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The Effect of Minor Elements on the Yield and Storage Qualities of Onions

by

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This paper reports the progress of tests with a commercial fertilizer and minor element application on onions. In 1944 similar tests were conducted on the Western Slope in Delta County and at the Arkansas Valley Substation at Rocky Ford. While no minor element deficiency symptoms have been reported on onions, previous work on potatoes (1, 2, 3) indicated the possibility of marginal types of deficiency or unavailability of minor elements or lack of balance in nutrients. The object of the tests was to determine the effect of fertilizer and minor element additions to the soil on yield and keeping qualities in storage. This report covers only 1 year's test, and the work is being continued in 1945.

Experimental Methods

The data presented here are confined to the two major varieties and districts of onions, the Mountain Danvers variety on the Western Slope and the Sweet Spanish variety in the Arkansas Valley. Previous unpublished work on commercial fertilizers in the Arkansas Valley indicated that a nitrogen and phosphate mixture gave increased yields of onions, so in 1944 a test was set up to include the 5-33-0 fertilizer applied at the rate of 200 pounds per acre singly and in various combinations with copper, iron, manganese, and boron. Minor elements were applied at the rate of 25 pounds per acre in the sulfate form (except Boron) of each element in each single or combination treatment. The design was a randomized block using single-row plots 20 feet long, replicated five times. A single buffer row was used in between each treated plot.

The soil type in Delta County was a Persayo clay loam which had not been cropped for a period of 15 years. At Rocky Ford the test plots were located on Otero clay loam soil, and the crop planted after summer fallowing of the soil the year before or in 1943.

Treatments were applied at planting time in bands along the side of each row, at a depth of about 3 inches.

The storage data were obtained by weighing the bulbs from each plot in and out of storage, and the moisture, rot, and sprout losses determined separately at the end of the storage period. The five replications of each treatment were carried through storage as ungraded bulbs. The yield and storage data were evaluated by the analysis of variance method.

Effect of minor elements on the yield and keeping qualities of the Yellow Sweet Spanish variety of onions at Rocky Ford, Colorado

Treatment	Mean yield per plot*	Storage Losses** (Mean weight)			Total storage losses
		Moisture	Rot	Sprouts	
	Pounds		Pounds		Pounds
No treatment	16.5	3.1	.77	3.14	7.01
Fertilizer	20.6	2.4	.29	2.4	5.09
Fert. + copper	16.0	2.3	.15	2.64	3.09
Fert. + iron	21.6	4.2	.26	2.0	6.46
Fert. + manganese	20.4	2.7	.27	2.76	4.73
Fert. + boron	24.0	3.5	.68	2.0	6.38
Fert. + Cu, Fe	17.6	3.16	.34	2.0	5.50
Fert. + Cu, Mn	19.6	2.70	.21	3.0	5.91
Fert. + Cu, B	23.6	3.8	.27	2.6	6.67
Fert. + Fe, Mn	20.6	3.34	.67	2.46	6.47
Fert. + Fe, B	20.3	2.8	.65	2.16	5.21
Fert. + Mn, B	21.3	3.8	.07	2.44	6.31
Fert. + Cu, Fe, Mn	20.8	3.1	.30	2.50	5.90
Fert. + Cu, Fe, B	20.6	2.7	.16	2.66	5.52
Fert.+ Cu, Mn, B	22.0	2.3	.11	2.50	4.91
Fert. + Fe, Mn, B	20.6	3.3	.18	2.70	6.18
Fert. + Cu, Fe, Mn, B	19.9	3.1	.20	2.90	6.20

*Planted April 17, 1944; harvested Sept. 19, 1944 and placed in storage.

**Storage weights taken Feb. 21, 1945.

No significant difference between treatments.

Effect of minor elements on the yield and keeping qualities of Mountain Danvers variety of onions in Delta County, Colorado

Treatment	Mean yield per plot*	Storage losses** (Mean weight)			Total storage losses***
		Moisture	Rot	Sprouts	
	Pounds		Pounds		Pounds
No treatment	14.80	5.6	3.5	1.9	11.0
Fertilizer	13.75	4.05	5.1	1.5	10.65
Fert. + copper	16.40	4.10	6.4	2.1	12.60
Fert. + iron	15.75	4.10	6.2	1.9	12.20
Fert. + manganese	17.25	4.95	6.9	2.4	14.25
Fert. + boron	14.00	3.8	4.1	3.1	11.10
Fert. + Cu, Fe	15.70	4.65	5.35	2.3	12.30
Fert. + Cu, Mn	15.10	4.50	4.4	2.6	11.50
Fert. + Cu, B	18.70	4.40	5.5	3.9	13.80
Fert. + Fe, Mn	14.75	4.7	6.0	2.3	12.00
Fert. + Fe, B	15.10	4.4	5.3	2.1	11.80
Fert. + Mn, B	14.60	4.5	5.4	1.4	11.30
Fert. + Cu, Fe, Mn	15.35	4.4	5.5	1.95	11.85
Fert. + Cu, Fe, B	13.55	4.15	5.1	1.80	11.05
Fert. + Cu, Mn, B	14.70	3.90	4.1	1.45	9.45
Fert. + Fe, Mn, B	16.90	4.90	3.6	2.5	11.0
Fert. + Cu, Fe, Mn, B	16.90	5.0	7.1	1.9	14.0

*Planted April 10, 1944; harvested Sept. 11, 1944.

**Weighed out of storage April 12, 1945.

***Storage results were based on a month longer storage period than normal, under unfavorable conditions.

No significant difference between treatments.

SUMMARY

The F values obtained for treatments showed that there was no significant difference between treatments in effect on yield, or on moisture, rot, or sprout losses in storage. The data on yield and storage varied between treatments and some trends only were indicated.

Literature Cited

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