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Temperature, Mulch Affect Growth of Snap Beans

Increases in temperature—in both greenhouse and field tests—produced greater stand counts and growth of snap beans during a year of testing at OSU. Soaking of seeds prior to planting and use of petroleum mulch treatments, however, did not produce consistent yield increases under field conditions.

Greenhouse tests began in October 1966. Five varieties of snap beans were pre-soaked in moist vermiculite at temperatures of 55, 65, and 75° F for about 16 hours. The seed lots were subsequently divided. Seeds were planted in a farm soil mix in cans and placed in water-bath controlled temperature tanks at 55, 65, and 75° F for the duration of the experiment. Air temperatures were about the same for all treatments.

Because responses of the five varieties (Tendercrop, Puregold Wax, and three bush types from the OSU snap bean breeding program—OSU 949, 2065, and 9839) were similar, results are averaged and presented in Table 1. The pre-soaking (imbibition) temperatures of 65 and 75° F appeared to be more advantageous than 55° F in increasing the number of seedlings that emerged and in decreasing the time from planting to emergence. However, the major effects appeared to be due to the soil temperatures at which seeds were germinated and

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Horticultural Society to Meet November 29 to December 1

The Oregon Horticultural Society will meet in Corvallis on November 29 and 30, and December 1. Vegetable sessions will be in the afternoons of November 30 and December 1.

Of special interest to the vegetable industry will be talks by three Extension Vegetable Specialists from the University of California. George Marlow will discuss new advances in potato and onion production and the effects of vegetable dehydration on the industry. Snap beans and pickling cucumbers in California will be discussed by Bill Sims. Vincent Rubatsky will present information on cole crop production with special emphasis on mechanization.

Another part of the program will include progress reports on vegetable research by the OSU Departments of Plant Pathology, Entomology, and Horticulture. There will also be a discussion of progress in mechanical harvest and talks on soil compaction and soil pesticide residues.

The vegetable sessions will be in the Food Technology auditorium on the Oregon State University campus.

There will also be a joint session with the small fruits section in the Home Economics Auditorium on Friday morning. Included in that program will be a film on harvest labor, a talk by Dr. Burton Wood on "Trends in Publicly Supported Agricultural Research in Oregon," and a discussion of labor-saving irrigation equipment by Marvin Shearer.

In This Issue . . .

Snap Beans . . .

Table 1. Effects of imbibition temperatures and soil temperatures on snap beans, greenhouse (Oct.-Dec. 1966)

Soil temp.	Imbibition temp.	Planting to emergence	Emergence	Planting to first bloom	Fresh weights at first bloom
°F	*°F*	*Days*	*%*	*Days*	*Grams/plant*
55	55	17.9	62	56.6	3.7
	65	16.0	78	55.1	3.5
	75	16.8	76	55.1	4.2
	Mean	16.9	72	55.6	3.8
65	55	9.8	81	48.7	8.9
	65	9.4	83	48.2	9.5
	75	9.0	84	48.1	9.6
	Mean	9.4	83	48.3	9.3
75	55	6.7	71	45.0	8.8
	65	6.5	83	44.8	9.3
	75	6.1	78	45.1	9.3
	Mean	6.4	77	45.0	9.1

grown. Fresh weights of plants grown at 65 and 75° F were more than twice as great as those of plants grown at 55° F. Time from planting to emergence ranged from about 17 days at 55° to 6½ days at 75° F. These results are in general agreement with earlier studies on effects of temperature on emergence of snap beans (*Oregon Vegetable Digest,* Vol. 14, No. 3, July 1965). Days from emergence to first bloom were about the same for plants at all three temperatures.

In a field test at the OSU Vegetable Research Farm, Tendercrop and OSU 949 bush beans were planted on three dates—May 3, June 16, and July 8, 1967. Treatments included: (1) a check; (2) petroleum mulch, 6-inch band over the row after planting; (3) pre-soaking (imbibition) of seeds in moist vermiculite at 75° F for 16 hours prior to planting; and (4) seed soak plus petroleum mulch. Data were obtained from single row plots, 10 feet in length, replicated six times.

Percent emergence of seedlings was not appreciably affected by planting dates or treatments (Table 2). Petroleum mulch increased the percentages of emerged seedlings over those with no mulch in some cases. Time from planting to emergence of seedlings for the petroleum mulch and pre-soak treatments was one-half to two days sooner than for the check treatment. Emergence of OSU 949 was usually one day faster than for Tendercrop. Time from planting to emergence of OSU 949 in the check treatment was about 12½ days for the May 3 planting date and 6½ days each for the June 16 and July 8 plantings.

Average air and soil temperatures for a 10-day period following planting were lower for the May 3 than for the June 16 and July 8 plantings (Table 3). Soil temperatures at 4-inch depth averaged about two degrees higher for mulch than for check treatments.

Maturity of pods at harvest, as indicated by sieve size distribution, was different for each of the varieties and for the planting dates; this should be taken into consideration when yield comparisons are made in Table 2. Days from planting to a harvest date producing a sieve size distribution of about 50% sieve size 4 and smaller was estimated to be 72, 65, and 61 for the respective planting dates.

The major difference in yields is noted when planting dates are compared; yields of both varieties in the first planting are considerably lower than in the other two plantings. Effects of petroleum mulch and pre-soak treatments on yield were not consistent. In some cases increases were obtained; in others, none were obtained over the check. In earlier work average yield increases from use of petroleum mulches on beans were 10 to 15% higher than check treatments (*Proc. Oregon Hort.*

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Snap Beans . . .

Soc., 58:180-182, 1966). The soil at the Vegetable Research Farm is fairly dark in color, and the 1967 season was warmer than average.

Although it is difficult to determine the relative importance of all the factors affecting growth and yield of snap beans under field conditions, sufficiently high soil temperatures at planting to insure good germination and emergence, and rapid, early growth of seedlings appear to be essential for producing plants with a high yield potential. Use of treatments to raise soil temperature and/or increase germination and emergence may prove beneficial under certain circumstances.

Table 2. Effects of seed imbibition (pre-soaking) and petroleum mulch treatments on two varieties of snap beans, OSU Vegetable Research Farm, 1967

Planting date treatments	OSU 949			Tendercrop		
	Emergence	Yield	Sieve sizes 4 & smaller	Emergence	Yield	Sieve sizes 4 & smaller
	%	*T/A*	*%*	*%*	*T/A*	*%*
May 3						
Check	82	1.8	65	87	1.0	55
Mulch	86	2.1	69	84	1.0	56
Seed imbib. 75° F	76	2.2	63	76	1.2	43
Seed imbib. plus mulch	82	2.1	65	82	1.0	51
June 16						
Check	89	6.9	34	90	7.2	42
Mulch	89	7.1	33	91	6.6	36
Seed imbib. 75° F	86	6.8	33	83	6.4	47
Seed imbib. plus mulch	87	7.6	31	87	6.8	52
July 8						
Check	84	6.8	38	77	6.7	43
Mulch	85	6.8	39	85	6.4	47
Seed imbib. 75° F	86	7.4	37	82	6.7	43
Seed imbib. plus mulch	83	7.1	36	84	6.1	49

Table 3. Average air and soil temperatures for a 10-day period after planting of snap beans, 1967

Planting date	Air temperatures			Soil temperatures at 4-inch depth					
				Min.	Max.	Mean	Min.	Max.	Mean
	Min	Max.	Mean	(bare soil)			(petroleum mulch)		
	°F	*°F*	*°F*	*°F*	*°F*	*°F*	*°F*	*°F*	*°F*
May 3	42	65	54	52	64	58	52	68	60
June 16	55	80	68	68	81	74	68	83	76
July 8	52	83	68	71	86	78	70	88	79

—H. J. MACK
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Onion Smut, Maggot Control Trial Completed

The onion maggot has not been a problem in the onion growing areas of Oregon since the development of furrow treatments of diazinon and other insecticides six or eight years ago. Onion smut has been effectively controlled by formaldehyde furrow treatments for about 30 years. However, studies have shown that other insecticides and fungicides are effective when used primarily as granules in the furrow at seeding time. Additional studies were considered advisable because of the threat of resistance developing to the currently registered insecticides and because of the inconvenience of using a liquid fungicide such as formaldehyde.

In 1967 the Chemagro Corporation requested an evaluation of two of their products against both smut and maggots under Oregon conditions. The test was conducted by the Departments of Entomology and of Botany and Plant Pathology, with the cooperation of Mr. Nathan Kurth, onion grower at Labish.

Seven different treatments were arranged for comparison: the standard treatment of diazinon (50% wettable powder) with dilute formaldehyde solution; Dasanit (Bayer 25141, a semi-residual phosphate material, registered for use against onion maggots in Canada) in four different combinations with formaldehyde or the experimental fungicide CHEM 4497; and checks to detect the presence of maggot and smut infestations. The two insecticides and the 4497 fungicide were used at the rate of one pound active ingredient per acre (based on 14-inch row spacing). The formaldehyde solution was used at the standard recommended rate: one pint of formalin (37-40%) per 16 gallons water, applied at the rate of one gallon per 150 feet of row in the seed furrow. Application to the single row, 20-foot plots was made with a syringe-type apparatus hung from the handles of a V-belt seeder so that the liquids flowed into the opened furrow by gravity. Granular pesticides were added in measured amounts to the V-belt with the seed. No further treatments were made during the season.

Seeding and treatment were accomplished April 29 on rows previously marked and fertilized by Mr. Kurth. A seedling stand count and several evaluations of smut and maggot losses were made during the season.

Results of the test are summarized in the table. It is immediately obvious (columns 1 and 2) that the granular combination of Dasanit and CHEM 4497 (Treatment No. 5) drastically reduced germination. The same materials applied in the furrow as emulsions (Treatment No. 4) lowered the seedling stand by only 5 or 6%, an amount probably not significant.

Table 1. Summary of results of onion smut and maggot control trial, Lake Labish, 1967

Treatment	Mean seedling stand (May 22, 1967)		Percent of original seedling stands lost		Marketable onions at harvest (Aug. 29)**	
	No. per plot	Percent of standard	to smut	to maggots	Mean no. onions	Percent of standard
1. Diazinon plus formaldehyde (50% w.p.)*	133.00	(Standard)	0.19	0.00	111.75	(Standard)
2. Dasanit plus formaldehyde (10G)	148.00	111.3	0.00	1.35	116.00	103.8
3. Dasanit plus formaldehyde (6 lb. e. c.)	149.25	112.2	0.50	0.33	138.50	123.9
4. Dasanit plus CHEM 4497 (6 lb. e. c.) (2 lb. e. c.)	125.50	94.4	0.20	1.39	106.50	95.3
5. Dasanit plus CHEM 4497 (5G) (5G)	11.50	8.6	0.00	0.00	15.25	13.6
6. Check for maggots, (formaldehyde only)	130.00	97.7	0.38	40.19	48.00	42.9
7. Check for smut (Dasanit 10G only)	132.75	99.8	15.82	2.82	93.50	83.7

* Standard grower treatment for comparison.
** Mature onions, at least 1" in diameter and uninjured by smut or maggots.

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Onion Trial . . .

Smut infected about 16% of the check onions (Treatment No. 7), and all of the formaldehyde and CHEM 4497 treatments reduced losses from this disease to almost nothing.

The maggot infestation was moderately heavy (40% of the check onions were destroyed) and took place during the month of June. Surveys made in May, July, and August revealed insignificant infestations during those periods. The four counts of maggot damage were made at approximately weekly intervals during June. Control with the diazinon standard and with Dasanit was very good, all treatments keeping losses to less than 3% of the original plant stands.

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Vegetable Notes . . .

Resistance to Fusarium root rot of peas was studied by D. E. Knavel in Michigan, as reported in *Proc. Am. Soc. Hort. Sci.*, Vol. 90, 1967. Crosses between resistant P. I. 140, 165 and Early Perfection showed resistance to be dominant and controlled by cytoplasmic and nuclear materials. In the F_2 of P. I. 140, 165 x Early Perfection, and the backcross to Early Perfection, resistance was associated with yellow cotyledon. The resistant parent was thought to be of possible value for breeding purposes.

W. C. Barnes, in Vol. 89 of the *Proc. of the Am. Soc. for Hort. Sci.*, reported on the development of multiple-disease-resistant hybrid cucumbers. In this work hybrid slicer and pickle cucumbers were developed using multiple-disease-resistant gynoecious (all female) lines and various pollen parents. Hybrids with high resistance to four diseases and others with moderate to high resistance to as many as six diseases were obtained. Yields of the hybrids have been better than similar monoecious varieties. The gynoecious lines were developed and are maintained by the use of gibberellic acid to stimulate the production of male flowers for self-pollination.

The use of gibberellin (GA) to improve yields of forcing rhubarb was described by D. R. Tompkins in Vol. 89 of the *Proc. of the Am. Soc. for Hort. Sci.* Crowns treated with GA produced higher early and total yields of petioles, with color as desirable as untreated crowns when forced at 56° F. At 65° the total yields were about the same, but during the latter part of the season the yields were less and the color less desirable in the treated crowns compared with the control. The inclusion of sucrose in the treatment caused crowns forced at 65° to have color and yield equal to that of the controls. Sucrose alone improved both color and yield at either temperature.

M. S. Kaldy, as reported in Vol. 89 of the *Proc. of the Am. Soc. for Hort. Sci.*, studied the fiber content of Tenderlong 15 and Tendercrop when grown under warm (25° C) and cool (21° C) greenhouse temperatures. While Tenderlong was significantly more fibrous in warm conditions than in cool, Tendercrop did not differ. Fiber content was concluded to be a varietal characteristic which is influenced by temperature and humidity.