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Cropping and Fertilizing Wheat and Barley In the Camas Prairie — Fairfield Area

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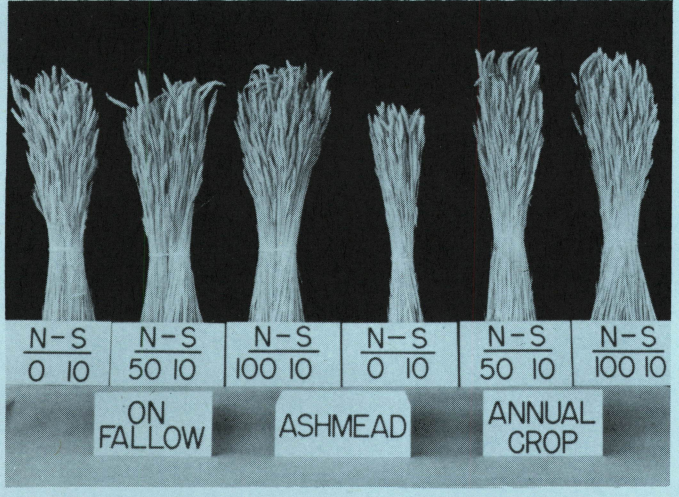
Wheat and barley grown every year with proper fertilization yielded as well as or better than when grown after fallow without fertilizer. Successful annual cropping requires: (1) selecting normal medium-textured (not droughty) soils, (2) controlling weeds, and (3) applying adequate nitrogen and sulfur. In general, annual cropping is a soil-conserving practice.

Precipitation in the Camas Prairie usually ranges between 14 and 17 inches per year. About three-quarters of it comes in the winter as snow. A high water table is normally found in the spring, even on fields cropped the previous year. Therefore, fallowing does not usually increase the stored soil moisture.

Fallowing does increase available nitrogen and sulfur and helps control weeds. During 3 years, 33 experiments were conducted near Fairfield in Camas County to determine if fertilizers could meet nutrient requirements and if 2, 4-D could replace fallowing for weed control in an annual cropping system.

Selecting Fields for Annual Cropping

Most medium-textured soils can be successfully cropped every year. These soils included the Simonton, Brinegar, Rands and Strom series. Some gravel in the soil profile can be tolerated though not so much to restrict root development and soil moisture movement. Coarse-textured Riceton sandy loam soil produced poor crops of wheat and barley when cropped annually because of its low water-holding capacity. Cleek loam has an impervious subsoil so it produced a spotty crop, depending on variations in the subsoil.



Comparable bundle yield samples from fallow and annual cropping plots on the Arlin Ashmead farm near Fairfield.

Weeds must also be controllable without fallow, for successful annual cropping. If herbicides such as 2, 4-D or MCP will not control weeds, summerfallow may be needed. When fallowing for weed control, every effort should be made to eliminate weeds. For example, perennial weeds should not be allowed to grow, nor should annual weeds be allowed to go to seed. However, cultivation during the fallow for other than weed control is usually not warranted.

Balancing Nitrogen and Sulfur

Cereals grown without sulfur (S) were yellow, small and unthrifty, especially when nitrogen (N) was applied under annual cropping (Fig. 1). On soils low in S, as on the Camas Prairie, at least 1 pound of available S is needed for every 10 pounds of N applied. S is available in ammonium sulfate (24% S), gypsum (18% S) and in several liquid fertilizers. Although ammonium sulfate contains more S than is needed for the N it contains, the extra S will neither harm nor help the yield. A blend of two or more fertilizers can be mixed commercially to provide the desired ratio of N to S (10 to 1).

In another study on the Camas Prairie, most of the sulfur from either ammonium sulfate or gypsum leached out of the top 1 foot of soil during the winter.* Therefore, either product must be applied in the spring for maximum use by the seedling. The fertilizer should be applied before or at planting. Unless elemental sulfur (100% S) is ground extremely fine or used in large quantities, it will not provide adequate available sulfur immediately.

Other Fertilizers

Phosphorus, potassium and zinc fertilizers were tested but none proved beneficial in this area. Soil tests for these elements are reliable and should be used for identifying problem areas.

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* D. T. Westermann. Unpublished data on alfalfa sulfur relationships, 1974 Annual Research Report, Snake River Conservation Research Center, Kimberly.

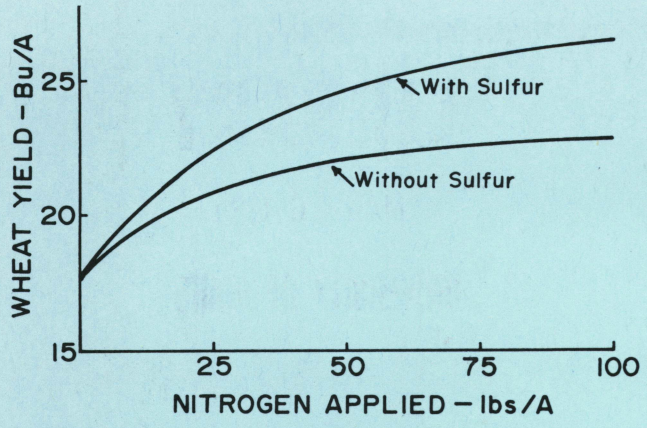

Fig. 1. Wheat yield response to nitrogen fertilizer with and without adequate sulfur on annually cropped plots (data from two years).

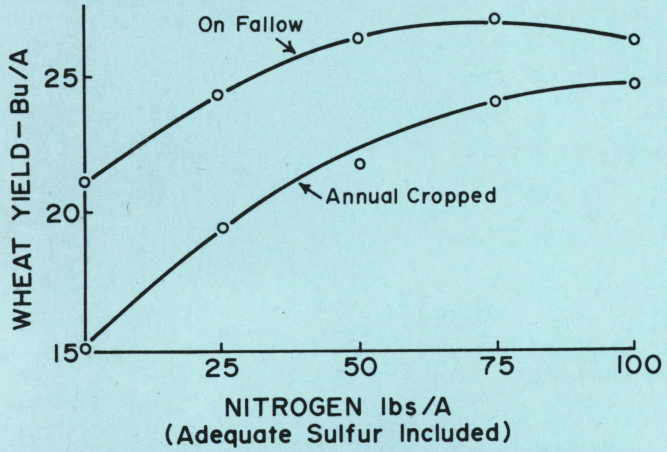

Fig. 2. Wheat yield response to nitrogen rates, with adequate sulfur, under two cropping systems.

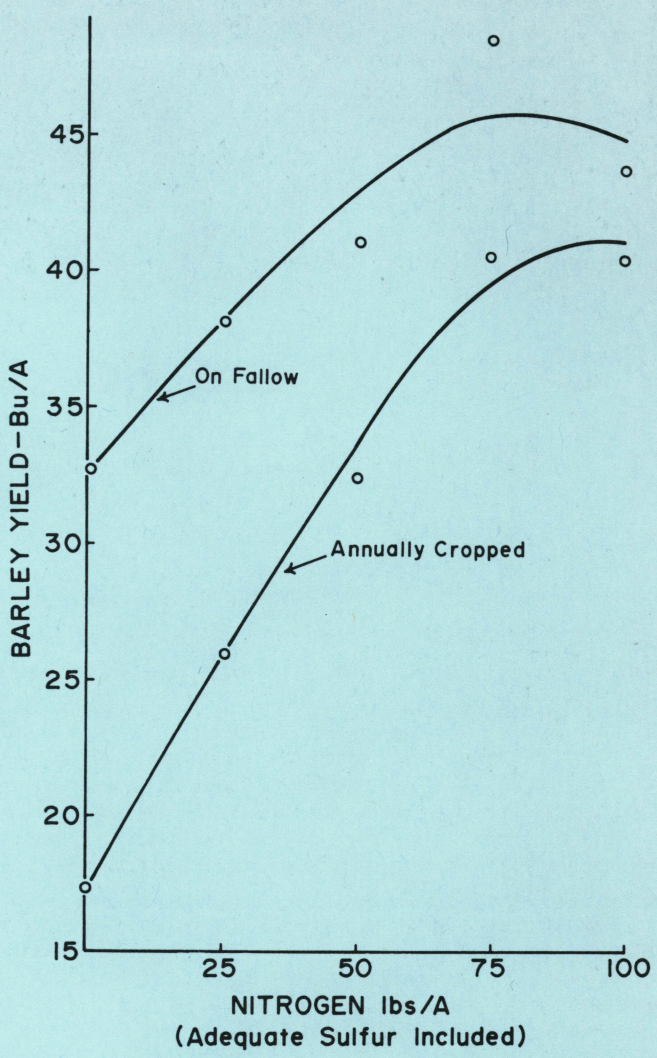

Fig. 3. At right: Barley yield response to nitrogen rates under two cropping systems.

Wheat Yields and Quality

Yields of 24 bushels per acre were produced with 75 lbs N/acre (with S) applied to annually cropped wheat or with 25 lbs N/acre (with S) applied to wheat after fallow (Fig. 2). Wheat test weight and protein content were about equal under fallow and annual cropping with various N + S application rates. Therefore, on selected fields and with chemical weed control, annual cropping with sufficient N and S provides an economic advantage.

Barley Yields and Quality

Barley yields from annual cropping with 75 lbs N/acre (with S) were about equal to yields from fallow plots fertilized with 25 lbs N/acre (38 bushels per acre). Yield curves are shown in Fig. 3.

Barley test weight and kernel size were good from most treatments, although slightly below malting grade on some nonfertilized annually cropped plots. The protein content was about 9 percent, acceptable for malting but slightly low for feed barley. Other micro-malting tests showed that the barley had a good malting quality.

Therefore, annual cropping barley with proper fertilization on selected fields where weeds can be controlled provides an economic opportunity.

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