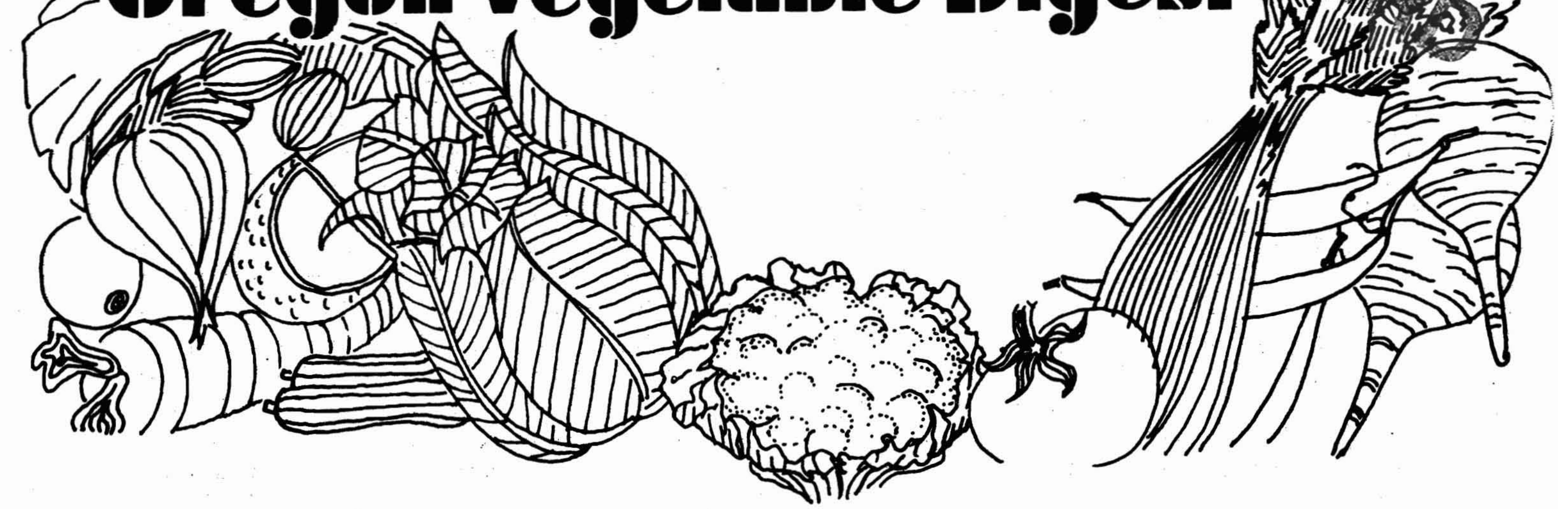
Oregon Vegetable Digest



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Cultural Practices Affect Corn Smut

Preliminary tests were conducted at the OSU Vegetable Research Farm in 1980 to evaluate effects of various cultural practices on incidence of head smut (Spacelotheca reiliana) of sweet corn. Plots were in an area infested during four years of tests on variety evaluation for head smut resistance.

In one experiment, different irrigation regimes, replicated four times, were established on 'Jubilee' and 'Sugar Daddy' sweet corn planted in 36-inch rows on June 4. Because of poor stand of plants, 'Sugar Daddy' was replanted on June 17. Three rows of each variety were alternated in arrangement for each plot.

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Spacing between plants was about 7 to 10 inches. Earlier research by others suggested that the early seedling stage is the most critical period for infection and that with higher moisture levels and higher temperatures, infection is decreased. The plot area was irrigated on May 30 with .5 inch of water before seeding on June 4. In one irrigation treatment, A, irrigation was supplied frequently during the first month after seeding and then minimum irrigation was given throughout the remainder of the season. Lawn sprinklers were used to supply irrigations for treatment A on June 5, 10, 17, 20, 23, 30, July 7, and 11. The other two irrigation treatments, B and C, were identical, receiving no irrigation early, and then receiving minimal irrigation throughout the season. All plots (A, B, and C) were irrigated as follows: July 16-1.1 inches, July 23-1.1 inches, July 28-1.0 inch, and August 8-1.4 inches. Dates of rainfall and amounts were: June 7-8, .22 inch; June 13-14, .76; June 23, .62; July 4, .24; and August 31, .01, for a total of 1.85 inches from June 4 to September 1. Observations on smut infection of plants (ear and/or tassel infection) were made on both varieties on September 26. Results (Table 1) show there was a marked reduction in number of plants with head smut for the irrigation treatment (A) that was watered frequently early compared to the other treatments (B and C) that received no irrigation early. 'Jubilee' variety showed the greater reduction in infection because of moisture treatment than did 'Sugar Daddy'. There was variability in infection in various plots as indicated by differences between identical treatments B and C. Number of plants infected was greater for 'Sugar Daddy' than for 'Jubilee' which has been demonstrated in other experiments, even to a greater degree than shown here.

In another experiment in an adjacent area, 10 treatments, replicated four times (Table 2), were evaluated for effect on head smut infection of 'Sugar Daddy' sweet corn. Fertilizer was banded at planting on June 4, as was the case for the irrigation experiment, at a rate of 50 pounds N, 150 pounds P_2O_5, 50 pounds K_2O per acre. This experiment received no irrigation early, then minimum irrigation after mid-July, comparable to treatments B and C in the irrigation experiment discussed earlier. Level of infection observed on September 4 for the ten treatments ranged from 73 to 100 percent of plants infected, Table 2. There was a trend for greater infection with increased depth of seeding. Also, where seed was separated into large and small sizes within the particular seed lot, percent plants infected was higher for small than for large seed.

Manipulation of certain cultural treatments can affect percent of plants that are infected with head smut. High levels of soil moisture during germination and early development reduced smut infection but further research is needed to clarify what amounts and frequencies of irrigation are required and at what stage of plant growth irrigation affects infection. Further evaluation is also needed on other cultural treatments related to head smut infection.

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Chemicals Tested for Control of Corn Smut

Several newer chemicals have been tested for corn head smut control because of the increasing concern with this disease in the Willamette Valley. The variety 'Sugar Daddy' was selected because it shows a high degree of susceptibility to head smut. Seed treatment, in-furrow sprays, in-furrow granules, and foliar sprays were tested for possible control. Seed treatments and in-furrow applications are aimed at preventing infection of the seedling while foliar sprays attempt to eliminate the fungus from the plant after most infection has occurred (five-leaf stage). In-furrow applications were applied to the bottom of a furrow four inches in depth in chehalis silt loam which was closed after application. The corn was seeded on top of the closed furrow at a depth of two inches. Foliar sprays were applied in 28 gallons of water per acre at the five leaf stage of plant growth, 30 days after planting. Treatments were arranged in a randomized block design with five replications. Each replication consisted of a 20 foot row 3 feet from adjacent rows with plants spaced at approximately 12-inch intervals. Each year, the plot received five overhead irrigations that totaled five to seven inches of water for the season. The plot contained soil-borne inoculum from variety tests artificially inoculated before 1979. In 1980, residual spores from the 1979 trials were the inoculum. Because Bayleton has shown strong residual characteristics, the area that received foliar sprays in 1979 was replanted in 1980 to see if residues were sufficient for control.

Seed treatments with Bayleton and Baytan gave good control of the head smut in 1979 (Table 1). Excellent control of the disease was obtained with in-furrow treatments with CGA-64250. CGA64250 was not tested as a seed treatment because data from the Midwest indicated phytotoxicity when it was applied in that manner. None of the foliar sprays were effective even though all are known to have systemic activity and some have systemically eradicated other smut diseases. Bayleton was dropped from further testing because the manufacturer was un-

Table 1. Effects of irrigation treatments on head smut infection of 'Jubilee' and 'Sugar Daddy' sweet corn plants, Corvallis, 1980

Irrigation treatment	Percent of Plants Infected	
	Jubilee	Sugar Daddy
A. Irrigated frequently early	2 a	45 b
B. Minimum irrigation	35 b	67 c
C. Minimum irrigation	40 b	69 c

Values followed by the same letter are not significantly different from one another by Duncan's Multiple Range Test.

Table 2. Effects of various treatments on head smut infection of 'Sugar Daddy' sweet corn plants, Corvallis, 1980

Treatment	Percent of Plants Infected
1) Seed planted 1/2 - 1 inch depth	82 abc
2) Seed planted 1 1/2 - 2 inch depth	96 bc
3) Seed planted 3 inch depth	100 c
4) Vermiculite in furrow with seed at planting	79 ab
5) Seed soak (water) before planting	81 ab
6) Seed soak (nutrient solution) before planting	88 abc
7) Water applied over row just after planting	76 ab
8) Black plastic mulch over row until emergence	88 abc
9) Small seed	95 bc
10) Large seed	74 a

Values followed by the same letter are not significantly different from one another by Duncan's Multiple Range Test.

Table 1. Chemical control of head smut in sweet corn, 1979

Treatment and Rate Applied	Application Method	% Smut*
CGA-64250 3.6 EC 71.2 fl oz/A	In-furrow spray	3.34 a**
Bayleton 50 WP 16 oz/100 lbs	Seed treatment	16.68 ab
Baytan 1.25 F 71.2 fl oz/100 lbs	Seed treatment	21.04 abc
Benlate 50 WP 16 oz/100 lbs	Seed treatment	35.54 bcd
Vitavax 75 WP 10.67 oz/100 lbs	Seed treatment	37.34 bcde
CGA-64250 3.6 EC 71.2 fl oz/A	Foliar spray	40.58 cde
TBZ 3.4 F 18.8 fl oz/A	Seed treatment	49.36 cde
Vitavax 3.34 F 57.5 fl oz/A	Foliar spray	46.42 cde
Untreated Control		46.42 cde
Benlate 50 WP 3 lbs/A	Foliar spray	53.32 def
TBZ 3.4 F 56.5 fl oz/A	Foliar spray	66.78 def
Baytan 1.25 F 153.6 fl oz/A	Foliar spray	71.40 ef
Bayleton 50 WP 3 lbs/A	Foliar spray	72.00 f

* Values were transformed to $X = \arcsin\sqrt{\text{percentage}}$ for analysis.

** Values followed by the same letter are not statistically significant from one another by Duncan's Multiple Range Test. P=.05.

Table 2. Chemical control of head smut in sweet corn, 1980

Treatment and Rate Applied	Application Method	% Smut*
CGA-64250 2.5 G 80 lbs/A	In-furrow granule	4.2 cde
CGA-64250 2.5 G 40 lbs/A	In-furrow granule	0.0 e
CGA-64250 2.5 G 20 lbs/A	In-furrow granule	2.4 e
CGA-64250 3.6 EC 71.2 fl oz/A	In-furrow spray	4.0 de
CGA-64250 3.6 EC 35.6 fl oz/A	In-furrow spray	4.0 de
CGA-64250 3.6 EC 17.8 fl oz/A	In-furrow spray	5.0 de
Baytan 1.25 F 102.0 fl oz/A	In-furrow spray	3.7 de
Baytan 1.25 F 25.6 fl oz/A	In-furrow spray	19.1 bc
Bayleton 50 WP 3.0 lb/A	Soil sprayed 1979	47.0 a
Baytan 1.25 F 12.8 fl oz/100 lbs seed	Seed treatment	4.3 de
Baytan 1.25 G 6.4 fl oz/100 lbs seed	Seed treatment	17.2 bcd
Baytan 1.25 F 3.2 fl oz/100 lbs seed	Seed treatment	27.8 b
Untreated Control		23.4 b

* Values were converted to $X = \arcsin\sqrt{\text{percent}}$ for computation.

**Values followed by the same letter are not significantly different from one another by Duncan's Multiple Range Test. P=0.05.

willing to consider registration of a seed or soil application of Bayleton.

In 1980 (Table 2), all rates of in-furrow CGA-64250 and the high rate of Baytan in-furrow treatment were effective in controlling head smut. The 12.8 fluid ounce per 100 pounds of seed rate of Baytan was equally effective. The highest rate of CGA-64250, both as a granule and as spray, caused some twisting of the leaves but did not appear to affect yield or stand.

These experiments have established that seed treatments with Baytan and in-furrow treatments with CGA-64250 can give satisfactory control of corn head smut. The minimum effective rate of Baytan tested was 12.8 fluid ounces per 100 pounds of seed. Since 'Sugar Daddy' is a highly susceptible variety, it is reasonable to assume that a lower rate might be effective for 'Jubilee,' a moderately susceptible variety. CGA-64250 is effective at all rates tested. The minimum effective rate is as low or lower than the lowest rates tested.

More work must be done on both compounds to determine the rate necessary to control head smut in 'Jubilee.'

Since neither compound has federal registration for use of sweet corn, it will be several years before either can be used commercially for head smut control.

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Watermelon Varieties Tested at North Willamette Station

Watermelon varieties were evaluated in 1980 at the North Willamette Agricultural Experiment Station in Clackamas County. The trial included 26 varieties or experimental lines from nine seed companies. Production of watermelons in the Willamette Valley is limited by the cool growing season and proximity to major production areas of eastern Oregon and California. Market garden production requires high-quality, productive, disease-resistant, early maturing varieties. For the home garden, the same qualities are desirable, although keeping and shipping quality are less important.

All varieties were seeded in a heated greenhouse on April 24 and transplanted to black plastic-covered beds on May 28. The plot area received a broadcast application of three T/A lime, 1000 lb/A of 10-20-10, 100 lb/A of calcium nitrate, 100 lb/A of Epsom salts (Mg source), and 50 lb/A of fritted trace elements. Via-flo tubing was used for drip irrigation and an additional 20 lb/A of N was applied through the drip system in mid-August. Nine plants of each variety, in three randomly distributed replications of three plants each, were set through holes cut in the plastic mulch and watered in with a cup of 2 oz/gallon 10-30-20. Volcanic ash covered the beds on May 25. Much ash was subsequently washed into transplant holes and may have contributed to poor early growth of many plants.

Table 1 presents yield, mean fruit weight, rank by yield, and percentage of fruit harvested during August, September, and October for the 15 varieties judged most successful in terms of yield, quality, and earliness. Table 2 lists the sources of these varieties and comments on fruit type and quality. Table 3 lists other varieties in the trial.

It should be noted that the heat unit accumulation (50°F base) for June, July, and August, 1980, was 10 percent below the previous 20-year average. Thus, bloom tended to be late, fruit set may have been affected, and maturity probably was later than in most years. However, very few fruit failed to ripen by first frost on October 23rd.

The highest yielder was New Shipper with a mean fruit weight of 18 pounds but only fair fruit set. Other large fruited varieties were Klondike Striped Blue Ribbon, Prince Charles, Sweet Favorite, Allsweet, and Crimson Sweet. Greatest fruit set was on Northern Sweet, X 4901, Golden Midget, and New Hampshire Midget.

Flavor favorites were Seedless 313, Prince Charles, Yellow Baby, Yellow Doll, Klondike Striped Blue Ribbon, Crimson Sweet, and New Shipper. Considering the combination of earliness, good flavor and texture, yield, and large fruit size, the most successful varieties were New Shipper, Klondike SBR, Seedless 313, Yellow Doll, You Sweet Thing, and Burpee's Fordhook. It was very difficult to judge the ripeness of the varieties Early Canada, Kengarden, Market Midget, and X 4901. Color of ground spot, dryness of the tendril at the node to which the fruit is attached, and thumping consistently failed to indicate when these varieties were ripe. Fruit of Kengarden, Golden Midget, Market Midget, and New Hampshire Midget was too small for commercial production.

A more complete report, including varieties listed in Table 3, may be obtained from the author at 15210 NE Miley Rd., Aurora, OR 97002. (Tables found on pgs. 8 and 9.)

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News and Notes

Effect of Gibberelic Acid Application on Flowering and Seed Production in Onion

Mother bulbs of onion were treated with gibberellic acid (GA_3) at 50, 150, and 450 ppm upon emergence of first flower stems. A single application at 50 ppm shortened by one-half the time required for emergence of 80 percent of floral stems and increased the uniformity in height of the flower stalks. GA_3-treated plants produced larger and more productive umbels, resulting in an increase in seed yield by about 30 percent. There was no difference in seed viability between treatments. (Fakhri Naamni, H. D. Rabinowitch, and N. Kedar. Journal of the American Society for Horticultural Science 105(2):164-167, 1980.)

Influence of High Temperature on Pollen Grain Viability and Pollen Tube Growth in the Styles of Green Beans

Four varieties were studied (including Oregon 1604) in a growth chamber experiment to determine the effect of high temperature stress on pollen viability and pollen tube growth in styles. Compared with an optimal growing temperature of 68 to 85°F night/day temperatures, stress temperatures of 68 to 95° F night/day temperatures or 95° constant temperatures reduced the percentage of viable pollen for all varieties and variety differences were apparent. Beans generally produced only small quantities of pollen under normal growing temperatures but much more under high temperatures. Stress temperatures did not reduce the ability of pollen tubes to grow to the base of the style. Because of the observed increase in total pollen grains per flower, estimated numbers of viable grains per flower increased at high temperatures for all but one variety. The net increase at high temperatures resulted from a much larger increase in pollen grain production than decrease in viability percentage. Results suggest that injury to pollen at high temperatures up to 95°F is not likely to hinder the ability of beans to set pods. These findings suggest that other factors are apparently involved in blossom drop than pollen viability, or pollen tube germination at high temperatures. (Anthony J. Halterlein, Carl D. Clayberg, and Iwan D. Teare. Journal of the American Society for Horticultural Science 105(1):12-14, 1980.) "News and Notes" is continued on pg. 10.

Table 1. Yield, Size, and Harvest Period of Watermelon Varieties, 1980

Variety	Percent Harvested by Date				Yield[z] T/A	Rank by Yield	Mean Fruit Wt., lb.
	8/29	9/29	10/22	10/31[y]			
New Shipper	0	84	16	0	35.1a	1	18.0
Klondike Stripe BR	12	54	34	0	33.8a	2	15.5
Seedless 313	58	23	19	0	30.3bc	3	9.7
Yellow Doll	20	64	14	2	27.9cd	4	8.3
You Sweet Thing	33	41	24	2	26.3d	5	10.7
Sweet Favorite	6	69	25	0	26.2d	6	13.5
Northern Sweet	9	52	39	0	25.9de	7	6.7
Peacock WR60	0	61	39	0	25.7de	8	11.7
Burpee Fordhook	30	34	34	2	25.6de	9	12.3
Northern Delight	37	46	15	2	24.4de	11	9.9
Prince Charles	21	63	16	0	22.2ef	12	15.5
All Sweet	0	75	22	3	19.5fg	14	13.7
Crimson Sweet	0	97	3	0	19.1fg	15	13.4
Super Sweet Seedless	37	63	0	0	16.1gh	16	8.3
Sugar Baby	53	34	13	0	13.1h	21	8.4

[z] Yields followed by same letter not significantly different at 95% confidence level.

[y] Percent of fruit not ripened before first killing frost October 23, 1980.

Table 2. Sources of Watermelon Varieties and Comments

Variety	Source[z]	Comments
Allsweet	6	Long, cylindrical, striped light green fruit; pink flesh, small seeds; good flavor; poor fruit set, low vigor, rather late maturing.
Burpee Fordhook	1	Round, dark green fruit; red flesh, small seeds, good flavor, sweet; poor fruit set; some fruit early but wide maturity range.
Crimson Sweet	1	Round, striped light green fruit; red flesh, large heart; good flavor; poor fruit set; mid-season maturity.
Klondike Striped Blue Ribbon	2	Oblong, striped light green fruit; pink flesh, small heart; good flavor; fair fruit set; large fruit; mid-season; vigorous.
New Shipper	3	Round, dark green fruit; red flesh, large black seeds; good flavor, fair fruit set, very large fruit, concentrated mid-season maturity.
Northern Delight	6	Oblong, striped, light green fruit; pink flesh, small seeds; fair flavor; fair fruit set, early.
Northern Sweet	3	Round, striped, light green fruit; pink flesh, large pale seeds; fair flavor; good set of small fruit; mid-season maturity.
Peacock WR60	2	Round, dark green fruit; red flesh; fair flavor; fair fruit set; mid-season maturity.
Prince Charles	7	Large, cylindrical, patterned green fruit; pink flesh, large seeds; good flavor; poor fruit set; fairly early.
Seedless 313	4	Round, striped, light green fruit; pink flesh, seedless; good flavor; good fruit set; very early.
Sugar Baby	4	Round, dark green fruit; salmon flesh, seeds few and small; fair flavor; poor set; early.
Super Sweet Seedless	5	Round, striped, light green fruit; pink flesh, seedless, good flavor, fair set; early.
Sweet Favorite	1	Large, oblong, striped, light green fruit; red-flesh, good flavor; fair set; mid-season maturity.
Yellow Doll	7	Round-oval, striped, light green fruit; yellow flesh; good flavor; good fruit set; fairly early.
You Sweet Thing	5	Round, striped, light green fruit; pink flesh; large black seeds; fair flavor; fair fruit set; early but with wide maturity spread.

[z]Sources: (1) Burpee Seed Co. (2) Ferry Morse Seed Co. (3) Gurney Seed Co. (4) Jos. Harris Co. (5) Geo. Park Seed Co. (6) Stokes Seeds, Inc. (7) Petoseed, Inc.

Table 3. Other Varieties Included in Trial

Source	Varieties
Burpee Seeds, Inc.	Yellow Baby, Burpee Seedless, New Hampshire Midget, Sugar Bush
Global Seeds, Inc.	X4901
Gurney Seeds, Inc.	Early Canada, Market Midget
Letherman's Seeds	Kengarden
Geo. Park Seed Co.	Golden Midget
Stokes Seeds, Inc.	Panonia, Stoke's Sugar

"News and Notes," continued from pg. 7.

1979 Cauliflower Varieties Tested in British Columbia

Cauliflower varieties were seeded March 30, 1979, transplanted May 2, and harvested beginning June 17. Of 15 varieties tested, most performed well and generally produced excellent quality. Varieties worthy of special attention included Elgon (Royal Sluis), Imperial 10-6 (Harris Seed), Sluis & Groot 105 (Sluis & Groot of America), Strong, (J. E. Ohsens), Type 165, and Type 338 (Rijk Zwaan). (1979 Cauliflower Variety Trials Report, Poultry Test Station, 32196 Marshall Rd., Abbotsford, B.C.)

Temperature Influences Bean Seed Quality

A study indicates that cool conditions (65 to 70^{o}F day and 55 to 60^{o}F night) during the maturation of bean seed are ideal for the production of high quality and mechanical damage resistant bean seed in a number of different types. However, genotypes resistant to mechanical damage when matured at low temperatures are not necessarily resistant when they mature at high temperatures. Of 10 genotypes of beans studied, all produced better quality seeds at low maturation temperatures. Resistance to mechanical injury also was maximized in low temperature matured seeds. In general, the colored seeded genotypes, unlike the white seeded genotypes, tolerated a wide range of maturation temperatures. The researchers determined that it probably would be possible to breed white seeded lines showing improved tolerance of high seed maturation temperatures. (M. A. Siddique and P. B. Goodwin. Journal of the American Society for Horticultural Science 105(2):235-238, 1980.)

Variation of Thiocyanate Ion Content in Cauliflower and Broccoli Cultivars

Cruciferous plants contain compounds which undergo enzymic changes when they are eaten, yielding thiocyanates and other related compounds. These compounds are responsible for the flavor in cruciferous plants and also for contributing to iodine deficiency and the incidence of thyroid gland enlargement in rats. There has been an increasing concern for the presence of potential toxicants in food plants. A study was conducted which evaluated a number of cauliflower and broccoli cultivars for their thiocyanate ion (SCN^-) content. The highest quantities of SCN^- in cauliflower curds and broccoli heads generally occurred at the premature stage of development, after which it decreased rapidly. Except for 'Jet Snow' cauliflower, relatively high quantities of SCN^- ion were found in edible curds of 9 other cauliflower cultivars and heads of 6 broccoli cultivars at the optimum mature stage. Although the biosynthesis of the parent compounds and the enzymes involved are not fully understood, reproductive plant tissues appear to be major sites of synthesis or storage of these compounds. There is also a trend towards higher SCN^- content in later maturing varieties of cauliflower. (Hak-Yoon Ju, Bernard B. Bible, and Calvin Chong. Journal of the American Society for Horticultural Science 105(2):187-189, 1980.)

Influence of Water Stress on Yield and Quality of Lettuce Seed

Moisture levels conducive to highest seed yield were different from those which produced the highest quality seed. An intermediate soil moisture deficit (-0.8 bar) during the short vegetative period, or as a continuous treatment throughout growth, produced the highest seed yields and acceptable levels of seed quality. Severe moisture stress (-5.0 bar) during the reproductive phase produced the largest average seed and the most vigorous seed, but at the expense of total seed production. Irrigation to provide intermediate moisture deficits appears to be the most desirable treatment, producing the highest yields together with adequate quality. (Hassan Izzeldin, L. F. Lippert, and F. H. Takatori. Journal of the American Society for Horticultural Science 105(1):68-71, 1980.)

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