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Garden Notes

GN 154

SOIL TEMPERATURE CONDITIONS FOR VEGETABLE SEED GERMINATION

Many internal and environmental conditions influence seed germination: condition of the seed, presence of water, sufficient air, soil conditions, and temperature. The chart below lists the optimum soil temperatures at which they do best. This does not mean your seeds will not germinate at higher or lower temperatures, but greater success will be achieved if optimum conditions are provided. Using a probe-type thermometer is an accurate method for testing soil temperatures prior to planting seeds and small plants.

Crops	Minimum (ºF)	Optimum range (ºF)	Maximum (ºF)
Asparagus	50	75-85	95
Beans, Lima	60	75-85	85
Beans, Snap	60	75-85	95
Beets	40	65-85	95
Broccoli	40	60-85	95
Cabbage	40	60-85	95
Carrots	40	65-85	95
Cauliflower	40	65-85	95
Celery	40	*	*
Chard, Swiss	40	65-85	95
Corn	50	65-95	105
Cucumbers	60	65-95	105
Eggplant	60	75-85	95
Garlic	32	65-85	95
Leeks	32	65-85	95
Lettuce	32	60-75	85
Muskmelons (Cantaloupe)	60	75-85	105
Okra	60	85-95	105
Onions	32	65-85	95
Parsley	40	65-85	95
Parsnips	32	65-75	85
Peas	40	65-75	85
Peppers	60	65-75	95
Pumpkins	60	85-95	105
Radishes	40	65-85	95
Spinach	32	65-75	75
Squash	60	85-95	105
Tomatoes	50	65-85	95
Turnips	40	60-95	105
Watermelons	60	75-95	105

Source: California Master Gardener Handbook, 2nd edition, Regents of the University of California, Division of Agriculture and Natural Resources, Publication 3382 (Table 5.2, page 114).

**Note: Celery requires diffuse light and a night temperature from 10° to 15°F lower than the day temperature for good germination. Optimal conditions are 85°F day, 70°F night with diffuse light and high moisture.*

NUMBER OF DAYS FOR VEGETABLE SEEDS TO EMERGE AT DIFFERENT TEMPERATURES

This chart shows the range of temperatures at which seeds will germinate. Note that temperatures higher or lower than the optimum soil temperature (as noted on the previous chart) will result in more days before germination occurs, or if temperatures are too extreme, germination may not result at all. For example, the optimum temperature range for tomatoes is 65° to 85°F (see previous chart). Within that range, it takes approximately 6 to 8 days before seeds germinate. Tomato seeds may still germinate at 50°F, but it will take over 40 days, and there will probably be no germination if the soil temperature is 104°F.

Crops	32ºF	41ºF	50ºF	59ºF	68ºF	77ºF	86ºF	95ºF	104ºF
Asparagus	0.0	0.0	52.8	24.0	14.6	10.3	11.5	19.3	28.4
Beans, Lima	---	---	0.0	30.5	17.6	6.5	6.7	0.0	---
Beans, Snap	0.0	0.0	0.0	16.1	11.4	8.1	6.4	6.2	0.0
Beets	---	42.0	16.7	9.7	6.2	5.0	4.5	4.6	---
Cabbage	---	---	14.6	8.7	5.8	4.5	3.5	---	---
Carrots	0.0	50.6	17.3	10.1	6.9	6.2	6.0	8.6	0.0
Cauliflower	---	---	19.5	9.9	6.2	5.2	4.7	---	---
Celery	0.0	41.0	16.0	12.0	7.0	0.0	0.0	0.0	---
Corn, Sweet	0.0	0.0	21.6	12.4	6.9	4.0	3.7	3.4	0.0
Cucumbers	0.0	0.0	0.0	13.0	6.2	4.0	3.1	3.0	---
Eggplant	0.0	---	---	---	13.1	8.1	5.3	---	---
Lettuce	49.0	14.9	7.0	3.9	2.6	2.2	2.6	0.0	0.0
Muskmelons	---	---	---	---	8.4	4.0	3.1	---	---
Okra	0.0	0.0	0.0	27.2	17.4	12.5	6.8	6.4	6.7
Onions	135.8	30.6	13.4	7.1	4.6	3.6	3.9	12.5	0.0
Parsley	---	---	29.0	17.0	14.0	13.0	12.3	---	---
Parsnips	171.7	56.7	26.6	19.3	13.6	14.9	31.6	0.0	0.0
Peas	---	36.0	13.5	9.4	7.5	6.2	5.9	---	---
Peppers	0.0	0.0	0.0	25.0	12.5	8.4	7.6	8.8	0.0
Radishes	0.0	29.0	11.2	6.3	4.2	3.5	3.0	---	---
Spinach	62.6	22.5	11.7	6.9	5.7	5.1	6.4	0.0	0.0
Tomatoes	0.0	0.0	42.9	13.6	8.2	5.9	5.9	9.2	0.0
Turnips	0.0	0.0	5.2	3.0	1.9	1.4	1.1	1.2	2.5
Watermelons	---	0.0	---	---	11.8	4.7	3.5	3.0	---

Sources: J. F. Harrington, Department of Vegetable Crops, University of California at Davis, Agricultural Extension Leaflet, 1954.

"*The New Seed-Starting Handbook*", Nancy Bubel, 1988, Rodale Press

Notes: 0.00 = Little or no germination.
--- = Not tested.

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