

Salt and Organic Matter Amendments
on the Jack Root and Don Boyle Farm

This experiment was conducted in cooperation with Dr. C. H. Ullery, OSU Soils Department.

The soil sample at the time of establishment is show below.

Soil test for soil amendment location, Jack Root and Don Boyle Farm,
Madras, Oregon.

Madras Loam Soil								
Soil depth in.	pH	P ppm	K ppm	Ca meq/100g	Mg meq/100g	Na meq/100g	B ppm	Salts (mmhos/ cm.)
0-8	6.0	44	262	12.2	8.2	0.33	0.36	0.67
8-16	6.7	11	320	9.7	6.6	0.35	0.33	0.45

The treatments are listed at the bottom of Table 43, and the entire area was rototilled four times to produce the heavy tillage effect of compacting the soil and interfering with water infiltration into the soil. The experiment consisted of two replications and was exploratory in nature. The yield, tuber size classes, percentage No. 1 potatoes and specific gravity are shown in Table 43. The only treatment to materially affect yield was the lime treatment. The manure treatment (70-80 tons per acre green manure) had a marked effect on lowering the specific gravity, probably because of the high total nitrogen application to this plot. The nitrogen application (164#/acre) was adequate before the addition of the manure which may have represented an additional 70-80 pounds of N. This level of nitrogen may have been effective in reducing yields also.

The lime treatment not only increased yield, it was most effective in raising the soil pH (Table 44) and lowering the Mn soil test value (Table 45).

The summary below shows that lime has a marked effect on raising the pH of the soil and of lowering Mn soil test level. Probably, the effect on the leaf Mn is not totally reflected because of the short period of time that the lime had been mixed with the soil. The treatment was reflected in yield, possibly by reducing further uptake and leaving the plant in a more vigorous condition during that period of time when the tubers were making their maximum development.

Treatment	pH ⁽¹⁾	Soil ⁽²⁾ Mn	Leaf ⁽³⁾ Mn
		-----ppm-----	
Check	5.4	5.14	204
Straw	5.7	4.80	202
Manure	6.0	2.25	235
Lime	6.5	0.84	191
Gypsum	5.4	3.70	191

(1) August 1, 1974.

(2) August 19, 1974.

(3) August 19, 1974.

The above soil test for Mn was taken on August 19, taken to Redmond

in a camp cooler, chilled with dry ice, frozen in a storage freezer and taken to Corvallis frozen. After thawing, the manganese was extracted with 1N KCl using 1:10 soil:solution ratio. The leaf Mn levels shown were probably all toxic to the potato plant.

The chemical analysis for leaf and petiole are shown in Table 46. The date of sampling (August 19, 1974) is at a later period than the usual sampling and, consequently, is low in P and K and higher in Ca and Mg than would exist in a sample taken at pre-bloom.

Table 43. The effect of several soil amendments on the size, percent no. 1, yield and specific gravity of Russet Burbank potatoes, Jack Root and Don Boyle farm, Madras, Oregon, 1974.

Treat.*	Percentage tubers in size classes				% No. 1	Total yield tons/A	Spec. grav.
	<4oz	4-6oz	6-10oz	>10oz			
Check	8.41	31.22	41.63	18.73	91.58	16.73	1.093
Straw	7.79	24.52	40.87	26.81	92.20	17.62	1.093
Manure	9.73	26.11	48.23	15.93	90.27	15.14	1.083
Lime	6.23	17.17	33.16	43.43	93.76	19.90	1.094
Gypsum	12.91	23.70	40.66	22.74	87.10	17.39	1.091

* The treatments received four additional times over with a rototiller after the treatments had been applied.
Treatments applied May 7, 1974.

Straw - 7 to 8 tons of grain straw per acre.

Manure - 70 to 80 tons wet manure (approx. 64% moisture).

Lime - 2 tons per acre.

Gypsum equivalent to calcium in 2 tons lime.

Table 44. The effect of soil amendment treatments on the pH of the soil planted to Russet Burbank potatoes, Jack Root and Don Boyle farm, Madras, Oregon 1974.

Treatment	Rep no.	pH readings				Rep ave.	Treat ave.
		1st		2nd			
Check	1	5.1	5.2	5.3	5.2	5.23	5.4
	2	5.7	5.6	5.7	5.6	5.65	
Straw	1	5.2	5.4	5.2	5.1	5.23	5.7
	2	6.4	6.3	6.0	6.1	6.20	
Manure	1	5.8	5.7	5.8	5.7	5.75	6.0
	2	6.3	6.3	6.0	6.1	6.18	
Lime	1	6.7	6.6	6.6	6.6	6.63	6.5
	2	6.5	6.5	6.2	6.3	6.38	
Gypsum	1	5.2	5.3	5.0	5.0	5.13	5.4
	2	5.8	5.5	5.5	5.6	5.60	

Samples taken August 1, 1974.

2:1 suspension of water and soil.

Table 45. The effect of soil amendment treatment on the soil test values of Manganese, Jack Root and Don Boyle farm, Madras, Oregon, 1974. Madras loam soil.

Treatment		Soil test Mn ppm	Treatment ave.
Check	1	5.70	5.14
	2	4.58	
Straw	1	4.84	4.80
	2	4.76	
Manure	1	2.82	2.25
	2	1.69	
Lime	1	1.49	0.84
	2	0.19	
Gypsum	1	4.84	3.70
	2	2.55	

Samples taken August 20, 1974.

Extraction made with 1N KCl using 1:10 soil:solution ratio.

Table 46. The effect of soil amendment on the chemical composition of the leaf and petiole of the Russet Burbank potato, Jack Root and Don Boyle Farm, Madras, Oregon. Madras loam soil.

Sampled August 19, 1974 ⁽¹⁾						
Chemical composition - leaf						
Treatment	P	K	Ca	Mg	Zn	Mn
	%				ppm	
Check	0.23	3.8	1.35	0.80	10	204
Straw	0.22	3.8	1.28	0.71	9	202
Manure	0.20	3.9	1.35	0.87	9	235
Lime	0.20	3.8	1.56	0.96	9	191
Gypsum	0.23	4.1	1.25	0.71	11	191

Chemical composition - petiole						
Treatment	P	K	Ca	Mg	Zn	Mn
	%				ppm	
Check	0.13	8.0	1.17	0.87	15	191
Straw	0.12	8.6	1.19	0.72	11	219
Manure	0.09	6.7	1.08	1.11	13	236
Lime	0.11	7.0	1.26	1.13	9	183
Gypsum	0.13	8.5	1.19	0.80	11	196

(1) Maximum vegetative growth.