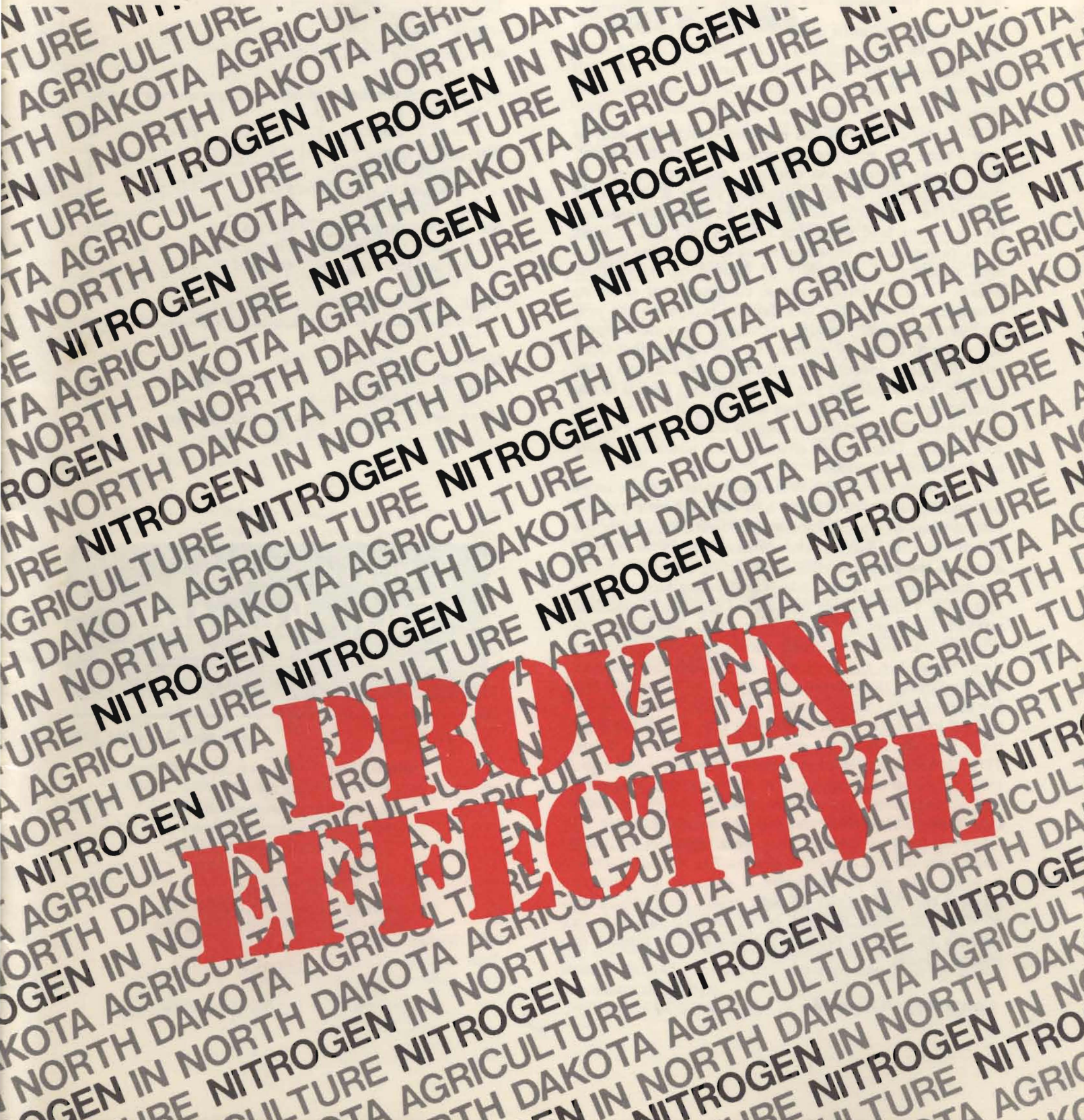
NORTH DAKOTA
Farm Research
Bimonthly Bulletin

Vol. 37, No. 3 November-December 1979



Guest Column

Donald S. Galitz
Professor of Botany

World food demands and economic conditions seem to have forced the adoption of agricultural practices which put extreme pressures on our land and environment. In zealous attempts to get maximum yields it sometimes appears that we forget the fact that we cannot indefinitely take from the land which has required centuries to build to its present state. However, many are becoming increasingly aware of the necessity of viewing our agricultural system not as a simple business commodity or as an inexhaustible resource but as a delicate ecosystem the productivity of which is readily influenced by various inputs and exports. More and more it is being realized that there must be a deep concern for replacing those elements being removed by harvesting. The use of elements here is in the broadest sense, to indicate not only mineral nutrients but also other soil characteristics such as water, organic matter and texture. These are all characteristics which contribute to the quality of the soil.

It has been shown that in land cultivated for row crops and small grains as well as in land used for tame pasture, natural range or wildlife habitats, nitrogen is frequently the growth limiting factor. The earliest settlers were fully aware of the nutritive value of returning animal wastes to the soil. Likewise, after World War II young farmers in the Red River Valley realized the value of applying commercial nitrogen fertilizers to increase crop yields, and in the 60's this practice started receiving acceptance throughout the state. Since then the application of supplemental nitrogen has continued throughout the state at an increasing rate for one of two reasons. First is the situation where applications have been made to replace that which has been taken from the soil by the removal of high cash value crops. This has been an attempt to regain or maintain a status quo in fertility. In older agricultural practices this frequently was accomplished by rotation systems which included leguminous plants. However, this system was dropped by many in favor of the, at that time, cheap N-fertilizers which gave quicker economic returns. The second situation is where the use of supplemental nitrogen has been to increase the productivity of soils which are marginal to good but in which nitrogen is the limiting factor in its capacity to yield or produce biomass for the support of grazing animals.

Continued on Page 24.

In This Issue

NORTH DAKOTA
Farm Research
Bimonthly Bulletin

Vol. 37, No. 3 **November-December 1979**

A BIMONTHLY progress report published by the
Agricultural Experiment Station, North Dakota State University of Agriculture and Applied Science
Fargo, North Dakota 58105
H. R. Lund
Dean of Agriculture, and Director of Agricultural Experiment Station

EDITORS

Gary Moran *Dorothea McCullough*

Table 3. The effect of N rate and source on the yield and protein of Roughrider winter wheat, under minimum tillage, Zahl, ND, 1978.[1/]

N Rate			Yield		
lb/a	kg/ha	N Source[2/]	bu/a	kg/ha	% Protein
0	0	—	25.6	1720	11.2
28	25	AN	34.7	2332	10.4
28	25	UR	36.0	2419	10.1
56	50	AN	48.3	3246	10.7
56	50	UR	47.0	3158	11.3
84	75	AN	50.4	3389	11.2
84	75	UR	60.2	4045	11.4
112	100	AN	57.9	3891	11.5
112	100	UR	62.0	4170	11.4
LSD (.05)			6.4	430	0.8

1/ Soil Test: 34 kg NO_3^--N/ha-60 cm (30 lb NO_3^--N/a-2 ft)
84 kg NO_3^--N/ha-120 cm (75 lb NO_3^--N/a-4 ft)

2/ AN = ammonium nitrate (34-0-0)
UR = urea (46-0-0)

CONCLUSION

Data indicate the importance of precipitation when selecting N fertilizer materials. If a no-tillage or reduced tillage system is being employed and surface application of N is anticipated, precautions in selection of N sources are suggested. Under dry conditions, surface application of ammonium nitrate is superior to urea. Given adequate moisture within 24-48 hours of application, urea and ammonium nitrate appear to be comparable sources of N under reduced tillage systems.

LITERATURE CITED

1. Bauer, Armand and Thomas J. Conlon. 1978. **Influence of Tillage Interval of Fallow on Soil Water Storage.** N. Dak. Farm Res. 35(4):8-11.
2. Deibert, E. J., E. French, B. Hoag, and R. Nowatzki. 1978. **No-Till: North Dakota Research Emphasis.** N. Dak. Farm Res. 35(4):3-6.
3. Estes, G. O. 1972. **Elemental Composition of Maize Grown Under No-Till and Conventional Tillage.** Agron. J. 64:733-735.
4. Hovermale, C. H., H. M. Camper, and M. W. Alexander. 1979. **Effects of Small Grain Stubble Height and Mulch on No-Tillage Soybean Production.** Agron. J. 71:644-647.
5. Kupers, L. J. P. and J. Ellen. 1970. **Experiences with Minimum Tillage and Nitrogen Fertilization.** Netherlands J. Agric. Sci. 18:270-276.
6. Lutz, J. A., Jr. and J. H. Lillard. 1973. **Effect of Fertility Treatments on Growth, Chemical Composition and Yield of No-Tillage Corn on Orchardgrass Sod.** Agron. J. 65:733-736.
7. O'Brien, Daniel Lawrence. 1979. **No-Tillage Spring Wheat: A Comparison with Conventional Tillage Systems.** M.S. Thesis. North Dakota State Univ., Fargo, N. D.
8. Phillips, S. H. and H. M. Young, Jr. 1973. **No-Tillage Farming.** Reiman Associates. Milwaukee, Wisconsin.
9. Schneider, R. P., F. Sobolik, and N. Riveland. 1978. **No-Till: Promise and Problems.** N. Dak. Farm Res. 35(4):12-14.

Guest Column Continued from Page 2.

North Dakota State University has, scattered in several departments, quite a number of scientists who, as it relates to their specific disciplines, have considerable interest and expertise in various aspects of nitrogen. If these persons were put together in a single unit they could by virtue of their number or scientific man years of effort constitute a department of their own. However, being scattered about the campus, the impact of this expertise and interest in the many areas of crop production, range management and animal science, has been far greater than if we were a self-contained unit. At the same time, by virtue of being physically scattered and sometimes under different administrative units, we are not always fully aware of each other's work.

With the apparent success and appeal of some of the previous issues of Farm Research which were based on a single theme, the idea was conceived to put together an issue on nitrogen. This would be an issue which would deal with various aspects of nitrogen as they fit into the agricultural scene of North Dakota.

The articles finally included in this issue of Farm Research are by no means exhaustive of the subject, as there is not space for such a complete treatment. The topics and authors chosen were selected so as to be representative, dealing with nitrogen requirements and utilization by specific crops, the status of nitrogen in North Dakota soils, the cycling of this element through our plant-soil and water systems, the possible sources of nitrogen available to the producer and their use over the years with an evaluation of the present economics of using supplemental nitrogen in our management programs, the economics of production, marketing and applying nitrogen fertilizers, and a look toward future availability, cost and use in North Dakota.

The purpose of this issue, then, is to bring together contributions by various scientists working with nitrogen, to limelight the total amount of work being done with nitrogen, and to inform the agricultural community of our state that the Experiment Station is concerned with and working on various problems relating to the use of too much, too little and the appropriate forms of nitrogen in agriculture. Also it is to make each of us working with nitrogen more cognizant of our colleagues' interests and efforts.

It is our hope that you will find this single-theme issue of Farm Research on "Nitrogen in North Dakota Agriculture" both interesting and informative. We hope the information pertains not only to your particular operation, but also will make you aware of how nitrogen relates to other forms of agriculture throughout the state. It is our interest to illustrate that the use of nitrogen has a pronounced effect upon the quality of life in both our urban and rural settings through its influence on the nutritional quality as well as quantity of agricultural goods produced, the economics of our agricultural industry and the quality of our environment.