

HOT-WATER TREATMENT OF AVOCADO SEED

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In connection with requirements of the avocado nursery stock certification program to protect against infection with **Phytophthora cinnamomi**, additional tests were run this year on tolerance of seed of a number of avocado varieties to hot-water treatment. To provide additional information, treated seed were planted in the field as well as in steamed sand in the greenhouse.

Tests reported in 1957 (1) demonstrated that some injury to avocado seed occurred following a 30-minute treatment in water at 130°F. No retardation of germination resulted from a 30-minute immersion in water at 115°, 120°, or 125°F. A treatment of 30 minutes in water held at a temperature of 120°F. or over was effective in eliminating the avocado root rot fungus, **Phytophthora cinnamomi**, from avocado seed.

Tests conducted in the winter and spring of 1958 included seed of 10 varieties of avocado: Topa Topa, Caliente, Ganter, Mexicola, Duke, Harman, and four unnamed varieties. Seed were treated in thermostatically-controlled tanks at 115°, 120°, 125°, and 130°F. for 30 minutes. Some seed were treated with the seed coat on, others with the seed coat removed. Other variables introduced were: Cutting of the seed versus non-cutting of seed at planting time, and planting in non-sterile soil in two San Diego County nurseries versus planting in steamed soil in the greenhouse.

A total of 2425 seed was involved in these experiments. Seed were treated and planted in both greenhouse and field in February 1958. Periodic data on emergence were taken from the time that germination began.

Results of both greenhouse and field trials showed no retardation in rate of germination or reduction in per cent germination of seed treated at 115°, 120°, or 125°F. for 30 minutes. In some varieties (Duke, Topa Topa, and 11GA Mexican) germination was severely reduced by treatment at 130°F. for 30 minutes. With the other 7 varieties, germination was only slightly reduced, or was unaffected, by the 130°F. treatment. In the experiments involving treating seed with the coat intact, as compared with treatment with seed coat removed, no significant differences were evident.

Table 1. Germination of avocado seed following 30-minute treatment at various temperatures, and planting in steamed sand in the greenhouse.

Variety	Number of seed	No treatment	Per cent germination 8 weeks after planting when treated for 30 minutes at:			
			115°F.	120°F.	125°F.	130°F.
Duke	125	92	100	96	94	24
Topa Topa	125	92	96	92	92	20
Mexicola	250	94	100	96	100	62
Ganter	125	84	100	100	100	100
Caliente	60	100	83	92	100	75
Harmon	60	83	83	83	100	83
Mexican No. 1	60	83	83	100	100	100
Mexican No. 2	60	91	100	100	91	83
Mexican No. 3	60	91	100	100	100	100
11GA Mexican	250	96	80	90	92	73

Seed all cut at time of planting; included are seed treated with seed coat on and with seed coat off.

Table 1 shows figures on germination of the several varieties of avocado seed following treatment and planting in the greenhouse. In table 2 similar data are presented for seed planted in the field in Fallbrook.

Table 2. Germination of avocado seed following 30-minute treatment at various temperatures, and planting in non-sterile soil in the Fallbrook area.

Variety	Temperature °F.	No. of seed	Per Cent germination in 3 months
Nursery No. 1 Ganter	No treatment	50	94
	115	50	90
	120	50	78
	125	50	96
	130	50	80
Mexican Seedling 11GA	No treatment	50	94
	115	100	87
	120	100	79
	125	100	82
	130	100	22
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Nursery No. 2 5 Mexican varieties	No treatment	65	94
	115	65	97
	120	65	94
	125	65	91
	130	65	74

Includes seed cut and not cut at time of planting; some seed were treated with seed coat on, others with seed coat off. Seed planted 2/12/58 and 2/13/58. Germination data taken 5/21/58.

Table 3. Effect of cutting seed at planting time, compared with non-cutting of seed, following hot-water treatment for 30 minutes at various temperatures.

Variety	Number		No treatment		Per cent germination after planting when treated for 30 minutes at:							
					115°F.		120°F.		125°F.		130°F.	
			A	B	A	B	A	B	A	B	A	B
Ganter	125	seed cut	44	84	84	100	64	100	88	100	76	100
	125	seed not cut	0	32	12	88	0	20	12	92	0	92
11GA Mexican	225	seed cut	48	96	34	80	50	90	48	92	45	73
	225	seed not cut	12	76	12	54	24	96	10	94	26	76

A = per cent germination after 5 weeks. B = per cent germination after 10 weeks.

In table 3 data are given which compare cutting of the seed with non-cutting of seed at planting time in the different temperature treatments. As has been shown by Halma and Frolich (2) germination of seed is strikingly accelerated by cutting.

One lot of Ganter seed was stored two months after treatment then planted in steamed sand in the greenhouse. Germination data are presented in table 4. No significant reduction in germination rate or in percentage germination was evident in the various heat-treated lots.

Table 4. Germination of Ganter avocado seed stored for two months after hot-water treatment for 30 minutes at various temperatures.

Temperature °F.	No. of seed	Per cent germination in:	
		4 wks.	8 wks.
No treatment	25	80	96
115	25	64	88
120	25	48	84
125	25	84	92
130	25	76	80

Seed cut at time of planting. Seed stored after treatment in polyethylene bags, at 50°F.

These data indicate the following:

1. Avocado seed of a number of varieties may be safely treated at 115°, 120°, or 125°F. for 30 minutes. Some varieties are not injured by a 30-minute treatment at 130°F.; others are severely injured at this temperature.
2. Presence of the seed coat at time of treating has little or no effect on germination rate or percentage.
3. Cutting the seed at planting time markedly increases the rate of germination, irrespective of seed treatment.
4. Storing heat-treated seed for two months does not significantly reduce its germination.

LITERATURE CITED

1. Durbin, R. D., E. F. Frolich, and G. A. Zentmyer. 1957. Eradication of *Phytophthora cinnamomi* in avocado seed by hot-water treatment. Calif. Avocado Soc. Yearbook, pp. 141-142.
2. Halma, F. F., and E. F. Frolich. 1949. Storing avocado seeds and hastening germination. Calif. Avocado Soc. Yearbook, pp. 136-138.