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1955 Tests With Beans

Outlying Testing Report 5

EXTENSION SERVICE
STATE COLLEGE OF WASHINGTON
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General Observations And Recommendations

The variable plot yields from the 1955 Bean Trials illustrate the wide variability of soil conditions among locations and even within a farm unit. It is emphasized that work from a single year is not conclusive. Repeated trials are necessary over a period of years and on different soil types.

Information from a large number of experimental trials and observations in the Columbia Basin shows that maximum yields cannot be assured without a fertilizer program which includes nitrogen, phosphorus and zinc. This is particularly true on areas where any leveling has been done.

General recommendations on new land are: 80 to 120 pounds of nitrogen; 40 pounds of available phosphorus (P_2O_5); and 10 pounds of zinc. Several years' supply of phosphorus can be applied at one time if desired. For example, 120 pounds of available phosphorus will be adequate for three years. The recommended zinc application will last for at least four years. Apply some nitrogen each year, reducing the application of nitrogen on old land which has previously had fertilizer according to the estimated nitrogen level.

For more specific recommendations based on local conditions, see your County Extension Agent.

1955 Tests With Beans

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Outlying Testing began in 1953 as a State College of Washington program. It is a joint project of the Experiment Stations and Extension Service, and is accomplished through cooperation with local farmers in the areas where trials are conducted. 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, field corn, grain sorghum, and barley.

In 1955 thirteen trials were conducted on bean fertility, corn fertility, corn varieties, and sorghum varieties. These were run on a wide range of soil types and on locations scattered throughout the Basin area. In addition to variation in soils, the locations represent differences in elevation and in climate. Of particular importance are the differences in temperatures and length of frost-free season. The locations of all the trials are listed in Table 3. This report gives the results from the work on beans. Separate reports cover the results of the work on corn and sorghum.

1955 Bean Fertility Trials

Information about the locations for the five 1955 bean fertility trials is presented in Table 1. Note that two of the trials were on second year bean land and the other three on newly irrigated land. Some leveling was done on four of the sites before they were brought under cultivation. Red Mexican beans were used in all cases.

The bean plots were fertilized by side dressing soon after the beans came up. Each of the treatments was repeated four times within each trial. Ammonium nitrate was used as the source of nitrogen, treble superphosphate as the source of phosphorus, and zinc sulfate as the source of zinc. Nitrogen was applied at 0, 40, 80, 120, and 160 pounds per acre along with 60 pounds of phosphorus (P_2O_5) and 10 pounds of zinc. The other two treatments were (1) nitrogen at 120 pounds per acre with zinc but no phosphorus and (2) nitrogen at 120 pounds with phosphorus but no zinc.

Results of Bean Tests

The plots were setup at each location in such a way that the results could be accurately measured. Every effort is made in such work to keep everything the same, except the amount of fertilizer applied. However, variations normally can be expected because of differences in soil and in plant growth. The real meaning of these differences can be learned by using statistical methods. Significant dif-

Table 1. Information on Soils Used for Bean Trials

Location	Block No.	Soil types	Soil test data[1] P_2O_5	pH	Previous crops or condition	Fertilizer used in 1954 (lbs. per A.)	Av. amt. of leveling (ft.)
			Lbs./Acre				
Eltopia	15	Royal loamy fine sand	12 (V.Low)	7.8	Dry land wheat	None	Cut 0.8
Mesa	12	Eltopia fine sandy loam	11 (V.Low)	8.1	Dry land wheat	None	Cut 0.5
Othello	49	Ephrata silt loam	30 (Low)	7.5	1954, beans	N-100	Cut 0.1
						Zinc-10	
Warden	44	Warden silt loam	28 (Low)	7.3	Dry land wheat	None	0.0
Quincy	72	Warden silt loam	10 (V.Low)	7.9	1954, beans	N-80	Cut 0.8
						Zinc-sprayed on beans	

[1] Courtesy, Soil Testing Laboratory, State College of Washington. In addition to phosphate—potash, calcium, and magnesium were determined and found to be in adequate supply according to the tests. Organic matter was determined and, as expected, was found to be low in all cases.

ferences have been calculated for each location. These are not the same since the variability at each location was different.

The observed differences in yield may be due to chance alone or due to the treatment. By means of statistics you can decide which cause was more nearly the real reason for the difference. In general, large differences between different treatment yields are more significant than small differences. From a given comparison between the effect of two treatments, a yield difference that is larger than a certain figure is said to be statistically significant. A yield that is less than this calculated figure could have occurred by chance alone and is therefore not significant. This figure, which serves as the dividing line between significant and not significant, is called the least significant difference (LSD). The LSD will not be the same amount in every case.

Based on such an analysis, the following points can be made:

1. **Nitrogen definitely increased the yields of beans in Block 12 and probably increased the yields in Block 44. There was a marked increase in yield in Block 15 and a small increase on the second-year-bean land of Block 72 but the differences are not considered significant because of extreme plot variation. In most cases the highest yields were obtained from the 120-pound rate of nitrogen as shown in Figure 1.**
2. **Phosphorus definitely increased the yields in Block 72 and probably increased the yield in Block 12. There was an increase in yield in Blocks 15 and 44 where phosphorus was applied, but in these two the differences were not considered significant because of the plot variation.**
3. **Zinc had no influence on yield in any of the trials.**
4. **In Block 49, yields were depressed in the presence of both nitrogen and phosphorus.**

Results from Block 49 did not follow the pattern found at the other locations. Added nitrogen and phosphorus decreased the yields rather than increased them. The reasons for this are not clear. A partial explanation may be high residual nitrogen level in the soil from last year, and an abnormal delay in maturity of the beans. Some of the differences may have leveled out at a later date of harvest but there are no data to support this explanation.

The lack of response to zinc was unexpected in view of the wide-spread zinc deficiency in the Basin. Although located on cut areas in most cases, there was little or no evidence of zinc deficiency on the plot areas. In contrast to this, zinc deficiency in the Basin was wide-spread in 1955, as it was in 1954, and in many cases rather severe, necessitating a spray application where zinc had not been applied to the soil.

Table 2. Yield of Beans as Influenced by Treatments of Nitrogen, Phosphorus and Zinc

Treatment			Yield in Pounds Per Acre				
Nitrogen (N)	Phosphorus (P_2O_5)	Zinc (Zn)	Block No.: 15 Location: Eltopia	12 Mesa	49 Othello	44 Warden	72 Quincy
0	60	10	1687	1843	3399	3892	2547
40	60	10	1857	2471	2804	4145	2515
80	60	10	1800	2721	2761	4198	2594
120	60	10	1978	2815	2409	4340	2714
160	60	10	2372	2757	2364	4277	2686
120	0	10	1380	2178	2875	4084	2278
120	60	0	2451	2838	2333	4298	2726
L.S.D.*			N.S.†	790	403	481	438

*L.S.D. (Least Significant Difference), refers to the amount necessary between any two yields within a trial before the difference can be considered real and not due to chance variation.

†Not Significant. All differences in this trial could have occurred by chance. There were large variations in plot yield in the Block 15 trial, apparently due to a differential in soil depth and effective soil moisture.

Figure 1. Influence of Nitrogen on Bean Yields

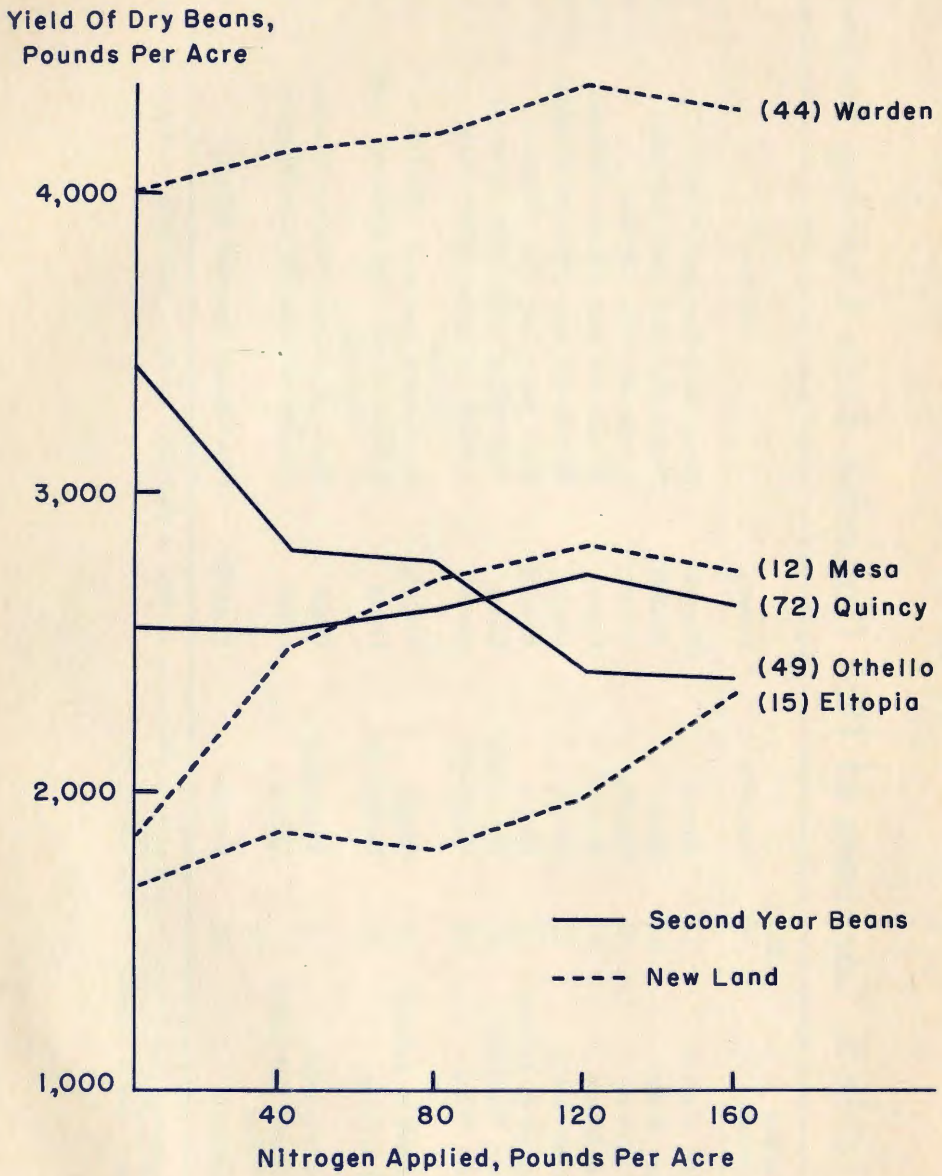

Table 3. Locations of 1955 Columbia Basin Outlying Testing Trials

Farmer Cooperator	Block No.	Location	County	Soil type*	Type of trial
Ralph Kincaid	15	Eltopia	Franklin	Royal loamy fine sand (Othello)**	Bean fertility
Eldon Jenks	12	Mesa	Franklin	Eltopia fine sandy loam (Ephrata)	Bean fertility
Jay Jenkins	49	Othello	Adams	Ephrata silt loam (Ephrata)	Bean fertility
D. E. Nelson	44	Warden	Grant	Warden silt loam (Warden-Wheeler)	Bean fertility
Murphy Black	72	Quincy	Grant	Warden silt loam (Warden-Wheeler)	Bean fertility
Marshall & Lafferty	15	Eltopia	Franklin	Royal loamy fine sand (Othello)	Corn fertility
Alfred Woolman	42	Moses Lake	Grant	Timmerman sandy loam (Ephrata)	Corn fertility
Erwin Wiser	73	Winchester	Grant	Babcock silt loam, shallow phase (Ephrata)	Corn fertility
Marshall & Lafferty	15	Eltopia	Franklin	Royal loamy fine sand (Othello)	Corn variety
Bill Bellomy	41	Moses Lake	Grant	Ephrata gravelly very fine sandy loam (Ephrata)	Corn variety
Ken Schroeder	73	Winchester	Grant	Haywood silt loam (Warden-Wheeler)	Corn variety
Lawrence and Eldon Weber	74	Quincy	Grant	Renslow silt loan (Warden-Wheeler)	Sorghum variety
Ed Bobson	16	Eltopia	Franklin	Hazel loamy fine sand (Quincy)	Sorghum variety

*Information obtained through courtesy of R. A. Gilkeson and the Dept. of Conservation and Survey, State College of Washington. The new series names will appear in a survey report now in press.

**Series names in parenthesis were used prior to 1955.

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