

Highlights of 1972 Fertilizer and Fertility Program - Swift Current

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CEREALS

No stubble fertilizer tests and only 6 N and P tests on fallow were conducted in 1972 as the major emphasis for the immediate future has been placed on obtaining information on variety-fertilizer interactions. In 1972 this program was initiated with three tests in the Swift Current area and one at Indian Head.

The soil test values in the fallow fertilizer tests were either very low or low in bicarbonate soluble P and either high or very high in $\text{NO}_3\text{-N}$. Check yields were average or above average despite somewhat lower than average stored moisture and growing season precipitation. Yield increases from nitrogen applications were small and nonsignificant although there was some indication that a small amount of added nitrogen applied with the phosphorus aided in phosphorus response in several of the tests. In three tests, two on coarse textured soils and one on Echo clay loam, the yield increases from phosphorus were negligible on soils having very low bicarbonate soluble P. On the fine textured soils satisfactory yield increases from phosphorus were obtained. Conquest barley responded to a much greater degree than wheat on an Echo clay loam soil containing several "burn-out" areas in the test plot site.

Two of three tests on fallow on coarse textured soils with barley as the test crop, and to which potassium and sulfur were applied as additional treatments to N and P, showed good response to P. There was no response to K or S at any of the three locations.

Data from stubble fertilizer tests conducted from 1968 to 1971 have been analyzed. The following points summarize the results:

1. Rainfall and weather during the growing season were responsible for much of the variation in yield and protein content of wheat grown on unfertilized soils.
2. Soil moisture and plant nutrient content (N and P) had the largest influence on the variability of response to applied

fertilizer.

3. N in the ammonia form or N as nitrate plus ammonia was more important in most comparisons than N in the nitrate form only.

The field work on the residual effect of phosphorus applied in 1966 is continuing. In 1972 no response was obtained from with seed application of P on plots to which 100 kg. or more per hectare P was applied in 1966. Yield increases from the initial application appear to be as efficient as smaller amounts applied with the seed of each crop. In greenhouse studies the residual effect lasted 5 to 6 crops from the 100 kg/ha application of P and for 12 to 14 crops from the 200 kg/ha application.

Preliminary results from the first year of the variety-fertilizer tests showed little interaction between variety and fertilizer on yield response but some differences in 1000 kernel and bushel weights.

Studies on the effects of moisture and temperature on nitrate and phosphorus changes in fallow soil have shown that $\text{NO}_3\text{-N}$ was leached to 30 cm or lower following precipitation greater than 1.75 cm. As the soil dried $\text{NO}_3\text{-N}$ increased in the surface (0-15 cm.) by nitrification and upward movement. In this layer the change in $\text{NO}_3\text{-N}$ was primarily a function of moisture change rather than of moisture content. In first year fallow change in bicarbonate soluble P was directly related to rainfall, moisture change and change in bacterial numbers.

Growing season soil temperatures accounted for 1 - 3 percent of $\text{NO}_3\text{-N}$ production in the 0 - 15 cm. soil depth. The remainder was primarily accounted for by moisture changes, including the physical movement of $\text{NO}_3\text{-N}$ as moisture moved upwards or downwards.

PERENNIAL FORAGE CROPS

Grasses (Irrigated)

One hundred pounds N on a stand of irrigated bromegrass gave first cut yields of nearly 4 tons hay per acre but left soil so deficient that second growth was virtually yellow and not worth cutting. This

degree of nutrient uptake and crop response has also been shown on irrigated pastures where 100 lb of N in April, June, and July (300 lb for season) sustained growth throughout the season and gave yields of up to 12,000 lb of D.M./acre.

Grasses (Dryland)

Crested wheatgrass continues to show greatest response to N or NP. Three to five years of accumulated yield from 300 lb N gave an additional 3,000 lb of D.M. Residual NO_3 indicates that further yield response will likely continue, given favorable moisture. At lower application rates no residual NO_3 was found. At higher rates than 300 lb N/acre yield increases for the same period were up to 4,000 lb/acre with 500 to 900 lb N. The main deposition of NO_3 was at the 2 - to 3 - foot level.

Row Crop vs. Cereal in 2-year crop-fallow rotation (No fertilizer applied)

After 8 years the NO_3 status under the sunflower-fallow rotation was much higher than under the wheat-fallow rotation.

In fall of 1972 the NO_3 in lb/acre after wheat or sunflower crop was as follows:

<u>Depth</u>	<u>Wheat</u>	<u>Sunflowers</u>
0 - 6"	7 - 8	7 - 8
1 - 2'	11	38
2 - 3'	10	37
3 - 4'	28	28