

## PRACTICAL VALUE OF SEED CONDITIONING PROCESS FOR BEANS

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Eyster<sup>1</sup> (1938) reported that the germination of bean seeds and vigor of seedlings which survived were adversely affected by soaking the seeds in water for a period of one to two days, but that the seeds could be conditioned to tolerate soaking in water at 10° C. Soaking in water at 10° C. simulates the sowing of seeds in soil which becomes drenched with cold rain. The conditioning process was discovered by Eyster. It is very simple and inexpensive, and consists merely of the placing of seeds on moist toweling in a moist chamber at room temperature or any temperature between 2° C. and 30° C. The amount of time required for the conditioning process varies with the temperature. At room temperature 1½ to 2 days are required for the conditioning of wax bush bean seeds. More time would be required at lower temperatures, less time at higher temperatures.

In order to determine the practical value of the seed conditioning process to the farmer, truck-produce grower, and gardener the author made sowings of conditioned bean seeds and control bean seeds early last spring in Vermillion, South Dakota. The usual time at which bean seeds are planted is May 20 and later when the danger of frost has subsided, and when there is less likelihood of decomposition and loss of seeds in soil because of its cool, moist condition.

<sup>1</sup> Eyster, H. Clyde, "Conditioning Seeds to Tolerate Submergence in Water," *Amer. Jour. Bot.*, 25: 33-36 (1938).

Two sowings of bean seeds were made last spring on April 25 and April 27 respectively.

**Materials and Procedure.** Golden wax bush bean seeds were used. The seeds were sorted for uniformity of size. Any seeds which were mutilated or had a broken seed coat were discarded. The seeds were gently scarified by rubbing on an emery stone. The seeds were scarified in order to make the seed coats uniformly permeable to water, and to reduce the number of variable factors in the experiment. The seeds were conditioned by placing them on several layers of moist filter paper in a large covered petri dish as a moist chamber. The conditioning process was done at room temperature (20-25° C.) for 1½ days. The control and conditioned bean seeds were sown in adjacent rows at an approximately uniform depth of one inch. By hoeing once every two weeks the weeds were kept under control and the soil was kept in the best of condition.

Data (Table I) were gathered on growing conditions such as temperature of soil, maximum and minimum temperature of atmosphere, and occurrence and amount of precipitation. In addition, data on germination and rate of growth (Table II) and on yield (Tables III and IV) were obtained. In the determination of yield, the number of fruits (pods) as well as weight of fruits from each plant was obtained. In the first picking, all fruits longer than one inch were harvested. Realizing that this was not the practical method for harvesting wax bush beans, the investigator included only yellow, non-dry, ready-to-pick fruits in the succeeding harvests.

**Results.** Of two sowings each of conditioned bean seeds and control bean seeds on April 25 and April 27 respectively, in cool, moist soil in Vermillion, South Dakota, the total yield of the conditioned plants was significantly greater than that of the control plants. In each case there was a higher amount and faster rate of germination for conditioned bean seeds and earlier flowering and fruiting for conditioned plants. In the first sowing the average yield per plant was

not significantly different for the conditioned plants than for the control plants, because the control seeds which survived became conditioned in a natural way during the first two to four days. In the second sowing the average yield per conditioned plant was about twice that per control plant. Moisture and temperature relationships in this case were not favorable for the natural conditioning of control seeds in the soil, as was the effect on some control seeds in the first sowing.

It is hoped that this seed conditioning process will be adopted by farmers, truck-produce growers, gardeners, and others, because its practical value is reflected in earlier fruit production and increased yield, as well as a more desirable germination of seeds.

TABLE I.

Growing conditions such as temperature of soil, maximum and minimum temperature of atmosphere, occurrence and amount of precipitation.

Date	Time of Day	Temperature of Soil	Temperature of Atmosphere		Amount of Precipitation
			Minimum	Maximum	
April 24	10:30 A. M.	12.5° C.	- 0.5° C.	12° C.	.01 inch
April 24	3:00 P. M.	17.5° C.			
April 25	5:00 P. M.	9.5° C.	4.0° C.	12° C.	.82 inch
April 26	10:30 A. M.	10.5° C.	4.5° C.	12° C.	
April 26	5:00 P. M.	11.75° C.			
April 27	10:30 A. M.	12.50° C.	5.5° C.	13° C.	.14 inch
April 27	3:00 P. M.	12.5° C.			
April 28			11.0° C.	18° C.	.14 inch
April 29	10:30 A. M.	10.0° C.	6.0° C.	17° C.	.03 inch
April 30	10:30 A. M.	8.5° C.	3.0° C.	9° C.	
April 30	3:30 P. M.	12.0° C.			
May 1	10:30 A. M.	10.5° C.	0.0° C.	13° C.	
May 1	3:30 P. M.	14.0° C.			
May 2	10:30 A. M.	15.0° C.	- 0.5° C.	20° C.	
May 3	10:30 A. M.	17.0° C.	3.0° C.	20° C.	
May 3	3:30 P. M.	20.0° C.			
May 4	10:30 A. M.	15.0° C.	9.3° C.	24° C.	
May 4	3:00 P. M.	22.0° C.			
May 5			14.5° C.	25° C.	
May 6	10:30 A. M.	18.5° C.	4.5° C.	26° C.	
May 6	4:30 P. M.	21.2° C.	10.5° C.	21° C.	
May 7	9:50 A. M.	16.2° C.			.13 inch
May 8	4:00 P. M.	27.5° C.	7.0° C.	22° C.	

TABLE II.

Germination data and rate of growth of seedlings.

Planting	Germination out of 75							Ave. Height of Seedlings May 17 (With standard error)
	May 8	May 10	May 11	May 13	May 14	May 16	May 18	
Conditioned April 25	4	31	36	54	58	58	59	5.85± .15 cm.
Control April 25	0	1	1	29	33	35	39	5.75± .28 cm.
Conditioned April 27	1	30	35	42	43	43	43	6.49± .15 cm.
Control April 27	0	1	1	5	6	11	17	4.96± .23 cm.

TABLE III.

Yield of bean plants grown from conditioned and control seeds planted on April 25.

Date of Harvest	Conditioned		Control	
	Number of Fruits	Weight of Fruits	Number of Fruits	Weight of Fruits
June 22	57	219.75g	14	33.9g
June 29	61	226.4	44	190.4
July 3	246	1089.6	129	591.4
July 6	625	2816.5	462	2146.5
July 15	941	4734.0	757	3955.0
July 22	428	1755.0	383	1575.0
Total	2393	10841.25g	1789	8492.2g
Ave. per plant	45.1 ± 2.1	204.6 ± 9.6g	51.1 ± 2.4	242.6 ± 11.3g

Standard error of mean difference=3.2 pods; 14.8 grams.

TABLE IV.

Yield of bean plants grown from conditioned and control seeds planted on April 27.

Date of Harvest	Conditioned		Control	
	Number of Fruits	Weight of Fruits	Number of Fruits	Weight of Fruits
June 22	57	194.8g	2	5.3g
June 29	57	234.0	19	78.0
July 4	315	1662.8	59	289.1
July 8	695	3587.8	199	999.2
July 17	911	4475.0	290	1350.0
July 23	176	522.0	143	430.0
Total	2211	10676.4g	712	3151.6g
Ave. per plant	51.4 ± 1.7	248.3 ± 8.5	29.7 ± 4.7	131.3 ± 21.8g

Standard error of mean difference=5.0 pods; 23.4 grams.