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Bush Beans Respond to High Density Planting

Dr. N. S. Mansour New Vegetable Specialist

Dr. N. S. Mansour has been appointed as Extension Vegetable Crops Specialist at Oregon State University. Prior to joining the OSU staff he was employed for four and one-half years in California at the Del Monte Agricultural Research Center where he was responsible for tomato variety development.

Dr. Mansour received his undergraduate training at Wisconsin State College at Stevens Point. After serving in the U.S. Marine Corps for three years he attended the University of Wisconsin, where he was awarded the MS degree in Horticulture. He gained further experience for one and one-half years in commercial vegetable production on a muck farm in Wisconsin. He received his Ph.D. degree from Michigan State University in vegetable plant breeding. While working on his doctorate, he was employed as a technician for three and one-half years and worked on a variety of vegetable projects.

Dr. Mansour's office is in Cordley Hall, Room 338; his telephone number is 754-3464.

In This Issue . . .

Eight varieties of bush beans with inherent differences in growth habit and pod sizes, when planted at a 5x5-inch spacing, produced yields of 9 to 12 tons per acre with 45% or more of the pods sieve size 4 and smaller. Yields were based on a once-over hand harvest and were affected by varieties and harvest dates.

Gallatin 50, Tempo, Oregon 58, Oregon 190, Oregon 949, Asgrow 290, Puregold Wax, and FM-14 (Romano) bush beans were planted at the OSU Vegetable Research Farm June 17, 1970. Varieties were seeded with a Stanhay precision planter in eight 5-inch rows with about 24 inches between the 40-inch "beds." Because of differences in seed size and subsequent stands, plants were thinned to a spacing of 5 inches apart in 5-inch rows. Before planting, 600 pounds 8-24-8 fertilizer per acre was broadcast and disked in; at planting, about 325 pounds 8-24-8 per acre was banded 2 inches to the side and 2 inches below the seed. Overhead sprinkler irrigation was supplied at 7- to 10-day intervals.

Dates of first bloom were July 29 for Oregon 58, Oregon 190, and Tempo; July 30 for Oregon 949; August 1 for Gallatin 50, Puregold, and FM-14; and August 2 for Asgrow 290. A once-over destructive hand harvest was made on each of the varieties on August 20, 25, and 28—64, 69, and 72 days after planting. Two or three replications of 10 feet of each 40-inch bed of each variety were harvested at each date. Pods from replications were combined for grading. On the second harvest date, August 25, 10 plants were selected at random from each of the three replications and the number of pods per plant was determined.

Yields ranged from 3.6 to 9.0 tons per acre for the eight varieties on the first harvest date (Table 1). Percentages of pods sieve size 4 and smaller varied from 85 to 100. On the second harvest date, yields ranged from

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Bush Beans . . .

Table 1. Effect of harvest dates on yield and sieve size distribution of eight varieties of bush beans

Variety	Harvest dates: First (8-20)		Second (8-25)		Third (8-28)	
	Tons/A	*Percent 4's and smaller*	*Tons/A*	*Percent 4's and smaller*	*Tons/A*	*Percent 4's and smaller*
Gallatin 50	4.0	99	7.3	77	7.9	68
Tempo	8.9	94	12.4	44	11.8	44
Oregon 190	9.0	90	12.7	38	11.4	34
Oregon 949	6.9	96	10.4	44	11.6	35
Oregon 58	7.4	85	11.2	30	10.2	27
Asgrow 290	3.6	100	8.2	97	10.0	86
Puregold	5.5	99	7.3	77	8.9	61
FM-14	6.5	....	9.4	....	10.0	....

7.3 to 12.7 tons per acre with 30 to 97% of pods sieve size 4 and smaller. On that date Oregon 58 produced the lowest percentage of 4 sieve and smaller pods and Asgrow 290 had the highest percentage, reflecting differences in maturity as well as inherent pod size. The variation in yields on the third harvest date as compared to the second date may have been related to the stage of maturity of varieties as well as to the possibility that moisture and fertilizer (perhaps N) was limiting further growth. The amount of water applied in the last two irrigations was not as much as planned. Consequently, on the third harvest date, some varieties produced pods with a high percent of seed development and lack of fleshiness; this probably would not have occurred under adequate moisture and higher fertility levels.

The number of pods per plant varied with varieties (Table 2), and in some cases was related to potential yield response. Pod length as well as sieve sizes would need to be considered when varieties are compared on this basis, however.

Table 2. Average number of pods per plant for eight bush bean varieties

Variety	Number of pods per plant (8-25)
Gallatin 50	10.4
Tempo	12.5
Oregon 190	13.9
Oregon 949	12.8
Oregon 58	12.5
Asgrow 290	10.6
Puregold	15.0
FM-14	12.7

These results indicate that these varieties of bush beans in high density plantings appear to have a potential for producing reasonably high yields of small sieve-size pods when harvested early. Similar results for some of these varieties were reported earlier in the April 1969 issue of *Oregon Vegetable Digest* (Vol. XVIII, No. 2).

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Vegetable Note . . .

Sneed and Bowers in Arkansas found that the correlation was significant between each of the green fruit characters of cucumbers (carpel separation, firmness, and skin toughness) with balloon bloating in salt stock. In balloon bloating the carpels of fruit separate because of gas pressure and are pressed flat toward the skin, leaving a large single cavity. As the percentage of carpel separation increased, the percentage of balloon bloating increased. As fruit firmness and skin toughness increased, the percentage of balloon bloaters decreased. The multiple correlation coefficient between carpel separation, fruit firmness, and lens bloating was significant. In lens bloating, the gas pockets are smaller, are lenticular in shape (biconvex), and usually occur perpendicular to the longitudinal axis of the fruit (*J. Amer. Soc. Hort. Sci.*, 95(4): 489-491, 1970).

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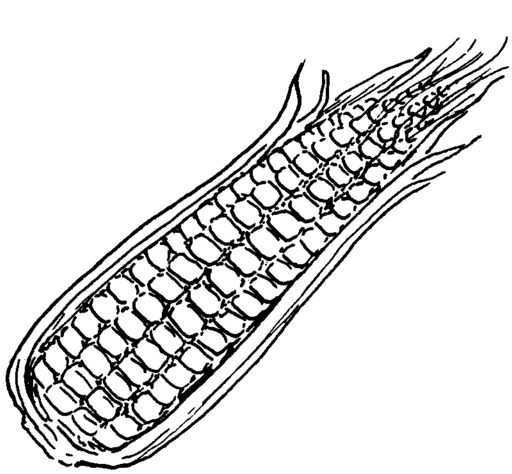
Herbicide Antidote in Sweet Corn Evaluated

The inhibition of development of herbicide symptoms from thiocarbamate compounds applied to sweet corn was evaluated in 1970. The compound used in this experiment, 1,8-naphthalic anhydride, was tested for this purpose by other workers in 1969 (Burnside, Hoffman). Since the thiocarbamate herbicides are very useful for certain weed problems and under certain conditions may result in injury to sweet corn, protection by an antidotal material could be of considerable value.

Rates of 2, 4, and 6 pounds active per acre of EPTC (*S*-ethyl dipropylthiocarbamate) and 4 and 8 pounds active of butylate (*S*-ethyl diisobutylthiocarbamate) were applied prior to planting and incorporated to a depth of 3 inches in the soil with a power-driven rotary tiller. The herbicide plots were split with subplots planted with untreated seed and with seed treated with 1,8-naphthalic anhydride (supplied by Gulf Chemical Co.) at the rate of 2.3 grams per pound of corn seed. The variety Jubilee was used in this trial. Plots were evaluated early in the experiment by counting total stands and the number of injured corn plants in each plot. A later evaluation of crop response and weed control was made by a visual rating method. Predominant weed species included redroot pigweed, sowthistle, yellow mustard, and hairy nightshade.



Results of this trial are summarized in Table 1. The results indicate a slight but significant reduction in stand in plots with seed treated with 1,8-naphthalic anhydride. There was also a very significant amount of injury to the crop plants with the two highest rates of EPTC; this injury was almost totally eliminated at the 4-pound-per-acre rate with the use of 1,8-naphthalic anhydride as a seed treatment. At the 6-pound-per-acre rate of EPTC a slight amount of injury was noted in plots planted with treated seed when evaluated early in the development of the crop plants, and this injury was even more evident at the later evaluation date. No significant crop injury was recorded from plots in which butylate had been applied, regardless of seed treatment.

Weed control from the two herbicides was about what would be expected with the rates applied and did not seem to be significantly influenced by treating the crop seed with 1,8-naphthalic anhydride.

Literature Cited

Burnside, O. C. 1969. Seed treatment to protect corn from EPTC injury. North Central Weed Control Conf., p. 99.

Hoffman, O. L. 1969. Chemical antidote for EPTC on corn. Gulf Research and Development Company, Merriam, Kansas.

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Table 1. Sweet corn response to herbicides and seed treatment with 1,8-naphthalic anhydride

Herbicide		Untreated seed				Treated seed			
		Plants per plot[1]		Average rating[2]		Plants per plot		Average rating	
Chemical	Application rate	Total	Injured	Crop response	Weed control	Total	Injured	Crop response	Weed control
	lbs./A								
EPTC	2	216	0	0	5	202	0	0	4
EPTC	4	233	45	4	6	220	0	1	6
EPTC	6	237	102	8	7	208	1	4	7
Butylate	4	237	4	0	7	227	0	0	6
Butylate	8	244	0	0	8	206	0	0	8
Untreated	....	236	0	0	1	221	0	0	1

[1] Counted and classed for injury when corn plants were 8 to 10 inches tall.

[2] Rated eight weeks after planting (0 = no effect, 10 = complete kill of crop or weeds).

Potassium, Boron, and Sodium Fertilizers Affect Table Beets

The yield of table beets was increased 11% from addition of 500 pounds NaCl (common salt) per acre in combination with 50 pounds K_2O per acre. However, at 200 pounds K_2O/A, no increase in yield was obtained from addition of NaCl, resulting in a significant K x NaCl interaction at odds of 19 to 1. There were no differences in yields when rates of 50 and 200 pounds K_2O/A or when 0 and 10 pounds boron per acre were compared.

The percent of 2- to 3-inch roots with B deficiency was reduced significantly from 16.4 when no B was added to 4.7 at 10 pounds B/A. At the rate of 50 pounds K_2O/A there were fewer roots with B deficiency at 500 pounds NaCl/A than when no NaCl was added.

The experiment was conducted at the OSU Vegetable Research Farm during 1969 and included a complete factorial design of broadcast fertilizer rates of 50 and 200 pounds K_2O/A, 0 and 10 pounds B/A, and 0 and 500 pounds NaCl/A. A uniform base application of 625 pounds 8-24-8 fertilizer per acre was broadcast and disked in before planting Detroit Dark Red (Morse strain) table beets. Results from combinations of N, K, and B fertilizers were reported earlier (*Oregon Vegetable Digest,* Vol. XIX, No. 3, July 1970).

Yield data show that no differences were obtained when the two rates of K_2O, two rates of B, or the two rates of NaCl were compared (Table 1). Data in Table 2

Table 1. Effects of fertilizers (K, B, Na) on yields of table beets

Rate, NaCl/A	50 lbs. K_2O/A		200 lbs. K_2O/A		
	No B	10 lbs. B/A	No B	10 lbs. B/A	NaCl average
	T/A	*T/A*	*T/A*	*T/A*	*T/A*
0 lbs. NaCl/A	22.8	22.2	21.9	23.6	22.7
500 lbs. NaCl/A	24.4	25.5	21.9	23.4	23.8
B average	23.5	23.9	21.9	23.5	
K average	23.7		22.7		

show that yield response from addition of 500 pounds NaCl/A was dependent upon the rate of K_2O. At the rate of 50 pounds K_2O/A, yield was increased from application of NaCl, but no increase was obtained at 200 pounds K_2O/A. Substitution of sodium for potassium has been reported by others, but in this experiment there was no yield increase obtained from addition of 200 pounds K_2O/A as compared to 50 pounds K_2O/A. It can be assumed then that K was not limiting yields in this test. There were differences in size distribution of roots which may have been related to the increase from NaCl

Table 2. Effects of K_2O and NaCl rates on yields of table beets

Rate, NaCl/A	50 lbs. K_2O/A	200 lbs. K_2O/A
	T/A	*T/A*
0 lbs. NaCl/A	22.5	22.8
500 lbs. NaCl/A	25.0	22.7

at the lower K_2O rate. Average percentages of roots 1 to 2, 2 to 3, and 3 to 4 inches in diameter were 18, 55, and 23, respectively for the 0 NaCl and 50 pounds K_2O/A treatment and 13, 48, and 36% respectively for the 500 pounds NaCl and 50 pounds K_2O/A treatment.

Percent of roots (2- to 3-inch size) showing symptoms of B deficiency or canker was significantly less at the rate of 10 pounds B/A than when no B was added (Table 3). A significant K x NaCl interaction was obtained. At 50 pounds K_2O/A, application of 500 pounds NaCl/A increased the incidence of B deficiency but decreased B deficiency at 200 pounds K_2O/A. Expressed in another way, at the zero rate of NaCl, B deficiency was greater at the 200-pound rate of K_2O than at the 50-pound rate. However at the 500-pound rate of NaCl, the 200-pound K_2O rate produced less B deficiency than was found at the 50-pound K_2O rate. Further work is needed to clarify K - NaCl relationships under a wider range of soil fertility levels and climatic situations. Salt is generally not added as a fertilizer material in western Oregon. It may be used in some cases as a spray application for weed control in table beets.

Table 3. Effects of fertilizers (K, B, Na) on percentage of 2- to 3-inch roots with boron deficiency

Rate, NaCl/A	Percent of 2- to 3-inch roots with B deficiency				
	50 lbs. K_2O/A		200 lbs. K_2O/A		
	No B	10 lbs. B/A	No B	10 lbs. B/A	NaCl average
0 lbs. NaCl/A	10.5	1.4	18.9	7.1	9.5
500 lbs. NaCl/A	22.6	6.1	13.5	4.1	11.6
B average	16.6	3.8	16.2	5.6	
K average	10.2		10.9		

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