertilized acreage		Fertilized acreage in percent of harvested acreage		Total amount of fertilizer used		Average pounds of fertilizer per acre	
	1959	1964	1959	1964	1959	1964	1959	1964
	acres		percent		tons		pounds	
Economic Area 3B	36,281	42,466	20.8	27.7	1,248	1,786	68.8	84.1
Barnes	9,676	7,974	27.6	30.2	387	368	80.0	92.3
Eddy	1,892	2,137	21.7	27.1	58	71	61.3	66.4
Foster	5,339	7,707	42.6	59.1	181	353	67.8	91.6
Griggs	1,705	2,278	19.6	27.0	49	66	57.5	57.9
LaMoure	6,218	7,877	16.1	22.8	180	321	57.9	73.2
Steele	4,510	3,598	42.8	59.3	138	163	61.2	90.6
Stutsman	4,924	5,682	12.6	15.4	192	241	78.0	84.8
Wells	2,017	5,213	9.5	26.3	63	203	62.5	77.9
Economic Area 3C	93,545	110,675	38.5	53.8	3,500	4,939	74.8	89.3
Dickey	7,037	11,104	15.3	28.9	182	377	51.7	67.9
Ransom	11,862	14,996	29.8	43.1	437	494	73.7	65.9
Richland	65,185	72,458	56.8	74.1	2,510	3,525	77.0	97.3
Sargent	9,461	12,117	22.5	34.8	371	543	78.4	89.6
Economic Area 4	87,702	58,361	63.4	65.8	3,715	3,048	84.7	104.5
Cass	63,964	37,167	68.9	65.6	2,462	1,788	77.0	96.2
Grand Forks	12,047	10,475	68.1	75.2	768	722	127.5	137.9
Pembina	805	3,256	23.3	103.7*	38	181	94.4	111.2
Traill	8,945	4,995	44.5	46.0	349	244	78.0	97.7
Walsh	1,941	2,468	46.2	59.7	98	113	101.0	91.6
State Total	292,695	253,287	22.3	25.9	10,481	11,344	71.6	89.6

*May be an error in the census data.

TABLE 26. FERTILIZATION OF POTATOES IN NORTH DAKOTA BY CENSUS ECONOMIC AREAS AND COUNTIES IN THE RED RIVER VALLEY, 1959 AND 1964

Census economic area and county	Fertilized acreage		Fertilized acreage in percent of harvested acreage		Total amount of fertilizer used		Average pounds of fertilizer per acre	
	1959	1964	1959	1964	1959	1964	1959	1964
	acres		percent		tons		pounds	
Economic Area 1[a]	1,273	907	118.0[b]	104.9[b]	117	118	183.8	260.2
Economic Area 2A[a]	63	59	24.5	41.5	3	7	95.2	237.3
Economic Area 2B[a]	67	36	35.8	33.0	3	5[c]	89.6	277.8
Economic Area 3A[a]	600	2,417	16.9	75.8	56	216[c]	186.7	178.7
Economic Area 3B[a]	565	204	45.1	22.2	32	18[c]	113.3	176.5
Economic Area 3C[a]	216	255	55.5	88.5	32	33	296.3	258.8
Economic Area 4	82,954	94,594	88.9	104.3[b]	9,283	11,305[c]	223.8	239.0
Cass	795	78	93.4	32.5	42	6[c]	105.7	153.8
Grand Forks	21,604	24,202	94.7	96.9	2,597	3,202	240.4	264.6
Pembina	25,593	25,728	86.5	115.5[b]	3,001	3,119	234.5	242.5
Traill	3,525	4,186	64.6	74.6	375	425	212.8	203.1
Walsh	31,437	40,400	90.7	107.5[b]	3,268	4,553	207.9	225.4
State Total	85,738	98,472	85.7	102.4	9,526	11,702[c]	222.2	237.7

[a]Data for each county are not given because of small acreages involved.

[b]The fertilized acreage exceeds the harvested acreage. This may be due to abandonment of a part of the planted acreage prior to harvest.

[c]Adjustments were made in the tonnage data because of discrepancies in census data.

TABLE 27. FERTILIZATION OF ALL WHEAT IN NORTH DAKOTA BY COUNTIES AND CENSUS ECONOMIC AREAS, 1959 AND 1964

Census economic area and county	Fertilized acreage		Fertilized acreage in percent of harvested acreage		Total amount of fertilizer used		Average pounds of fertilizer per acre	
	1959	1964	1959	1964	1959	1964	1959	1964
	acres		percent		tons		pounds	
Economic Area 1	549,328	724,543	41.0	57.5	12,207	15,156	44.4	41.8
Adams	39,098	60,102	32.3	53.9	828	1,159	42.4	38.6
Billings	6,603	11,681	24.7	52.4	154	291	46.6	49.8
Bowman	37,901	59,663	35.3	59.7	793	1,277	41.8	42.8
Dunn	32,209	49,984	28.9	51.7	770	1,110	47.8	44.4
Golden Valley	26,410	37,998	39.6	59.7	519	713	39.3	37.5
Grant	31,012	44,172	28.1	40.8	732	868	47.2	39.3
Hettinger	101,741	134,276	55.0	85.6	1,946	2,421	38.3	36.1
McKenzie	65,891	56,771	48.8	48.2	1,414	1,243	42.9	43.8
Mercer	30,566	27,523	35.7	35.4	733	640	48.0	46.5
Morton	55,340	61,228	57.9	49.0	1,565	1,514	56.6	49.5
Oliver	13,653	11,563	33.0	24.9	337	283	49.4	48.9
Sioux	2,861	9,885	10.4	29.5	76	148	53.1	29.9
Slope	30,725	59,465	35.3	75.9	699	1,311	45.5	44.1
Stark	75,318	100,232	54.3	82.6	1,641	2,178	43.6	43.5
Economic Area 2A	279,422	243,152	30.0	27.5	5,912	5,112	42.3	42.0
Burke	38,953	36,228	32.4	31.5	828	739	42.5	40.8
Divide	15,831	11,371	10.2	8.2	289	246	36.5	43.3
McLean	99,082	110,323	40.8	46.6	2,266	2,337	45.7	42.4
Mountrail	52,864	41,584	27.5	22.8	1,060	835	40.1	40.2
Williams	72,692	43,646	32.9	20.6	1,469	955	40.4	43.8
Economic Area 2B	130,060	108,762	23.3	19.3	3,395	2,682	52.2	49.3
Burleigh	36,032	20,600	48.9	24.0	954	505	53.0	49.0
Emmons	42,392	22,046	33.1	16.3	1,111	466	52.4	42.3
Kidder	10,052	8,559	16.3	13.5	254	172	50.5	40.2
Logan	16,867	14,675	18.1	16.8	441	354	52.3	48.2
McIntosh	7,305	23,472	6.8	23.3	259	659	70.9	56.2
Sheridan	17,412	19,410	18.6	21.2	376	526	43.2	54.2
Economic Area 3A	723,604	797,970	41.6	46.9	17,672	19,735	48.8	49.5
Benson	62,525	57,904	38.0	36.8	1,649	1,461	52.7	50.5
Bottineau	68,627	83,065	32.7	40.7	1,572	2,067	45.8	49.8
Cavalier	95,075	125,036	47.9	59.0	2,310	3,076	48.6	49.2
McHenry	76,404	75,720	47.1	49.5	1,830	1,853	47.9	48.9
Nelson	77,896	83,343	76.2	82.9	2,247	2,392	57.7	57.4
Pierce	48,684	32,357	36.7	25.7	1,080	735	44.4	45.4
Ramsey	59,657	79,085	34.2	46.2	1,633	2,004	54.7	50.7
Renville	39,765	46,913	35.4	44.5	868	1,022	43.7	43.6
Rolette	26,017	39,971	31.8	46.8	571	893	43.9	44.7
Towner	54,592	66,210	33.2	41.4	1,412	1,756	51.7	53.0
Ward	114,362	108,366	48.5	48.1	2,500	2,476	43.7	45.7

continued

TABLE 27. FERTILIZATION OF ALL WHEAT IN NORTH DAKOTA BY COUNTIES AND CENSUS ECONOMIC AREAS, 1959 AND 1964 (continued)

Census economic area and county	Fertilized acreage		Fertilized acreage in percent of harvested acreage		Total amount of fertilizer used		Average pounds of fertilizer per acre	
	1959	1964	1959	1964	1959	1964	1959	1964
	acres		percent		tons		pounds	
Economic Area 3B	464,083	632,383	53.5	74.5	13,656	18,294	58.9	57.9
Barnes	102,434	113,255	61.7	73.7	3,026	3,604	59.1	63.6
Eddy	29,667	36,641	62.5	83.2	757	928	51.0	50.7
Foster	46,228	53,597	88.7	86.7	1,292	1,502	55.9	56.0
Griggs	31,998	48,710	58.9	86.3	834	1,465	52.1	60.2
LaMoure	39,694	79,038	34.5	71.3	1,527	2,343	76.9	59.3
Steele	58,673	68,522	79.7	93.7	1,666	1,945	56.8	56.8
Stutsman	93,423	143,817	45.1	70.8	2,859	4,324	61.2	60.1
Wells	61,966	88,803	40.8	60.7	1,695	2,183	54.7	49.2
Economic Area 3C	61,218	140,217	24.8	53.9	1,932	4,524	63.1	64.5
Dickey	9,275	25,322	17.3	42.2	266	753	57.4	59.5
Ransom	13,133	30,386	25.6	59.9	371	788	56.5	51.9
Richland	30,342	58,119	37.3	62.6	1,005	2,067	66.2	71.1
Sargent	8,468	26,390	14.1	46.6	290	916	68.5	69.4
Economic Area 4	553,736	627,309	73.6	83.7	19,398	24,047	70.1	76.7
Cass	108,357	140,304	61.1	80.5	3,328	5,211	61.4	70.7
Grand Forks	138,458	147,928	87.8	91.5	5,537	6,086	80.0	81.1
Pembina	120,563	127,072	77.2	82.1	4,204	4,711	69.7	70.0
Traill	56,288	68,795	60.7	74.3	1,884	2,464	66.9	70.2
Walsh	130,070	143,210	77.2	86.3	4,445	5,575	68.3	72.0
State Total	2,761,451	3,274,336	42.9	52.2	74,172	89,550	53.7	54.7

TABLE 28. FERTILIZATION OF TAME HAY[a] AND CROPLAND PASTURE IN NORTH DAKOTA BY COUNTIES AND CENSUS ECONOMIC AREAS, 1959 AND 1964

Census economic area and county	Fertilized acreage		Fertilized acreage in percent of harvested acreage		Total amount of fertilizer used		Average pounds of fertilizer per acre	
	1959	1964	1959	1964	1959	1964	1959	1964
	acres		percent		tons		pounds	
Economic Area 1	7,022	7,682	0.8	4.0	289	375	82.3	97.6
Adams	170	310	.3	.5	4	11	47.1	71.0
Billings	265	155	1.0	.5	10	12	75.5	154.8
Bowman	105	385	.3	.9	3	19	57.1	98.7
Dunn	715	661	.8	.7	62	23	173.4	69.6
Golden Valley	240	305	1.1	1.4	11	34	91.7	223.0
Grant	990	1,092	.9	1.2	38	76	76.8	139.2
Hettinger	67	455	.1	1.0	2	13	59.7	57.1
McKenzie	2,209	1,244	3.0	2.1	83	71	75.1	114.1
Mercer	760	20	1.4	b	16	2	42.1	200.0
Morton	808	580	.6	.6	34	31	84.2	106.9
Oliver	0	653	0.0	1.6	0	29	0.0	88.8
Sioux	0	374	0.0	1.2	0	5	0.0	26.7
Slope	140	244	.4	.8	4	7	57.1	57.4
Stark	553	1,204	.7	1.5	22	42	79.6	69.8
Economic Area 2A	2,311	1,462	1.1	.8	87	83	74.6	113.5
Burke	590	44	2.8	b	22	2	74.6	90.9
Divide	0	220	0.0	1.2	0	20	0.0	181.8
McLean	371	817	.4	1.2	7	28	37.7	68.5
Mountrail	115	45	.3	.1	4	2	69.6	88.9
Williams	1,235	336	2.9	.8	54	31	87.4	184.5
Economic Area 2B	1,128	2,288	.3	.7	31	156	55.0	136.4
Burleigh	385	1,123	.4	1.4	6	92	31.2	163.8
Emmons	20	95	b	.2	1	6	100.0	189.5
Kidder	345	40	.4	b	9	4	52.2	200.0
Logan	308	290	.9	.7	12	18	77.9	124.1
McIntosh	50	450	.2	1.1	2	20	80.0	88.9
Sheridan	20	290	.1	.9	1	16	100.0	110.3
Economic Area 3A	11,504	3,405	2.5	.8	326	207	56.7	121.6
Benson	310	235	.6	.5	8	15	51.6	127.7
Bottineau	482	440	1.1	1.1	21	27	87.1	122.7
Cavalier	500	292	1.9	.9	22	43	88.0	294.5
McHenry	1,160	780	1.3	.9	27	42	46.6	107.7
Nelson	2,300	78	6.2	.2	78	8	67.8	205.1
Pierce	110	256	.2	.6	2	10	36.4	78.1
Ramsey	1,210	175	3.5	.5	36	8	59.5	91.4
Renville	0	130	0.0	.6	0	4	0.0	61.5
Rolette	770	0	2.9	0.0	27	0	70.1	0.0
Towner	441	457	2.1	2.0	13	27	59.0	118.2
Ward	4,221	562	6.8	1.1	92	23	43.6	81.9

continued

TABLE 28. FERTILIZATION OF TAME HAY[a] AND CROPLAND PASTURE IN NORTH DAKOTA BY COUNTIES AND CENSUS ECONOMIC AREAS, 1959 AND 1964 (continued)

Census economic area and county	Fertilized acreage		Fertilized acreage in percent of harvested acreage		Total amount of fertilizer used		Average pounds of fertilizer per acre	
	1959	1964	1959	1964	1959	1964	1959	1964
	acres		percent		tons		pounds	
Economic Area 3B	9,061	13,520	2.2	3.1	328	733	72.4	108.1
Barnes	2,019	2,019	4.1	3.3	83	137	82.2	135.7
Eddy	649	654	1.9	1.9	22	30	67.8	91.7
Foster	2,265	2,408	6.7	5.8	86	106	75.9	87.2
Griggs	595	1,157	1.8	3.4	20	37	67.2	64.0
LaMoure	760	1,666	1.4	2.3	18	109	47.4	129.7
Steele	1,040	1,083	4.3	6.5	33	76	63.5	140.4
Stutsman	1,173	4,283	.9	3.3	27	206	46.0	96.2
Wells	560	250	1.1	.6	39	32	139.3	256.0
Economic Area 3C	12,313	15,321	6.1	6.6	836	887	135.8	115.4
Dickey	544	1,147	.9	1.6	11	76	40.4	127.3
Ransom	1,530	3,106	3.3	6.3	63	164	82.4	105.6
Richland	10,027	10,315	16.8	15.5	752	610	150.0	118.3
Sargent	212	753	.5	1.7	10	37	94.3	98.3
Economic Area 4	12,253	9,463	5.7	4.9	634	562	103.5	116.0
Cass	3,896	4,439	5.6	6.5	216	282	110.9	122.6
Grand Forks	4,942	1,911	9.1	4.3	290	118	117.4	120.4
Pembina	330	876	1.3	3.4	16	49	97.0	111.9
Traill	895	1,718	2.5	6.4	54	89	120.7	103.6
Walsh	2,190	519	7.6	1.8	58	24	53.0	92.5
State Total	55,592	53,141	2.1	2.1	2,531	3,003	91.1	112.3

[a]Does not include wild hay.

TABLE 29. FERTILIZATION OF IMPROVED OPEN PERMANENT PASTURE[a] IN NORTH DAKOTA BY COUNTIES AND CENSUS ECONOMIC AREAS, 1959 AND 1964

Census economic area and county	Fertilized acreage		Fertilized acreage in percent of harvested acreage		Total amount of fertilizer used		Average pounds of fertilizer per acre	
	1959	1964	1959	1964	1959	1964	1959	1964
	acres		percent		tons		pounds	
Economic Area 1	605	2,023	1.3	1.3	70	69	231.4	68.2
Adams	0	75	0.0	0.9	0	3	0.0	80.0
Billings	0	0	0.0	0.0	0	0	0.0	0.0
Bowman	40	0	2.8	0.0	1	0	50.0	0.0
Dunn	210	65	3.8	0.3	52	4	495.2	123.1
Golden Valley	30	0	0.4	0.0	2	0	133.3	0.0
Grant	0	100	0.0	0.9	0	5	0.0	100.0
Hettinger	85	100	1.7	0.8	5	3	117.6	60.0
McKenzie	40	1,054	2.2	13.0	4	34	200.0	64.5
Mercer	0	0	0.0	0.0	0	0	0.0	0.0
Morton	110	339	1.9	3.4	3	8	54.5	47.2
Oliver	0	138	0.0	5.4	0	3	0.0	43.5
Sioux	0	80	0.0	0.7	0	5	0.0	125.0
Slope	0	60	0.0	0.8	0	3	0.0	100.0
Stark	90	12	1.1	b	3	1	66.7	166.7
Economic Area 2A	85	615	0.9	1.8	6	26	141.2	84.6
Burke	0	0	0.0	0.0	0	0	0.0	0.0
Divide	0	12	0.0	0.3	0	1	0.0	166.7
McLean	85	0	2.3	0.0	6	0	141.2	0.0
Mountrail	0	420	0.0	5.1	0	17	0.0	81.0
Williams	0	183	0.0	2.3	0	8	0.0	87.4
Economic Area 2B	160	756	1.0	1.8	8	45	100.0	119.0
Burleigh	0	410	0.0	2.7	0	9	0.0	43.9
Emmons	90	0	3.9	0.0	4	0	88.9	0.0
Kidder	70	0	1.1	0.0	4	0	114.3	0.0
Logan	0	0	0.0	0.0	0	0	0.0	0.0
McIntosh	0	10	0.0	0.3	0	1	0.0	200.0
Sheridan	0	336	0.0	14.2	0	35	0.0	208.3
Economic Area 3A	1,882	917	9.2	1.9	71	27	75.5	58.9
Benson	175	180	8.8	2.6	31	6	354.3	66.7
Bottineau	452	20	18.4	0.5	11	1	48.7	100.0
Cavalier	0	0	0.0	0.0	0	0	0.0	0.0
McHenry	80	310	1.2	2.4	4	6	100.0	38.7
Nelson	315	75	27.1	2.7	7	5	44.4	133.3
Pierce	0	0	0.0	0.0	0	0	0.0	0.0
Ramsey	20	0	1.8	0.0	1	0	100.0	0.0
Renville	40	0	4.5	0.0	2	0	100.0	0.0
Rolette	0	293	0.0	7.2	0	8	0.0	54.6
Towner	0	39	0.0	2.3	0	1	0.0	51.3
Ward	800	0	36.9	0.0	15	0	37.5	0.0

continued

TABLE 29. FERTILIZATION OF IMPROVED OPEN PERMANENT PASTURE[a] IN NORTH DAKOTA BY COUNTIES AND CENSUS ECONOMIC AREAS, 1959 AND 1964 (continued)

Census economic area and county	Fertilized acreage		Fertilized acreage in percent of harvested acreage		Total amount of fertilizer used		Average pounds of fertilizer per acre	
	1959	1964	1959	1964	1959	1964	1959	1964
	acres		percent		tons		pounds	
Economic Area 3B	800	2,302	5.8	4.8	41	95	102.5	82.5
Barnes	30	63	1.5	.8	2	4	133.3	127.0
Eddy	0	373	0.0	7.0	0	9	0.0	48.3
Foster	400	870	15.6	20.5	15	31	75.0	71.3
Griggs	0	30	0.0	1.6	0	1	0.0	66.7
LaMoure	280	696	19.3	7.7	14	34	100.0	97.7
Steele	50	0	20.0	0.0	2	0	80.0	0.0
Stutsman	40	260	.9	1.7	8	15	400.0	115.4
Wells	0	10	0.0	.5	0	1	0.0	200.0
Economic Area 3C	355	2,167	3.6	6.8	26	107	146.5	98.8
Dickey	0	296	0.0	3.3	0	12	0.0	81.1
Ransom	40	670	1.3	7.8	5	32	250.0	95.5
Richland	285	1,181	14.3	25.3	20	62	140.4	105.0
Sargent	30	20	1.7	.2	1	1	66.7	100.0
Economic Area 4	967	2,085	20.4	14.2	72	122	148.9	117.0
Cass	465	878	21.9	29.1	35	56	150.5	127.6
Grand Forks	105	1,064	10.8	27.6	10	59	190.5	110.9
Pembina	0	20	0.0	2.0	0	1	0.0	100.0
Traill	222	120	41.3	2.9	19	6	171.2	100.0
Walsh	175	3	19.3	.1	8	c	91.4	0.0
State Total	4,854	10,865	4.0	2.9	294	491	121.1	90.4

[a]"Improved open pasture" is pastureland that is not cropland or woodland and on which one or more of the following practices have been used: liming, fertilizing, seeding, irrigating, draining, and clearing of weeds or brush growth.

[b]Less than .05 percent.

[c]Reported in small fractions.