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PROJECT TITLE: Comparison of Spring Wheat and Barley Varietal Response Under Conditions of Low Versus Optimum Fertility Off-Station at Turner.

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OBJECTIVES:

1. To evaluate and demonstrate the general, long-term effects of optimum fertility on dryland spring wheat and barley production under conditions common to the "Big Flat" area of northern Blaine County.

2. To add "lower and moderate level" protein observations for spring wheat varieties to existing databases utilized for evaluation of variety performance on the basis of gross production value as influenced by yield, protein and market.

3. To explore and classify potential differences, if any, among varieties in their response to fertilizer, particularly nitrogen.

RESULTS:

General spring wheat and barley response to applied fertilizer at Turner was strong throughout a 5-year study ending in 1998. In a previous, single-year study at the same location in 1986, dramatic and economically significant responses due to protein were obtained in the absence of meaningful yield differences (data not reported here). Growers previously reported that economic response to fertilizer under commercial-scale dryland production systems on the Big Flat were inconsistent. After acquiring plot equipment more appropriate for crop nutrition work, NARC initiated a 5-year trial series at the Turner location in 1994.

The 1994-1998 results were presented in the 1998 MWBC report in five-year summary format following completion of the study. In 1999, a condensed format, single-page table featuring agronomic and economic spring wheat variety response was prepared for seminar handout and County Extension Agent newsletter purposes. Due to producer interest in this topic in 1999 winter seminars, the spring wheat data via the new condensed table is repeated here.

Agronomic and economic performance data for 13 spring wheat varieties grown in each of the 5 years, fertilized and unfertilized, are presented in Table 1 with varieties listed in descending order by 5-year average $/Ac fertilized return (gross less fertilizer cost).

SUMMARY:

Four adjacent trials were established on unfertilized fallow (2 each for spring wheat and barley cultivars) with one trial for each crop fertilized at planting time. Standard plot techniques were employed with 3 replications in a randomized complete block design. Entries were planted in 3-row plots, 20 feet in length on a 12-inch spacing utilizing a self-propelled cone seeder equipped with 'haybuster' hoe openers and capability to band granular fertilizer 1.0-1.5 inches directly below the seed. Applied fertilizer was constant at 66#N and 33#P_2O_5 per acre. Plots were trimmed to 16 feet and harvested with a 'Hege 125C' plot combine until 1997

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when a 'Wintersteiger 1541-21' plot combine (partially funded by MWBC) replaced the former machine. Bread wheat prices used were based on annual average values for each year under procedures reported separately by NARC-Havre in this 1999 report to MWBC from the Research Centers. Average annual feed wheat prices were used for any production below 12% protein. Fertilizer prices were based on average annual retail values for the Hi-Line area.

FUTURE PLANS:

These investigations were terminated since collection of a 5-year database as initially planned was completed. Depending upon further interpretation of results, related investigations may be initiated under other environments in the future. Such investigations may include use of an air drill with fewer varieties and varying levels of fertility.

TABLE 1. [1]FIVE-YEAR AVERAGE AGRONOMIC AND ECONOMIC PERFORMANCE SUMMARY FOR 13 HARD RED SPRING WHEAT VARIETIES GROWN UNDER *UNFERTILIZED VS. FERTILIZED* DRYLAND FALLOW CROPPING CONDITIONS OFF-STATION AT THE LEON CEDERBERG FARM, TURNER. NORTHERN AGRICULTURAL RESEARCH CENTER. HAVRE, MONTANA. 1994-1998.

	YIELD (Bu/Ac)		PROTEIN (UNFERTILIZED)		PROTEIN (FERTILIZED)		[3]GROSS RETURN ($ / Ac)		[4]NET RETURN ($/Ac)	[5]ADDED RETURN ($/Ac)	[6]ADDED RETURN ($/$)
VARIETY	UNFERT	FERT	(%)	[2]($ Prem.)	(%)	($ Prem.)	UNFERT	FERT	FERTILIZED	FERTILIZED	FERTILIZED
McNEAL	31.5	42.8	10.9	.00	14.6	24.40	124.20	215.00	195.77	71.59	3.72
HI-LINE	30.5	42.6	11.0	.66	14.3	23.35	119.80	211.20	191.97	72.11	3.75
AMIDON	33.5	42.2	11.1	1.26	13.9	20.50	131.10	206.80	187.57	56.43	2.93
WESTBRED 926	31.2	40.9	11.6	2.80	14.6	24.39	129.40	206.30	187.07	57.70	3.00
NEWANA	31.5	43.5	10.5	.33	13.5	15.70	116.50	205.70	186.47	69.94	3.64
ERNEST	31.9	41.2	11.4	1.80	14.7	24.04	129.90	205.50	186.27	56.40	2.93
GRANDIN	30.9	40.3	11.4	2.01	14.8	24.46	122.90	203.80	184.57	61.72	3.21
GLENMAN	30.7	42.7	10.4	.00	13.4	15.97	109.40	203.10	183.87	74.45	3.87
STOA	30.9	39.7	10.9	.79	14.7	23.40	121.40	201.90	182.67	61.22	3.18
LEN	32.2	39.6	11.8	2.06	14.6	25.09	136.20	201.20	181.97	45.77	2.38
RAMBO	29.8	38.6	10.8	.00	14.0	20.58	109.70	192.00	172.77	63.00	3.28
FORTUNA	26.3	36.4	11.8	2.64	14.4	21.06	112.30	183.00	163.77	51.43	2.67
LEW	29.1	36.9	10.6	.06	14.2	21.13	109.30	182.80	163.57	54.27	2.82
GRAND MEANS	30.8	40.6	11.1	1.11	14.3	21.85	120.90	201.40	182.17	61.23	3.18

[1]Abridged data presentation format (see full report for statistical analyses, narrative interpretation, and year by year climatic & plot management details). All values are 5-yr ave.'s.
[2]Small protein premiums for average protein less than 12% are possible in this summary as values presented are the average of a 5-yr period during which protein greater than 12%, with a corresponding premium, may have occurred in one or more individual years without protein averaging 12% or greater over all five years.
[3]Gross return including protein premium, if any (before consideration of fertilizer costs or any other production costs).
Annual average Portland market values used for milling wheat with protein => 12.0%. Average annual feed wheat market values used for wheat <12% protein.
[4]Gross return less 5-yr average fertilizer cost per acre for 66-33-0 (1994 = $18.11, 95 = $21.88, 96 = $19.63, 97 = $18.99, and 98 = $17.56). Ie, 'Net' after 'fertilizer' costs only.
[5]Added dollar return due to fertilization (after subtracting fertilizer costs), as compared with unfertilized performance of the same variety.
[6]Added dollar return per fertilizer dollar invested, as compared with unfertilized performance of the same variety.