

The Effect of Fertilization on Potato Yields¹

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The potato is an important food crop in many countries of Latin America; but as yet in Honduras, it is of only minor significance. The average yield of potatoes, as indicated in table 1, is low, mainly due to the low fertility of the soil, disease and insect problems, and an insufficient knowledge of modern methods of potato production (2).

The present investigation was conducted during the 1961-62 and 1962-63 growing seasons to study the response of potatoes to fertilizers.

METHODS AND MATERIALS

The experimental plots were located at the Escuela Agricola Panamericana in El Zamorano, Honduras. The area has an elevation of 780 meters above sea level. The annual temperature ranges from 11° C to 29° C, with a mean average of 21°C; and a total rainfall of 100 to 120 mm. during the December to March growing season for potatoes in this area.

TABLE 1.—Potato production in Honduras during 1951 to 1960.

Year	Total area ha.	Total production metric tons	Average Yield tons/ha
1951	960	1,814	1.89
1952	970	1,894	1.95
1953	980	1,944	1.98
1954	1,020	1,994	1.95
1955	1,040	2,044	1.97
1956	1,020	2,004	1.96
1957	1,070	2,094	1.96
1958	1,046	2,044	1.95
1959	1,011	1,974	1.95
1960	884	1,727	1.95

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TABLE 2.—Soil analyses for the two fields in La Vega used in this study.

Soil Properties	Field N° 1	Field N° 2
1. pH	5.4	5.6
2. N ppm	20.0	15.0
3. P ppm	5.2	7.9
4. K ppm	225.0	285.0
5. Organic matter (%)	2.5	2.9
6. Clay (%)	28.6	25.2
6. Silt (%)	30.5	32.6
6. Sand (%)	41.9	42.2

1. pH determined with a glass electrometric potentiometer on a 1:10 water mixture after allowing the suspension to stand 15 minutes.
2. Nitrogen determined as Kjeldahl N (4).
3. The molybdate blue procedure was used to determine the P extracted by the Morgan method (3).
4. Potassium determined on sodium acetate extract by the Cobaltrinitrite method (3).
5. Organic matter determined by the Walkley-Black method (4).
6. Clay, silt and sand analysis were made according to the Bouyoucos method (1).

The soil analysis data of the two fields in La Vega used in this study are summarized in table 2. Sebago potatoes were planted on December 14, 1961 in field N° 1, and on December 21, 1962 in field N° 2; in rows one meter apart with 25-cms. spacing between seed pieces. A 2x2x2 factorial experiment in a complete randomized block design with two replicates was used.

The levels of nutrients used were, 0 and 80 kgs. per hectare of N in the form of urea, 0 and 53 kgs. per hectare of P in the form of triple superphosphate, and 0 and 66 kgs. per hectare of K in the form of potassium chloride. All the eight treatments received a uniform application of 5 kgs. per hectare of 50 percent chlorodane at the time of planting. Three weeks after planting, all the plants received periodical spray applications of 2 kgs. per hectare of Cupravit-extra, 2 kgs. per hectare of Dipterex S. P. 80. and 500 ml. per hectare of Folidol M48: for the control of blights and insects. Water was applied by an overhead irrigation system when the available moisture dropped to 50 percent.

RESULTS AND DISCUSSION

Data on analysis of soil samples taken from the fields prior to the study indicated that a response to N and P was to be expected. The analysis showed that the K supply in the soil was adequate.

The data in table 3 indicates that in both the fields, the potato yields were significantly increased by fertilizer applications. The yield increases obtained by N and P applications are in agreement with results obtained with other crops in these soils, but the significant effect



Fertilizer testing with potatoes at the Escuela Agrícola Panamericana



The over head irrigation system used in this study

TABLE 3. Response of Sebago potatoes to fertilizer treatments during the 1961-62 and 1962-63 growing season.

Treatment N—P—K	Yield of potato tubers metric tons/ha.	
	1961-62	1962-63
0- 0- 0	5.5a	5.8a
80- 0- 0	8.7b	10.0b
0-53- 0	15.4c	19.7c
0- 0-66	17.1d	17.9cd
80-53- 0	17.6de	16.6de
80- 0-66	18.8e	18.0cde
0-53-66	21.7f	22.5f
80-53-66	26.5g	32.4g

Yields followed by the same letter are not significantly different at the 5 per cent level based on Duncan's multiple range test.

of K on potato yields is unique (5). This indicates that even on soils where the K level should be adequate, as indicated by soil test, additional K in the form of fertilizers increases potato yields. This need for additional K would probably become more pronounced when high yields are to be maintained over a long period of time. The yield of the check plots were nearly triple the average yield of potatoes in Honduras. This illustrates that the use of certified seed, and the control of diseases and insects are of primary importance for obtaining high yields. In both the fields the complete fertilizer treatment gave the highest yield.

SUMMARY

The results of this study indicate that the two tons per hectare low average yield of potatoes in Honduras can be effectively increased to a possible high of 32 tons per hectare by the use of adequate amounts of a complete fertilizer, and opportunate control of diseases and insects.

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