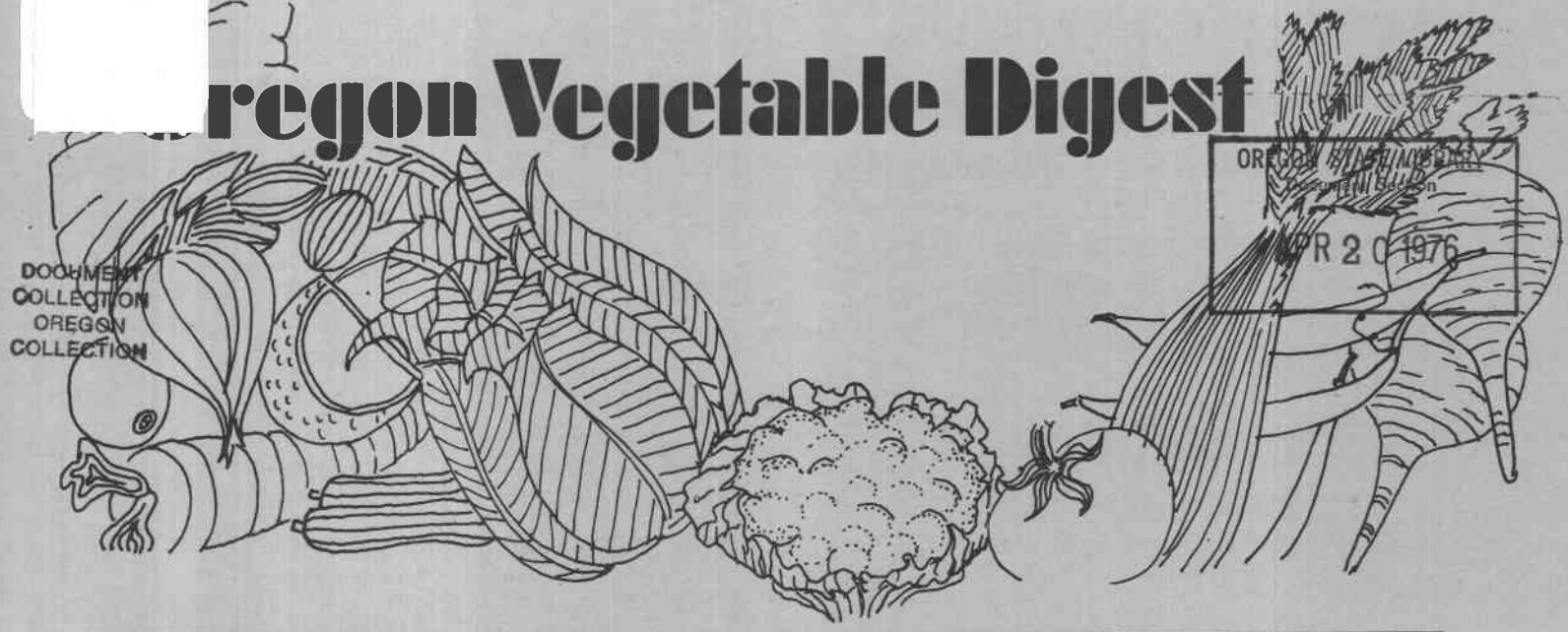
Oregon Vegetable Digest



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Fertilizers and spacing affect yield, composition of bush snap beans

Studies were conducted for five years on effects of fertilizers on yield and chemical composition of bush snap beans at Corvallis. Variables in row spacing were included in three years. In 1966 and 1974, fertilizers were broadcast and disked before planting. In 1967 and 1970, plots were in an area where P and K fertilizers were applied in the fall of 1966 at rates of 100P-100K, 500P-500K, and 1000P-1000K (pounds/A). In 1973, a base application of 25N-75P_2O_5-25K_2O (pounds/A) was banded at planting and additional N was broadcast and irrigated in when plants had two trifoliate leaves expanded. Recently expanded trifoliate leaves with petioles were sampled when plants were in early bloom except in 1974. In 1974, above-ground parts of plants were sampled at the three-trifoliate leaf stage of growth about two weeks before first bloom. Samples were dried, ground, and analyses were determined in the Horticulture Plant Analysis Laboratory. Plots were irrigated as needed at 7- to 10-day intervals. After a once-over hand harvest, pods were graded into appropriate sieve sizes by a mechanical grader.

Yield of 'Tendercrop' bush beans was not affected by fertilizer rates in 1966 (Table 1). Elemental composition of leaves was increased by an increase in fertilizer rates. Yield of 12-inch rows was about 21 percent higher than for 36-inch rows. There was a slight decrease in mineral composition of leaves of plants from 12-inch rows compared to 36-inch rows.

In 1967, yield was highest for the 100-500-500 fertilizer rate (Table 2). There was a general trend for an increase in N, P, K, and Zn contents of leaves as fertilizer rates were increased. Levels of Ca, Mg, and Mn were reduced slightly.

Data (Table 3) show that in 1970 an increase in N fertilizer reduced yield slightly. There was only a 4 percent increase in N content of leaves at the 100 pounds/A rate of N compared to 50 pounds N/A. Yield at the 500P-500K rate was about 9 percent higher than at 100P-100K. Levels of P and K in leaves were increased as P-K rates were increased.

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Yield at a 5x5-inch spacing was 36 percent higher than for 36-inch rows. There was a slight decrease in elemental composition of leaves at the narrow spacing, similar to the trend in 1966 (Table 1).

Yield of 'Oregon 1604' bush beans was increased as N rates were increased from 25 to 300 pounds/A in 1973 (Table 4). N and K contents of leaves were increased as N rates were increased. Yield from the 6-inch row spacing was 20 percent higher than for 12-inch rows. There was no change or a slight decrease in mineral composition of leaves from plants in 6-inch rows compared to 12-inch rows.

High rates of N fertilizer in 1974 caused some reduction in stand and early growth of plants which are reflected in lower yields at the 150 and 200 pound rates of N compared to 50 and 100 pounds N/A (Table 5). Increase of N rates generally increased N, Mg, and Mn content of plants. There was an increase in yield as P rates were changed from 0 to 200 pounds P/A. Phosphorus and K levels in plants were increased as P rates were increased while N levels were reduced.

We are recommending that rates of fertilizer should be increased as row spacings decrease and plant populations increase. Past and present management practices, method and time of fertilizer application, soil test results, nutritional status of plants, and economics of production should all be considered in determining optimum rates of fertilizer to insure adequate levels of all nutrients for bush snap beans.

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Table 1. Effects of fertilizers and spacing on 'Tendercrop' bush beans, 1966

Fertilizer rate $N-P_2O_5-K_2O$/A (pounds)	Yield/A (tons)	Sieve size 4's & smaller (percent)	Leaf composition N (percent)	P	K	Ca	Mg	Mn (ppm)	Zn
50-150-50	6.9	48	3.69	.22	2.06	1.64	.41	44	27
100-300-100	7.0	50	3.83	.23	2.08	1.72	.47	60	26
200-600-200	7.0	53	4.20	.24	2.38	1.76	.52	134	29
Row spacing (inches)									
12	7.5	54	3.71	.23	2.00	1.52	.44	72	27
36	6.2	44	4.09	.23	2.35	1.79	.49	86	28

Table 2. Effects of fertilizers on 'Tendercrop' bush beans (18-inch rows), 1967

Fertilizer rate/A N-P-K (pounds)	Yield/A (tons)	Sieve size 4's & smaller (percent)	Leaf composition N (percent)	P	K	Ca	Mg	Mn (ppm)	Zn
100-100-100	7.4	44	4.23	.33	2.34	1.75	.43	48	29
100-500-500	8.2	44	4.38	.40	2.43	1.50	.40	45	32
100-1000-1000	6.3	60	4.55	.46	2.42	1.34	.37	39	33

Table 3. Effects of fertilizers and spacing on 'Gallatin 50' bush beans, 1970

Fertilizer rate/A (pounds)	Yield/A (tons)	Sieve size 4's & smaller (percent)	Leaf composition N (percent)	P	K	Ca	Mg	Mn (ppm)	Zn
50N	7.3	66	3.95	.37	2.35	1.56	.48	41	31
100N	7.1	66	4.11	.37	2.36	1.67	.55	50	33
100P-100K	6.9	67	4.03	.32	2.18	1.59	.51	48	31
500P-500K	7.5	62	3.98	.36	2.46	1.65	.54	45	33
1000P-1000K	7.2	70	4.08	.41	2.42	1.60	.50	45	33
Spacing									
5x5 inches	8.3	67	3.97	.35	2.22	1.58	.51	44	30
36-in. rows	6.1	65	4.09	.39	2.49	1.65	.53	48	34

Table 4. Effects of N fertilizer and spacing on 'Oregon 1604' bush beans, 1973

Fertilizer rate/A (pounds)	Yield/A (tons)	Sieve size 4's & smaller (percent)	Leaf composition N	P	K	Ca	Mg	Mn	Zn
			(percent)					(ppm)	
25N	8.5	60	3.55	.34	1.93	0.93	.30	52	31
75N	9.0	63	3.79	.37	2.05	1.19	.38	53	37
150N	9.3	63	4.28	.37	2.31	1.75	.53	51	38
300N	9.9	60	4.38	.34	2.45	1.54	.48	69	38
Row spacing (inches)									
6	10.0	60	4.00	.36	2.13	1.17	.42	55	34
12	8.3	64	4.00	.34	2.24	1.53	.44	57	38

Table 5. Effects of N and P fertilizers on 'Oregon 58' bush beans (6-inch rows), 1974

Fertilizer rate/A (pounds)	Yield/A (tons)	Sieve size 4's & smaller (percent)	Plant composition N	P	K	Ca	Mg	Mn	Zn
			(percent)					(ppm)	
0 N	10.6	33	4.00	.38	2.21	2.79	.67	68	41
50N	12.2	32	5.11	.40	2.05	2.86	.73	123	53
100N	12.1	35	5.43	.38	1.85	2.58	.73	155	57
150N	11.1	36	5.71	.36	1.78	2.44	.76	169	55
200N	8.6	34	5.82	.33	1.53	2.37	.75	165	54
0 P	8.5	30	5.50	.24	1.65	2.57	.66	133	56
50P	10.6	33	5.34	.33	1.69	2.54	.68	137	51
100P	11.0	36	4.94	.38	1.95	2.69	.76	132	50
150P	11.6	35	5.10	.43	2.04	2.62	.77	139	49
200P	12.9	36	5.20	.47	2.10	2.64	.74	138	52

Effects of planting dates on bush bean varieties

Two experiments were conducted at the OSU Vegetable Research Farm, Corvallis, in 1973 and 1974 to evaluate effects of planting dates on bush snap beans.

In 1973, six varieties were planted on three dates - April 24, May 30, and June 21. Two within row seeding rates were used to plant 4 and 9 seeds per foot of row in 36-inch rows. For all varieties except 'Asgrow 290', harvest dates were: Pl. Date 1 - July 10, 13, 19; Pl. Date 2 - August 2, 6, 9; and Pl. Date 3 - August 20, 22, 27. For 'Asgrow 290', harvest dates were July 13, 19, 24; August 2, 14, 16; August 22, 27, Sept. 4.

Four varieties were planted in 1974 on six dates - April 25, May 8, May 28, June 7, June 18, and July 15. There were no differential seeding rates. Varieties were only harvested once for each planting date.

The yields and sieve size distribution of pods of varieties in 1973 are presented in Table 1. 'Oregon 1604' produced highest yields, but with a lower percentage of sieve size 4 and smaller pods than some of the other varieties. It is recognized that inherent differences in pod size for varieties should be kept in mind to obtain the best yield - pod size distribution combination for optimum quality. Average yield was highest for the May 30 planting. It can also be seen that average yield was increased as harvest date was delayed with a concomitant reduction in percentage of smaller pods. Days from planting to harvest ranged from about 65 to 85 days. Heat unit cumulation varied from about 840 for the first to 995 for the last plantings (air temp., 50°F base). Data, not shown in the table, indicate that there was a yield increase of 16 percent for the higher seeding rate (9 seeds/ft.) than for the lower rate (5 seeds/ft.). Average sieve size distribution was the same for both seeding rates.

In 1974, highest yields were produced from the May 28 and June 7 planting dates (Table 2). Harvest was not always at optimum maturity for varieties, but ranges can be seen in Table 2. Average yield was highest for 'Oregon 1604'. 'Asgrow 290' produced good yields with a high percentage of small sized pods, which is characteristic of this smaller podded, somewhat later variety. Heat unit cumulation was lowest for the early plantings and ranged from about 720 to 1080 for the last planting date.

Continued attention should be given to careful selection of varieties, planting, and harvest dates for obtaining maximum yields and quality for full season production of bush snap beans.

Table 1. Effects of planting dates and harvest dates on yield and sieve size distribution of six varieties of bush snap beans, Corvallis, 1973

Planting and harvest		VARIETY Oregon 58		Oregon 190		Oregon 1604		Asgrow 290		E. Gallatin		Tempo	
		tons[1]	percent	tons	percent	tons	percent	tons	percent	tons	percent	tons	percent
PD#1	H 1	2.5	64	1.5	93	3.3	67	0.9	96	1.9	67	1.3	65
April 24	H 2	3.8	32	2.7	66	4.1	31	3.2	64	2.9	46	2.3	48
	H 3	6.6	11	4.7	21	6.3	16	4.8	40	4.6	19	4.2	15
PD#2	H 1	3.4	60	2.4	78	3.8	62	2.7	96	3.1	66	2.9	56
May 30	H 2	5.4	31	4.4	64	6.1	36	6.3	44	4.5	43	4.9	30
	H 3	6.7	20	5.9	36	6.8	21	7.3	32	5.4	19	5.8	20
PD#3	H 1	3.8	39	2.2	80	4.5	51	1.0	95	2.2	65	2.7	60
June 21	H 2	4.5	27	3.3	68	5.8	32	2.4	81	3.0	45	3.8	39
	H 3	6.5	22	4.3	36	7.3	23	4.6	51	3.7	26	5.2	28
Avg.		4.8	34	3.5	60	5.3	38	3.7	66	3.5	44	3.7	40

		tons	percent		tons	percent
Overall avg.	PD#1	3.4	48	H 1	2.6	70
	PD#2	4.9	45	H 2	4.1	46
	PD#3	3.9	48	H 3	5.6	25

[1]Yield in tons/acre and sieve sizes in percent sieve size 4 and smaller.

Table 2. Effects of planting dates on yield and sieve size distribution of four varieties of bush snap beans, Corvallis, 1974

Planting date	VARIETY Asgrow 290		Gallatin 50		Oregon 58		Oregon 1604		Planting date average	
	tons[1]	percent	tons	percent	tons	percent	tons	percent	tons	percent
1. 4/25	5.9	61	5.2	44	7.5	25	8.0	31	6.7	40
2. 5/8	7.0	77	4.4	30	6.3	44	7.5	26	6.2	44
3. 5/28	7.1	86	5.6	58	7.9	28	8.5	38	7.3	52
4. 6/7	6.3	92	5.5	84	5.8	56	8.6	57	6.6	72
5. 6/18	7.3	64	4.7	52	6.7	38	6.6	50	6.3	51
6. 7/15	7.7	58	4.7	63	6.4	29	7.4	21	6.6	43
Variety avg.	6.9	74	5.0	55	6.8	37	7.8	37		

[1]Yield in tons per acre and sieve sizes in percent sieve size 4 and smaller.

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