

# Commercial Fertilizer Use, Especially Nitrogen, in North Dakota

E. H. Vasey

When one reflects back over the last 20 years in terms of use of commercial fertilizer in North Dakota several things come to mind. Amounts of commercial fertilizer being purchased by producers has increased quite dramatically. Prices paid have generally been upward, with peaks especially in the mid seventies. Availability has ranged from very tight to all that was wanted by our producers. Major changes have taken place in types of commercial fertilizer being purchased by crop producers, especially in the last 5-10 years.

Let us first consider overall use of commercial fertilizer in the state. I will deal in terms of consumption of commercial fertilizer by crop years. This was determined using fertilizer consumption figures reported by the State Laboratories Department, Bismarck, North Dakota. To obtain crop year values the consumption figures for July to December and January to June were added to represent a particular crop year. Figures for the current 1979 crop year are not yet available.

Figure 1 summarizes the commercial fertilizer consumption in North Dakota in terms of total fertilizer; total of the nutrients nitrogen, phosphorus and potassium; and individual consumption of nitrogen, phosphorus expressed as  $P_2O_5$  and potassium expressed as  $K_2O$ .

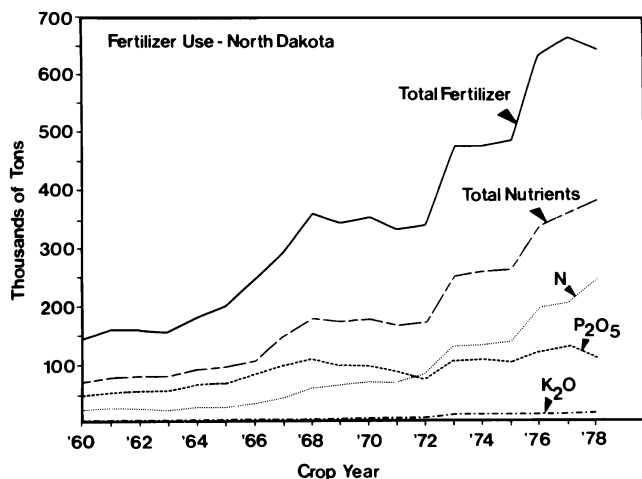


Figure 1. Fertilizer Use Patterns in North Dakota for Crop Years 1960 Through 1978.

Several observations can be made from the data in Figure 1. Total tons of commercial fertilizer used shows quite a dramatic increase over the period of years considered. Total tons of material used for the 1978 crop declined to some extent from the high used for the 1977 crop (667,700 tons to 648,369 tons), but the nutrients contained in the material showed some increase. This is mainly the result of greater use of higher analysis fertilizer materials, especially anhydrous ammonia.

Phosphorus was the nutrient used in greatest amounts by North Dakota producers until the 1972 crop year. The use of nitrogen surpassed phosphorus for the 1972 crop and has been on a rather steady increase since.

The use of the nutrient potassium is still quite low, mainly because most North Dakota soils used for crop production are quite high in native sources of potassium and do not require additional potassium to be added from commercial fertilizer.

The strong upward trend in the amount of nitrogen used by North Dakota producers deserves a closer look. Nitrogen use during the 1940's and 50's was quite low, ranging around 5,000 to 15,000 tons of actual nitrogen. Almost all of this was being used by producers as multi-nutrient materials like 11-48-0 and 16-20-0.

The use of nitrogen by North Dakota producers for crop years since 1960 is shown in Figure 2.

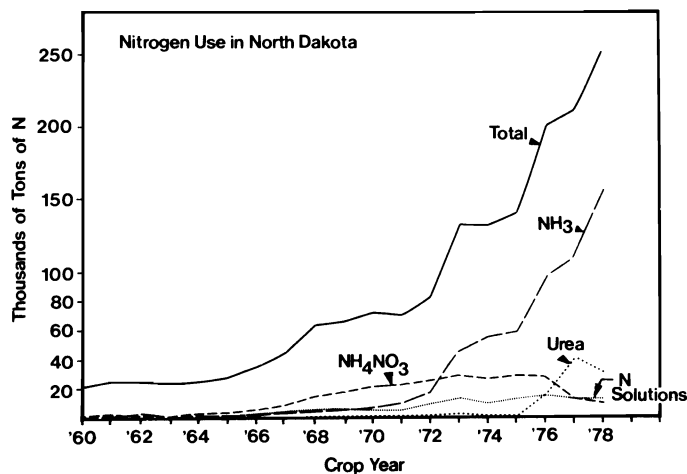


Figure 2. Use of Actual Nitrogen in North Dakota for Crop Years 1960 Through 1978.

Much of the nitrogen used during the early 1960's was contained in materials like 16-48-0. Since the mid 1960's use of straight nitrogen materials has increased quite dramatically, especially during the last 10-12 crop years. Some of the increase in nitrogen since the late 1960's and through the 1970's is a result of the nitrate-nitrogen soil test being used. Since the introduction of the test in 1968, the need for nitrogen fertilizer has been stressed in educational materials and meetings on fertilizer use. This increased emphasis on the need for nitrogen in crop production in North Dakota helped bring about the rapid increase in nitrogen used, as shown in Figure 2. The magnitude of this increase has been from 20,456 tons of nitrogen for 1960 to 71,909 tons of nitrogen for 1970 and on to the present high of 252,604 tons of nitrogen for the 1978 crop year.

Figure 2 also shows changes in the pattern of use of various nitrogen materials. These changes can be better visualized if the data is expressed as a percentage, as has been done in Figure 3.

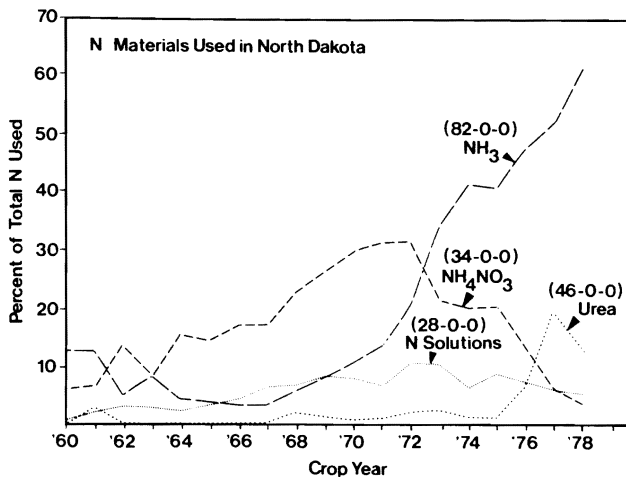


Figure 3. Major Nitrogen Materials Used in North Dakota for Crop Years 1960 Through 1978.

In 1970, ammonium nitrate (34-0-0) supplied approximately 30% of the nitrogen used, followed by anhydrous ammonia (82-0-0) supplying just over 10%, nitrogen solu-

tions (28-0-0) about 8% and urea (46-0-0) under 1%. Approximately 52% of the total nitrogen used in the crop year 1970 was contained in multinutrient fertilizers like 18-46-0, 11-55-0 and in fertilizer blends of mixed materials. Data for the 1978 crop year show quite a switch. Approximately 62% of the nitrogen used for that crop year came from anhydrous ammonia, 12% from urea, 5% from nitrogen solutions and 4% from ammonium nitrate. Only 5% was supplied via multinutrient or mixed materials.

The rapid increase shown for the use of anhydrous ammonia and urea, along with the decline in the use of ammonium nitrate, has been the result of several factors. Fertilizer manufacturers have undergone conversion of many ammonium nitrate plants to produce urea. North Dakota fertilizer suppliers are stocking the more concentrated nitrogen materials, especially anhydrous ammonia. The cost of nitrogen from anhydrous ammonia has also been a factor in producers using it. Producers should make their decisions regarding economics of nitrogen source on cost applied to fields, not just on cost as obtained from the fertilizer dealer.

#### Summary:

Consumption of commercial fertilizer, especially nitrogen, has increased rather sharply during the last 20 years in North Dakota. I am of the opinion that we will continue to see increases during future years. Increased interest in recropping and the accompanying need for adequate nitrogen on recropped acres will play a large part in this. Soil test summary data also indicate more and more of our summerfallow acres can benefit from addition of nitrogen. Many of our acres of grassland also can benefit from the use of nitrogen.

Producers need to sharpen their decision pencils and start calculating what is their most economical source of nitrogen applied to the soil. Better decisions regarding nitrogen use can be made using yield goals adjusted based on moisture conditions with fertilizer applied based on recommendations from soil test values. This approach to fertilizer management goes a long way in assuring profitable returns on dollars invested in fertilizer. It helps assure that fertilizer is used where it is needed, thus is most likely to produce profitable responses.