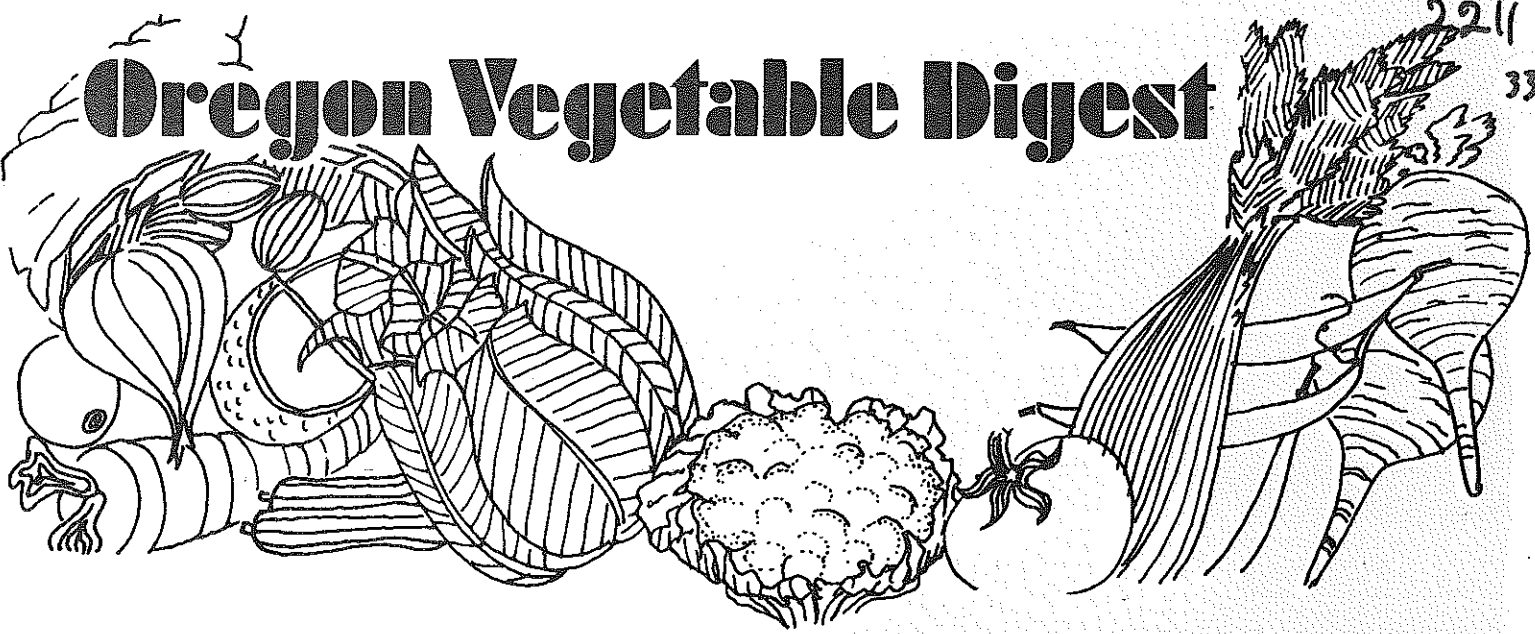


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Effects of phosphorus fertilizer on onions at Medford

TL Jackson

Digest begins 27th year

This issue begins the 27th year of publication of Oregon Vegetable Digest. The mailing list has been expanded with names of growers and industry representatives suggested by county Extension Agents. We welcome your comments and suggestions for improving future issues.



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Response from phosphorus (P) has been difficult to measure on field experiments on Lake Labish peat soils near Salem because of the high rates of previous P fertilization on most soils in this area. This problem prompted us to include Oregon Danvers onions in field experiments at the Southern Oregon Experiment Station, where we could measure response from P fertilizer and compare responses from broadcast versus band applications close to the seed at planting.

Fertilizer treatments were established by broadcasting none, 100 or 200 pounds of P₂O₅/A in early February, 1977, on plots large enough to subdivide into 0, 50 or 100 pounds of P₂O₅ banded at planting. Oregon Danvers and Fiesta onions were planted over the band in a separate operation on March 18. Soil samples were collected from broadcast treatments before planting. Leaf samples were collected June 15, 29 and August 3. Phosphorus response was evident about June 10 when onions were about 1/4 inch in diameter. Onions were starting to bulb and were about 3/4 inch in diameter by June 29, the second sample date.

Yield data were collected in September when onions were graded into total marketable and small (1 1/2 - 2 inch), medium (2-3 inch) or large (3-inch or larger) sizes.

An infestation of mildew developed in mid-June probably reduced yields slightly. Mildew development did not appear very serious at first, so no fungicides were applied until June 29. We assume this did not change responses to P fertilizer since vegetative responses were evident on Danvers before the mildew was evident.

Yields of both total marketable and large Oregon Danvers were increased by both broadcast and banded P treatments (Table 1). When yields from the check plot (treatment 1) are compared with plots banded with 50 or 100 pounds of P_{205} (treatments 2 and 3) yields increased from 274 to 750 and 922 bags per acre, respectively. Broadcast application of 100 or 200 pounds of P_{205} per acre (treatment 4 and 7) increased yields from 274 to 365 and 838 bags per acre respectively.

Banded applications were more effective in increasing yields than broadcast applications of P. Maximum yield of large onions was produced with a combination of either 100 or 200 pounds P_{205} broadcast plus 50 pounds P_{205} banded. Treatments 5 and 8 produced 395 and 290 bags of large onions respectively, while plots with no P or 100 pounds P_{205} broadcast treatment resulted in none or 37 bags of large onions.

Effects of P treatments on P concentration in onion leaves are presented in Table 3. If treatments 3, 5, and 8 are accepted as optimum P treatments, this suggests P concentration in leaf samples should be 0.45 per cent P or higher on both June 15 and June 29 sample dates.

Application of P did not have as much effect on total yield of marketable Fiesta onions (Table 2) as it did on Danvers onions. Fiesta is a smaller onion variety.

Yield of Fiesta without P fertilizer or 100 pounds P_{205} broadcast was higher than yield of Danvers with comparable P treatments. Fiesta yielded 735 and 812 bags per acre compared with 274 and 365 bags per acre of Danvers. There were limited effects of P on yield of marketable onions with Fiesta; the check plots yielded 735 bags of onions per acre, while the highest yielding treatment (treatment 9) produced 841 bags per acre. However, either 100 pounds of P_{205} banded or broadcast increased yields of medium and large onions.

These increases in yields of Fiesta onions were associated with P levels of 0.39 per cent or higher in leaf samples for the June 15 and June 29 sample dates (Table 3).

The above results indicate that band applications of P fertilizer near the seed or directly below the seed at planting generally are more effective than broadcast applications of P. Leaf analyses can be used to identify fields receiving adequate P fertilizer although leaf concentrations of P may fluctuate from year to year as well as with stage of maturity during any given year. A reasonable margin above a minimum critical level of leaf P should be maintained.

Growers generally have assumed correctly that high rates of P fertilizer applied to assure luxuriant levels of P would not decrease yields but excess P can interfere with uptake of copper and iron. There never has been any indication of iron deficiency on onions in the Lake Labish area, but periodic applications of copper are required.

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Table 1. The effects of broadcast and banded phosphorus treatments on yields and size grades of Oregon Danvers onions. Medford, 1977.

No.	Treatments (lbs. P ₂ O ₅ /A)		Yield of 50 lb bags (Size distribution)				Culls
	Broad- cast	Band	Large 3"+	Medium 2-3"	Small 1½-2"	Total marketable	
----- sacks/A -----							
1	0	0	0	185.6	88.8	274.4	115.0
2	0	50	179.0	511.0	59.5	749.5	135.3
3	0	100	240.5	582.8	98.7	922.0	88.2
4	100	0	36.6	268.5	60.1	365.2	124.8
5	100	50	394.6	422.1	107.2	923.9	108.5
6	100	100	242.4	397.9	87.6	727.9	98.7
7	200	0	120.2	626.0	91.5	837.7	96.7
8	200	50	289.5	552.8	92.1	934.4	87.6
9	200	100	271.2	499.8	81.7	852.7	127.4
Mean			153.3	449.6	85.2	732.0	109.1

Notes:

1. Data are means of 2 replications.
2. Broadcast phosphate is the mainplot treatment; phosphate banded under the row is the subplot treatment.

Table 2. Effects of banded and broadcast phosphorus treatments on yield and size grades of Fiesta onions. Medford, 1977.

No.	Treatments (lbs. P ₂ O ₅ /A)		Yield of 50 lb. bags (Size distribution)				Culls
	Broad- cast	Band	Large 3"+	Medium 2-3"	Small 1½-2"	Total Marketable	
----- sacks/A -----							
1	0	0	9.6	404.2	321.0	734.8	7.0
2	0	50	29.0	459.3	284.4	772.7	17.8
3	0	100	41.8	423.8	234.8	700.4	24.2
4	100	0	44.6	468.3	298.8	811.7	7.2
5	100	50	50.3	448.7	296.4	795.4	18.7
6	100	100	39.6	434.7	276.4	750.7	24.4
7	200	0	34.0	493.7	299.9	827.6	14.6
8	200	50	48.6	494.2	243.7	786.5	18.9
9	200	100	52.5	476.3	312.5	841.3	15.5
Mean			38.9	455.9	285.3	780.1	16.5

Notes:

1. Data are means of 6 replications.
2. Broadcast phosphate is the mainplot treatment; phosphate banded under the seeded row is the subplot treatment.

Table 3. Effects of phosphorus treatments on phosphorus concentration in onion leaves. Medford, 1977.

Treatments			Fiesta		Danvers		
(lbs. P ₂ O ₅ /A)			June 15	June 29	June 15	June 29	August 3
No.	Broad-cast	Band	%P	%P	%P	%P	%P
1	0	0	0.31	0.37	0.31	0.34	0.44
2	0	50	0.41	0.39	0.41	0.47	0.38
3	0	100	0.48	0.38	0.50	0.44	0.40
4	100	0	0.41	0.39	0.38	0.41	0.42
5	100	50	0.44	0.41	0.46	0.48	0.35
6	100	100	0.50	0.43	0.54	0.51	0.46
7	200	0	0.44	0.41	0.44	0.46	0.40
8	200	50	0.47	0.44	0.53	0.48	0.44
9	200	100	0.51	0.45	0.48	0.50	0.46

Tomato varieties tested at North Willamette Station

A tomato variety trial was established at the North Willamette Experiment Station near Aurora, Oregon in 1977. The trial included standard varieties grown in the northern Willamette Valley for several years, new releases from several seed companies, new cultivars from the USDA-WSU breeding program at Prosser, WA. and several experimental lines developed by Dr. J. R. Baggett of OSU. Of the 25 varieties tested, 13 were cherry or small "salad" tomatoes of particular interest to backyard or patio gardener. Varieties with compact growth habit and early maturity are considered to be most suited to the relatively cool climate of the Willamette Valley.

All varieties were seeded in a heated greenhouse on March 31 and transplanted to the field on June 6. Prior to transplant, raised beds with 22-inch wide tops were formed following broadcasting of 700 lb/A of 10-20-10 and 1 T/A of dolomite. Viaflo drip irrigation tape was laid down, and beds and tape were covered with a 3-foot strip of 1.5 mil black plastic. Six plants of each variety, divided into three randomly distributed replications, were set through holes cut in the plastic. Beds were 7 feet apart, and in-row spacing was 1.5 feet for cherry types, 2 feet for

indeterminate varieties which were pruned to one leader and staked, 3 feet for determinate varieties which were left unpruned and tied to a wire trellis. The varieties Redpak and Springset were on 4-foot centers, unpruned, with no support provided. Twelve plants of Early Girl were set out; six without support or pruning, and six pruned to one leader and staked, to determine the effect of this cultural practice on yield and earliness.

Data on tendency to crack during periods of heavy rainfall and susceptibility to blossom end rot were also obtained. During early August, considerable blossom end rot was observed on some varieties, apparently triggered by moisture stress due to unusually hot, dry weather and a problem with the drip irrigation system. In late September, heavy rains caused severe splitting and cracking of some varieties.

Early Girl was the earliest of the large-fruited varieties followed closely by Extra Early, Burpeeana Early, Springset, and Redpak. Willamette and Rowpac were about 2 weeks later, and Roza, Columbia and OSU 465 were the latest varieties tested. Roza and Columbia are both high yielding plants with attractive, good-quality fruit, but may be too late for the Willamette Valley in an average

summer. Early Girl and Redpak combine characteristics of earliness, high yield, and quality fruit. Extra Early, Burpeeana Early and Big Early had lower fruit quality, primarily due to a tendency to crack or form rough, misshapen fruit. Staking and pruning of Early Girl led to earlier maturity of the first three clusters but severely reduced total yield.

Redpak had the largest fruit and fruit size held up well throughout the harvest. Springset, Willamette and OSU 465 had the smallest fruit. Columbia, Burpeeana Early, Big Early, Extra Early and the staked Early Girl were most susceptible to splitting, while only Willamette, OSU 465, Burpeeana Early, Big Early and Extra Early had significant blossom end rot.

OSU T5-4 was the earliest cherry tomato with the first fruit fully ripened on July 3. Other early varieties included Pixie, Oregon Cherry and Sweet 100.

Saladmaster and Tumbler Tom were the latest varieties. Sweet 100 is a very attractive plant with some very early fruit, but the large later clusters are slow to ripen and nearly 40% of the total potential yield was immature at first frost. Sweet 100 is also highly susceptible to cracking, as are Gardener's Delight, Salad Top, OSU T5-4, Oregon Cherry and Tiny Tim.

A more complete report, including data on the varieties Roza, Rowpac, Burpee Big Early, OSU 465, Burpeeana Early, Extra Early, OSU T8-2, OSU T1-8, Salad Top and Tiny Tim, is available from the author.

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Table 1. Yield of Tomato Varieties, North Willamette Station, 1977

Variety, Standard Size	Percent of Crop Harvested by Each Date				Total Yield, T/A ^y
	8/11	9/8	10/6	10/20 ^z	
Early Girl, non-staked	7	42	36	15	45
Springset	2	50	48	10	33
Redpak	1	30	63	6	30
Columbia	0	26	53	19	30
Willamette	0	26	63	11	30
Early Girl, staked	10	43	23	24	28

Variety, Cherry or Salad	8/11	9/8	10/6	10/20 ^z	Total Yield, T/A ^y
Saladmaster	1	40	54	5	28
Toy Boy	11	56	28	5	25
Gardener's Delight	8	28	44	20	25
Tumbler Tom	1	41	53	15	24
Pixie	26	62	9	4	20
OSU T5-4	26	50	21	3	20
Oregon Cherry	10	59	19	12	17
Sweet 100	9	31	27	26	15

^zFinal harvest includes mature green fruit.

^yLSD at 5% = 3.5 T/A

Table 2. Average Fruit Weight at Harvest Dates, g/fruit

Variety, Standard Size	8/11	9/8	10/6	10/20	Weighted Season's Average
Redpak	230	221	218	197	221
Columbia	-	180	185	163	180
Early Girl, staked	129	165	147	130	152
Early Girl, unstaked	125	163	143	121	143
Willamette	-	142	142	89	140
Springset	137	130	125	96	130

Variety, Cherry or Salad

Tumblin' Tom	86	77	73	69	72
Pixie	61	53	42	30	59
Saladmaster	38	42	29	22	35
Toy Boy	33	32	23	17	30
OSU T5-4	18	14	10	7	16
Gardener's Delight	19	16	11	12	13
Sweet 100	13	14	12	11	13
Oregon Cherry	13	12	9	12	12
Small Fry	13	11	9	6	10

Table 3. Observations on Tomato Varieties

Variety & Source	Percent Split	Percent Blossom	Comments
Standard Sized	8/25-9/8	end rot, season	
Columbia ¹	50	0	Oblate; thick, tough wall; good flavor; determinate
Early Girl ² , staked	33	2	Spherical, meaty; fair flavor, somewhat bland; indeterminate
Early Girl ² , unstaked	15	1	Spherical, meaty; fair flavor
Redpak ³	10	0	Oblate to spherical, large, meaty and very firm; somewhat bland; very attractive fruit, medium-sized, determinate
Springset ³	1	0	Oblate, small; juicy, good flavor, determinate
Willamette ⁴	5	6	Spherical, firm; excellent flavor and appearance; determinate

Variety, Cherry or Salad			
Gardener's Delight ²	60	0	Spherical; sweet and bland; clusters long, bearing 15-25 fruit, resembling Sweet 100; large indeterminate, attractive plant
OSU T5-4 ⁴	75	2	Shape irregular, many parthenocarpic fruit, pink red color; fair flavor, very early; determinate
Oregon Cherry ⁴	50	0	Ovoid, small; fair flavor; determinate
Pixie ⁵	15	0	Spherical; good flavor; strong tendency for green shoulder, blotchy ripening; determinate
Saladmaster ¹	10	0	Oblong, fleshy; good flavor, high acid; resists splitting; determinate
Small Fry ²	2	0	Spherical; sweet, watery, fair flavor; determinate
Sweet 100 ²	90	0	Spherical, firm; juicy, fair flavor, low acid; splits badly; ripens slowly; up to 40 fruit/cluster; indeterminate, needs staking
Toy Boy ²	20	0	Spherical, very firm, fair flavor; determinate
Tumblin' Tom ²	1	1	Spherical, very meaty; good flavor; resists splitting; determinate

Sources of seed: 1 - Mark W. Martin, USDA-SEA, Irrigated Agriculture Research and Extension Center, Prosser, WA 99350

2 - George Ball, Inc.

3 - Harris Seed Co.

4 - J. R. Baggett, Oregon State University, Department of Horticulture, Corvallis, OR 97331

5 - W. Atlee Burpee Co.

Onion varieties tested at Ontario

Onion varieties were tested at the Malheur Experiment Station, Ontario, for three years and results are summarized in the table. The early varieties, Golden Treasure, Ringer, Bull Ring, Autumn Spice and Ring King, performed consistently well in the tests.

These varieties had a low incidence of storage rots. The later varieties, Yellow Sweet Spanish, Monarch, and Victory, were high yielding but had a higher incidence of storage rots.

C. E. Stanger
Malheur Expt. Station

Vegetable Notes . . .

Gray and Steckel in Great Britain reported that fluid-sowing pre-germinated parsnip seeds advanced emergence by about four days compared to untreated seeds. Sowing pre-germinated seeds also increased the final percentage emergence by about 60 percent compared with untreated, hardened and primed (treated with potassium and phosphorus salts) seeds, and at an early sowing reduced the spread of emergence. (Jour. Horticultural Science 52:525-534. 1977)

Soil compaction resulting from farm implement traffic increases soil strength and density and decreases porosity, root growth, yield and water and nutrient use efficiency. Smittle and Williamson in Georgia suggested that a seedbed preparation for cucumbers consisting of plowing with herbicide application and incorporation with spring tines attached to the moldboard plow produced a desirable soil strength for good root penetration and adequate incorporation of herbicides. The use of this system would eliminate the need for disking and rototilling operations; thereby allowing the use of smaller tractors which would eliminate high soil strengths due to wheel traffic on the seedbed area. (Jour. Amer. Soc. Hort. Sci. 102:822-825, 1977).

Broken-end discoloration of snap beans can be reduced by treatments with SO_2 or elevated CO_2 atmospheres according to research conducted by Henderson and Buescher in Arkansas. Broken-end discoloration (BED) was controlled when samples were treated before storage with 7500 to 10,000 ppm SO_2 for 30 seconds or

when samples were stored in controlled atmospheres containing 20 or 30 percent CO_2 for 24 hours. Processed quality attributes of color, flavor, texture, and sloughing were not affected by these treatments. Oxygen levels of 5 percent or less also controlled BED but caused off-flavors in the canned product. Elevated CO_2 levels were not injurious to snap bean quality as long as O_2 was maintained at 10 percent or higher. (Jour. Amer. Soc. Hort. Sci. 102:768-770. 1977)

Loomis and Crandall in Washington found that the best irrigation schedule for pickling cucumbers involved removal of between 48 and 64 percent of the available water in the upper 36 inches of the soil profile between irrigations. The ratio of consumptive water use to evaporation pan loss reached a maximum of 1.5 during the early harvest season. Moderate moisture stress had no significant effect on the grade or number of poorly developed fruit. Transpiration rate, leaf area, water use pattern, and total water use were compared in greenhouse and growth chamber environments for fruiting and nonfruiting cucumbers. Transpiration rate was higher and leaf area smaller for fruiting plants. Fruit production did not significantly affect total water consumption or the seasonal water use pattern. (Jour. Amer. Soc. Hort. Sci. 102:124-127. 1977).

SUMMARY OF ONION VARIETY TESTING RESULTS

Malheur Experiment Station, Ontario, Oregon, 1977

Entries	Years Tested	Yield cwt/ac				% Shrink		% Rot		Maturity Rating ¹			% Solids		
		≥ 3"		2 1/4-3"		Total Yld.				8-10	8-26	9-5			
		Avg. 1977		Avg. 1977		Avg. 1977		Avg. 1977							
Monarch	3	700	717	39	22	904	954	18	23	10.7	15.4	1	1	2	9.27
Golden Treasure	3	626	765	68	41	757	887	8	10	3.7	3.9	3	3	3	10.14
Yellow Sw. Spanish	3	588	596	32	23	815	864	19	29	11.5	18.0	1	1	2	9.17
Challenger	3	711	731	40	19	840	852	9	12	5.2	9.2	2	2	3	8.73
Ringer	2	704	719	41	29	806	835	8	11	3.3	4.4	3	3	3	8.82
Cima	3	582	616	58	36	738	811	10	20	4.3	9.7	2	3	3	10.99
El Capitan	3	624	634	44	38	780	809	13	17	5.2	7.2	1	2	3	9.75
Bronze Wonder	3	610	631	50	38	778	808	14	18	6.7	8.2	2	2	2	8.37
Victory	3	520	397	58	39	790	792	24	45	20.1	40.5	1	2	3	9.09
Bullring	3	654	652	59	60	767	780	8	9	5.7	7.5	3	3	3	9.07
Autumn Surprise	3	684	654	8	25	825	779	12	13	5.2	4.0	3	3	3	9.88
Early Shipper	3	600	665	58	42	712	775	7	9	2.7	3.6	2	3	3	8.63
Ring King	3	657	668	42	31	765	767	10	9	5.9	4.7	3	3	3	7.80

¹Maturity ratings: 1 = tops standing, 2 = 50% of tops down, 3 = 100% of tops down

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