From the DIRECTOR

A. G. HAZEN

We take pleasure in joining with agricultural scientists of the world to add our congratulations on the selection of Dr. Norman Borlaug as a Nobel Peace Prize winner.

For over a decade, this dedicated wheat breeder has been inspiring countless young plant scientists amid the heat, dust and biting gnats of Obregon, Sonora, Mexico. This is the site of the Rockefeller Foundation — Mexican CIMMYT (International Maize and Wheat Improvement Center) field breeding nursery.

Dr. Borlaug's award was for his leadership in the "Green Revolution" that has provided new type of high-producing cereal grains adapted to the growing conditions of developing nations desperately needing additional food.

Many of the young scientists who have worked with Dr. Borlaug have visited the wheat and barley breeding facilities at North Dakota State University before they return to their own countries. Later, some of them return to NDSU to work toward advanced degrees in the plant sciences. Usually Rockefeller or Ford Foundation Fellows, these young scientists learn modern techniques of wheat and barley improvement while contributing their research efforts to the NDSU research program. Then they return to their homelands to put into practice what they have learned, usually under the watchful eye and inspiration of Dr. Borlaug. He has visited NDSU several times in recent years and visits these young scientists in their countries to help make their research more productive.

While at NDSU, the Fellows and their families learn much about the "real United States." They work with local scientists, send their children to local schools, and learn to understand the country better. They take this understanding home with them. NDSU now shares with Dr. Borlaug this network of friends all over the world.

Dr. Borlaug and his associates have developed from world-wide sources a series of short, thick-stemmed wheat varieties, that with high fertilization will yield at previously unknown levels in difficult growing climates and conditions all over the

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On The Cover: Clayton Haugse and the Department of Animal Science were among the first to utilize the computer as a research tool at North Dakota State University. All departments of the Agricultural Experiment Station now make extensive use of the computer's speed and accuracy in data analysis.

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Various plant species respond differently to water tables at different depths; they also respond differently to fluctuating water tables. How each species responds also depends on timing and duration of root inundation. Only by costly deep drainage can a farmer be assured that natural precipitation will not cause the water table at some time to rise into the root zone. In our fluctuating water table experiments we will determine how several major crops respond to various durations and magnitudes of root inundation at specific stages of growth. In addition, we will determine how fertilizer might be used to help overcome the effects of an adverse water table condition after it occurs.

Fertility management studies will be conducted on mobile nutrients, primarily nitrogen. Certain forms of nitrogen, mainly nitrate, move with the flow of water through the soil. If water percolates downward past the bottom of the root zone, nitrates are carried with it and become inaccessible to plant roots. This nitrogen loss results in reduced efficiency of fertilizer use and lower crop yields.

Water management studies are being designed to determine the drainage requirements for various crops, the relationship between actual evapotranspiration and water needs calculated from meteorological measurements (5), and how water table depth affects irrigation requirement. Nonweighing lysimeters (9) will be used to separate the quantities of water used by crops into components of applied water, precipitation, and water moving upward from the water table. These relationships will serve as a basis for using meteorological data and a knowledge of the properties of the soil-water system to schedule irrigations in the Garrison Diversion.

Information obtained in water table studies, fertility studies, and lysimeter studies will be used to evaluate the combined interactions of water management, fertility management, and water table depth (drainage) on crop growth. By studying the soil environment in which the root grows, we hope to determine the factors that affect root growth and the factors that cause certain crop species to have certain drainage requirements. The data obtained in these studies will provide much of the information an irrigation farmer in the Garrison Diversion will need in making his water and fertilizer management decisions.

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REFERENCES

1. Bond, J. J., J. F. Power, and H. M. Olson. 1970. **Rotating-boom plot irrigator with offset mounting.** Trans. ASAE 13(1): 143-144, 147.
2. Carlson, C. W., D. L. Grunes, J. Alessi, and G. A. Reichman. 1961. **Corn growth on Gardena surface and subsoil as affected by application of fertilizer and manure.** Soil Sci. Soc. Amer. Proc. 25(1): 44-47.
3. Carlson, C. W., D. L. Grunes, L. O. Fine, G. A. Reichman, H. R. Haise, J. Alessi, and R. E. Campbell. 1961. **Soil, water, and crop management on newly irrigated lands in the Dakotas.** USDA-ARS Production Research Report 53.
4. Holmen, H., C. W. Carlson, R. J. Lorenz, and M. E. Jensen. 1961. **Evapotranspiration as affected by moisture level, nitrogen fertilization, and harvest method.** Trans. ASAE 4(1): 41-44.
5. Jensen, M. E. 1969. **Scheduling irrigations with computers.** J. of Soil & Water Conserv., September-October, p. 193-195.
6. Kouwe, J. J. 1968. **The effect of the microrelief on the possibilities of subsurface irrigation,** p. 105-122. **In** Determination of the optimum combinations of water management systems in areas with a microrelief. Inst. Land and Water Mgmt. Res. Tech. Bull. 56. Wageningen, Netherlands.
7. Lorenz, R. J., C. W. Carlson, G. A. Rogler, and H. Holmen. 1961. **Bromegrass and bromegrass-alfalfa yields as influenced by moisture level, fertilizer rates and harvest frequency.** Agron. J. 53: 49-52.
8. Lorenz, R. J. and G. A. Rogler. 1961. **Irrigated forage crop yields for North Dakota.** NDSU Agr. Exp. Sta. Bull. 437, 31 p.
9. Lutz, J. F. (Chairman, Committee on Terminology). 1964. **Glossary of Soil Science Terms.** Soil Sci. Soc. Amer. Proc. 29: 330-351.
10. Omodt, H. W., G. A. Johnsgard, D. D. Patterson, and O. P. Olson. 1968. **The Major Soils of North Dakota.** NDSU Agr. Exp. Sta. Bull. 472, 60 p.
11. Patterson, D. D., G. A. Johnsgard, M. D. Sweeney, and H. W. Omodt. 1968. **County General Soil Maps—North Dakota.** NDSU Agr. Exp. Sta. Bull. 473, 150 p.
12. Tovey, R. 1963. **Comsumptive use and yield of alfalfa grown in the presence of staticwater tables.** Nevada Agr. Exp. Sta. Tech. Bull. 232.
13. U.S. Department of the Interior. Bureau of Reclamation. 1965. **Definite Plan Report on Garrison Diversion Unit (Initial Stage - 250,000 acres).** Garrison Diversion - North Dakota - South Dakota - Missouri River Basins Project, Appendix A — Land Classification. 324 p.
14. Williamson, R. E. and J. van Schilfgaarde, 1965. **Studies of crop response to Drainage: II. Lysimeters.** Trans. Amer. Soc. Agr. Eng. 8: 98-100, 102.
15. Zwerman, P. J. and I. T. Corpuz. 1965. **Nitrogen fertilization of crops to compensate for yield losses from poor drainage.** p. 17-20. **In** Conf. Proc. of Drainage for Efficient Crop Production. (Chicago, Ill.). Publ. by Amer. Soc. Agr. Eng., St. Joseph, Mich.

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world. By North Dakota standards, the grain is not of high quality; they are not fine bread wheats. But these wheats are filling empty stomachs where previously hunger and starvation were constant companions.

One of NDSU's own wheats, not considered for release in North Dakota because of quality defects, recently was named Dakuru and is being produced in Uruguay as part of the "Green Revolution."

NDSU is proud to join the world in its salute to Dr. Borlaug, the first agricultural scientist since the inception of the Nobel prizes in 1901 to be so honored.