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Tests With Beans

Outlying Testing Report 9

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By: A.I. Dow
Specialist in Outlying Testing

SUMMARY

The various fertilizer treatments used in the six bean trials increased yields in many cases. In one trial (Nelson) the yield increases were substantial, particularly from nitrogen, but also from phosphorus and zinc.

Nitrogen -- On beans following a crop other than beans, highest yields were obtained with 120 to 160 pounds of nitrogen per acre. On beans following beans, the yields varied, but highest yields appeared to be at 40 pounds of nitrogen.

Phosphorus -- Some response to phosphorus on two trials.

Zinc -- Some response to zinc on one trial. Most of the areas had received zinc in previous years.

Potash and minor elements -- No increase in yield.

Returns per acre -- The amount one can expect in return for his fertilizer dollar will vary with conditions. It usually pays to fertilize and sometimes the return is considerable. For example, in the Nelson Trial (See Table 3) there was a 95 per cent chance of obtaining $33.72 per acre above the cost of the 120 pounds of nitrogen used.

For recommendations see Extension Bulletin 497, "Growing Field Beans in Central Washington Irrigated Areas."

OUTLYING TESTING IN WASHINGTON

Outlying testing is a joint project of the Experiment Stations and Extension Service of the State College of Washington. The program is conducted in cooperation with local farmers. In eastern Washington work is being done in Franklin, Adams, and Grant counties of the Columbia Basin. Trials have been conducted on dry beans, wheat, barley, oats, field corn, grain sorghum, and peas. In 1956 fifteen trials were conducted on small grain varieties, pea fertility, bean fertility, corn fertility and corn varieties. The locations represent a wide range of climatic and soil conditions throughout the Basin area. The locations of all the trials are listed in Table 3. In addition to the 15 listed, a few trials were started but were unavoidably eliminated before being carried to completion.

1956 Bean Fertility Trials

Fertility trials on Red Mexican field beans were conducted at six locations. The locations for each trial along with the cooperators and the soil type are listed in Table 4. Information on the cropping and fertilizer history is presented in Table 1. All trials were on land previously cropped under irrigation. Part of the Black trial area at Quincy had been moderately leveled. All other trials had been leveled only slightly. All leveling took place previous to 1956.

The yields of beans as they were influenced by the various fertilizer treatments are presented in Table 2. Each value is an average of four plots receiving the same fertilizers. For each trial, the plot yields were subjected to a statistical analysis. This was to determine to what extent the differences in yield were actually due to the different fertilizer treatments. In all except the Nelson trial, plot variation had a tendency to cover up the differences which may have been due to fertilizers.

The following statements can be made regarding the results of the trials:

1. Nitrogen -- (See Fig. 1) Most of the trials appear to have responded to nitrogen. In the case of the Nelson trial, the response was substantial. In the Nelson and Black trials, which had been in potatoes and wheat respectively in 1955, the highest yields were obtained at 120 and 160 pounds of N per acre. In the other four, which had been planted to beans in 1955, the responses which were present reached their peaks at 40 pounds of N per acre.

2. Phosphorus -- In two trials Holloway and Nelson, the yields were lower in the absence of phosphorus.

3. Zinc -- As seen in Table 1, most of the locations had received zinc in previous fertilizer programs. These did not indicate a response to zinc. Of those which did not receive zinc, only the Nelson trial showed a response to zinc.

4. Potash and Minor Elements -- There is no evidence of a yield response to this treatment. In fact, in some cases, the yields appear to have been depressed somewhat (particularly in the Snekvik and Nelson trials). There is no obvious explanation for these apparently lower yields.

It is of interest to note (Table 3) the return for the investment in the fertilizer from the Nelson trial, and the probability of obtaining this return based on a statistical analysis of the plot yields. Obviously, the returns from the other locations were

not as high. Nor was the probability as great for obtaining the returns. However, one should remember that it requires only:

90 pounds of beans to pay for each 40 pounds of N.
60 pounds of beans to pay for each 40 pounds of P_2O_5.
60 pounds of beans to pay for each 10 pounds of zinc.

Table 1. Information on the Soils of the Bean Trial Locations.

Location	Soil Type	Crop and Fertilizer* History
Quincy (Holloway, Blk. 75)	Timmerman very fine sandy loam	1955 beans, N-74 pounds per acre, Zn-10 pounds. per a 1954 sagebrush.
Quincy (Black, Blk. 72)	Haywood silt loam	1955 wheat, N-35 pounds per acre 1954 beans, N-50 pounds per acre P_2O_5 - 45 pounds per acre Zinc spray
Warden (Nelson, Blk. 44)	Warden silt loam	1955 potatoes (Fertilizers not known) 1954 dry land wheat.
Othello (Risenmay, Blk. 49)	Scooteney-Ringold complex, very fine sandy loam	1955 beans, N-110 pounds per acre Zn- 10 pounds per acre 1954 sagebrush
Othello (Snekvik, Blk. 49)	Ephrata very fine sandy loam	1955 beans, N-100 pounds per acre Zn-10 pounds per acre 1954 sagebrush.
Mesa (Persons, Blk. 12)	Glade very fine sandy loam	1955 beans, N-40 pounds per acre 1954 vetch-rye cover crop, N-100 pounds per acre

*All figures refer to pounds per acre of actual nitrogen, actual P_2O_5, and actual zinc.

Table 2. Yield of Beans as Influenced by Various Fertilizer Treatments

Treatment, pounds per acre									
Nitrogen (N)	Phosphorus (P_2O_5)	Potassium + M. E.[1] (K_2O)	Zinc (Zn)	Quincy (Holloway)	Quincy (Black)	Warden (Nelson)	Othello (Risenmay)	Othello (Snekvik)	Mesa (Persons)
0	100	0	10	2849	2845	2890	2316	2052	3904
40	100	0	10	3265	3011	3114	2551	2361	3811
80	100	0	10	3234	3076	3390	2347	2386	4224
120	100	0	10	3034	3170	3722	2544	2366	3494
160	100	0	10	3206	3311	3579	2410	2331	3605
120	100	0	10	3034	3170	3722	2544	2366	3494
120	0	0	10	2688	3098	3406	2403	2309	3514
120	100	0	0	3290	3027	3327	3088	2375	3597
120	100	100	10	3002	3077	3427	2318	1979	3916

NOTE: The table is divided into 2 sections. Comparisons of nitrogen rates may be made in the upper section. Phosphorus, zinc, and the "complete" treatments can be compared in the lower section. The 120-100-0-zinc treatments appear in both sections.

[1] Minor elements -- calcium, magnesium, sulfur, iron, manganese, boron, copper, and molybdenum were all included in the treatment with potassium.

Table 3. Yield Increase and Value of Extra Beans from the Nelson Trial Resulting from Certain Fertilizer Treatments.

Fertilizer (lbs. /acre)	Fertilizer cost[1] (per acre)	Yield increase (lbs. /acre)	Value of extra beans[2] (per acre)	Return over cost of fertilizer (per acre)	Odds in favor of this return (greater than)	% chance in favor of this return (greater than)
N-120	$ 16.20	832	$49.92	$ 33.72	19 to 1	95
P_2O_5-100	9.00	316	18.96	9.96	4 to 1	80
Zinc - 10	3.50	395	23.70	20.20	9 to 1	90

1 Fertilizer costs are figured at 13.5¢ per pound for nitrogen, 9¢ for P_2O_5 and 35¢ for zinc. The cost of application is not included.

2 Beans are figured at $6.00 per cwt. Harvest and hauling costs are not included.

Figure 1. Influence of Nitrogen on Bean Yields

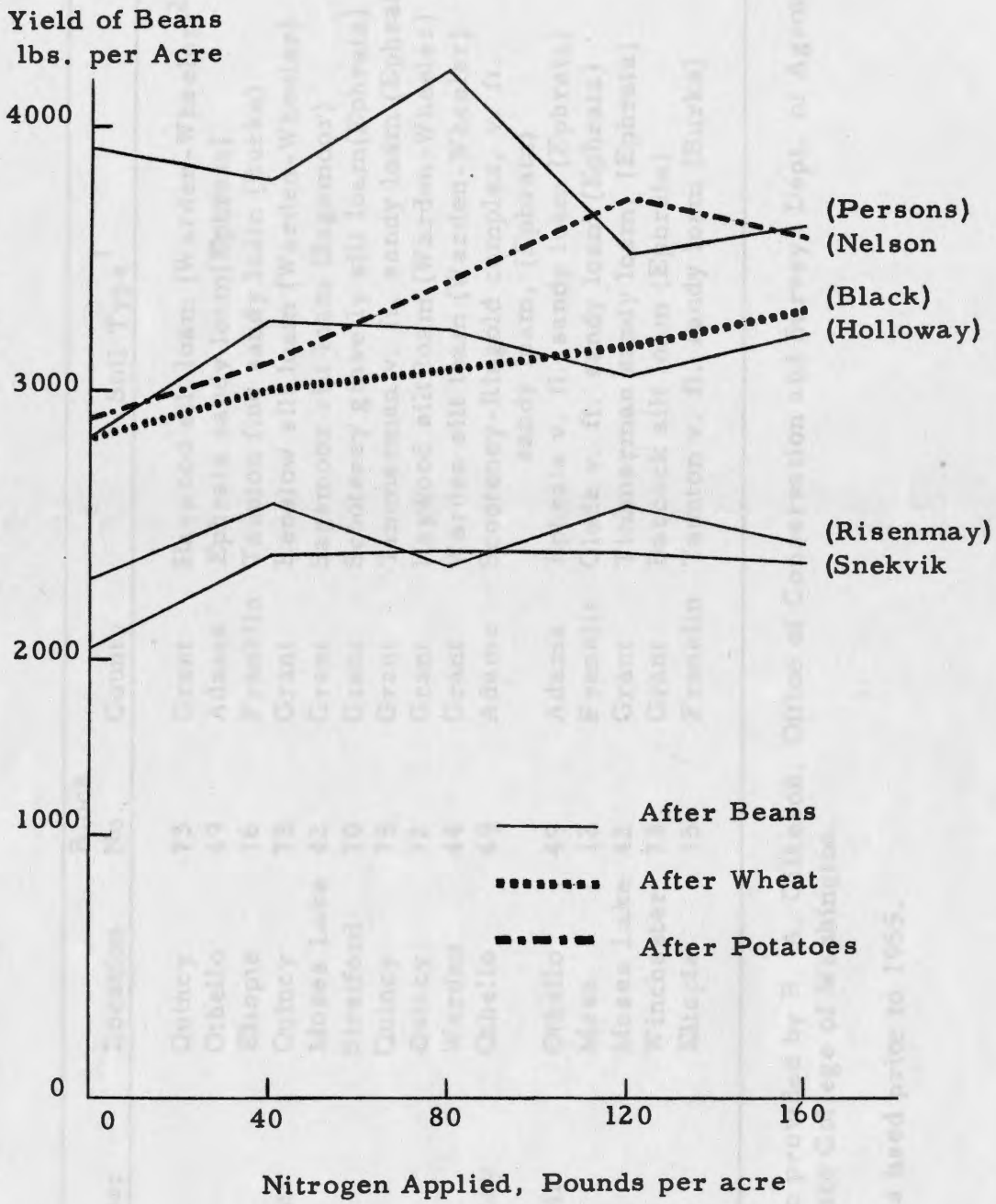

Table 4. Locations of 1956 Columbia Basin Outlying Testing Trials

Farm Cooperator	Location	Block No.	County	Soil Type[1]	Type of Trial
Sid Flanagan	Quincy	73	Grant	Haywood silt loam (Warden-Wheeler)[2]	Grain varieties
Ralph Parks	Othello	49	Adams	Ephrata sandy loam(Ephrata)	Grain varieties
Dale Worshem	Eltopia	16	Franklin	Taunton fine sandy loam (Burke)	Grain varieties
Everett Mietzner	Quincy	73	Grant	Renslow silt loam (Warden-Wheeler)	Pea fertility
Ken Goodrich	Moses Lake	42	Grant	Sagemoor silt loam (Sagemoor)	Pea fertility
Willis Suhbier	Stratford	70	Grant	Scooteney gravelly silt loam(Ephrata)	Pea fertility
Bob Holloway	Quincy	75	Grant	Timmerman v. fi. sandy loam (Ephrata)	Bean fertility
Murphy Black	Quincy	72	Grant	Haywood silt loam (Warden-Wheeler)	Bean fertility
D. E. Nelson	Warden	44	Grant	Warden silt loam (Warden-Wheeler)	Bean fertility
Howard Risenmay	Othello	49	Adams	Scooteney-Ringold complex, v. fi. sandy loam, (Ephrata)	Bean fertility
Clarence Snekvik	Othello	49	Adams	Ephrata v. fi. sandy loam (Ephrata)	Bean fertility
Jim Persons	Mesa	12	Franklin	Glade v. fi. sandy loam (Ephrata)	Bean fertility
Al Woolman	Moses Lake	42	Grant	Timmerman sandy loam, (Ephrata)	Corn fertility
Ken Schroeder	Winchester	73	Grant	Babcock silt loam (Ephrata)	Corn variety
Max Pyles	Eltopia	15	Franklin	Taunton v. fi. sandy loam (Burke)	Corn variety

1 Information provided by R. A. Gilkeson, Office of Conservation and Survey, Dept. of Agronomy, State College of Washington.

2 Series names used prior to 1955.

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