

germination conditions for the kind of seed in question.

(a) Viability of ungerminated seeds shall be determined by any of the following methods or combinations of methods: a cutting test, tetrazolium test, scarification, or application of germination promoting chemicals.

(b) The percentage of dormant seed, if present, shall be determined in addition to the percentage of germination for the following kinds: Bahiagrass, basin wildrye, big bluestem, little bluestem, sand bluestem, yellow bluestem, bottlebrush-squirreltail, buffalograss, buffelgrass, galletagrass, forage kochia, blue grama, side-oats grama, Indian ricegrass, johnsongrass, sand lovegrass, weeping lovegrass, mountain rye, sand dropseed, smilo, switchgrass, veldtgrass, western wheatgrass, and yellow indiagrass.

(c) For green needlegrass, if the test result of method 2 is less than the result of method 1, subtract the result of method 2 from method 1 and report the difference as the percentage of dormant seed. Refer to §201.58(b)(7).

[46 FR 53638, Oct. 29, 1981, as amended at 59 FR 64506, Dec. 14, 1994]

§201.58 Substrata, temperature, duration of test, and certain other specific directions for testing for germination and hard seed.

Specific germination requirements are set forth in table 2 to which the following paragraphs (a), (b), and (c) are applicable.

(a) *Definitions and explanations applicable to table 2*—(1) *Duration of tests*. The following deviations are permitted from the specified duration of tests: Any test may be terminated prior to the number of days listed under “Final count” if the maximum germination of the sample has then been determined. The number of days stated for the first count is approximate and a deviation of 1 to 3 days is permitted. If at the time of the prescribed test period the seedlings are not sufficiently developed for positive evaluation, it is possible to extend the time of the test period two additional days. (Also, see paragraph (a)(5) of this section and 201.57.)

(2) *Light*. Cool white fluorescent light shall be provided where light is required in table 2. The light intensity

shall be 75 to 125 foot-candles (750–1,250 lux). (The light intensity for nondormant seed and during seedling development may be as low as 25 foot-candles to enable the essential structures to be evaluated with greater certainty.) The seeds shall be illuminated for at least 8 hours every 24 hours except when transferred to a low temperature germinator during the weekend. When seeds are germinated at alternating temperatures they shall be illuminated during high temperature periods. Seeds for which light is prescribed shall be germinated on top of the substratum except for ryegrass fluorescence tests.

(3) *Moisture-on-dry-side*. This term means that the moistened substratum should be pressed against a dry absorbent surface such as a dry paper towel or blotter to remove excess moisture. The moisture content thus obtained should be maintained throughout the germination test period.

(4) *Potassium nitrate* (KNO₃). These terms mean a two-tenths (0.2) percent solution of potassium nitrate (KNO₃) shall be used in moistening the substratum. Such solution is prepared by dissolving 2 grams of KNO₃ in 1,000 ml. of distilled water. The grade of the potassium nitrate shall meet A.C.S. specifications.

(5) *Prechill*. The term “prechill” means a cold, moist treatment applied to seeds to overcome dormancy prior to the germination test. The prechill method varies among kinds, but is usually performed by holding imbibed seeds at a low temperature for a specified period of time. The prechill period is not included in the duration of tests given in table 2, unless otherwise specified.

(6) *Predry*. The term “predry” means to place the seed in a shallow layer at a temperature of 35 ° to 40 °C. for a period of 5 to 7 days, with provisions for circulation of the air.

(7) *Substrata (Kinds)*. The symbols used for substrata are:

B= between blotters

TB= top of blotters

T= paper toweling, used either as folded towel tests or as roll towel tests in horizontal or vertical position

S= sand or soil where soil is an artificial planting mix of shredded peat moss, vermiculite, and perlite

TS= top of sand or soil

P= covered Petri dishes: with two layers of blotters; with one layer of absorbent cotton; with five layers of paper toweling; with three thicknesses of filter paper; or with sand or soil

C= creped cellulose paper wadding (0.3-inch thick Kimpak or equivalent) covered with a single thickness of blotter through which holes are punched for the seed that are pressed for about one-half their thickness into the paper wadding

TC= on top of creped cellulose paper without a blotter

RB= blotters with raised covers, prepared by folding up the edges of the blotter to form a good support for the upper fold which serves as a cover, preventing the top from making direct contact with the seeds.

(8) *Temperature.* A single numeral indicates a constant temperature. Two numerals separated by a dash indicate an alternation of temperature, the test to be held at the first temperature for approximately 16 hours and at the second temperature for approximately 8 hours per day. The temperature shall be determined at the substratum level and shall be as uniform as possible throughout the germination chamber. (A sharp alternation of temperature, such as obtained by hand transfer, may be beneficial in breaking dormancy.) If tests are not subjected to alternating temperatures over weekends and on holidays, they are to be held at the first-mentioned temperature during this time. In cases where two temperatures are indicated (separated by a semicolon) the first temperature shall be regarded as the regular method and the second as an alternate method.

(9) Paper substrata must be free of chemicals toxic to germinating seed and seedling growth. If root injury occurs from toxicity of a paper substratum or from the use of potassium nitrate, retests shall be made on soil or on a substratum moistened with water.

(10) *Ethephon.* This term means a 29 parts per million (0.0029 percent) solution of ethephon [(2-chloroethyl) phosphonic acid] which shall be used to moisten the substratum. This solution is prepared by mixing 0.6 ml of a stock

solution with 5,000 ml of distilled water. The stock solution contains 24 grams of active material per 100 ml of propylene glycol or two pounds of active material per gallon. A solution which is five times this concentration (5 x 29 ppm) may be used for extremely dormant seeds, provided seeds are transferred to substratum moistened with water after 1 to 3 days.

(11) *Ethylene.* This term means that five (5) ml of ethylene gas per cubic foot (176.57 ml/m³) of germinator space is injected into a germinator in which peanut seeds in moist rolled towels have been placed. Following injection of the ethylene, the germinator is kept closed until the first count (5 days). If the germinator door is opened for the purpose of checking or rewetting the samples, another injection of ethylene at the same rate shall be made.

(b) *Special procedures and alternate methods for germination referred to in table 2—(1) Alyceclover; swollen seeds.* At the conclusion of the 21-day test period, carefully pierce the seed coat with a sharp instrument and continue the test for 5 additional days. Alternate method: The swollen seeds may be placed at 20 °C for 48 hours and then at 35 °C for 3 additional days.

(2) *Bahiagrass; removal of glumes.* On all varieties except "Pensacola," remove the enclosing structures (glumes, lemma, and palea) from the caryopsis with the aid of a sharp scalpel. If the seed is fresh or dormant, lightly scratch the surface of the caryopsis.

(3) *Beet, Swiss chard; preparation of seed for test.* Before the seeds are placed on the germination substratum, they shall be soaked in water for 2 hours, using at least 250 ml of water per 100 seeds, then washed in running water and the excess water blotted off. The temperature of the soaking and washing water should be no lower than 20 °C. Samples producing excessive discoloration of the hypocotyl or root should be retested in soil or by washing in running water for 3 hours and testing on "Kimpak," keeping the seed covered with slightly moist blotters. Sugar beets may require 16 hours soaking in water at 25 °C, followed by rinsing and then drying for 2 hours at room temperature.

(4) *Buffelgrass; alternate method for dormant seed.* The caryopses shall be removed from the fascicles and placed on blotters moistened with a 0.2 percent solution of KNO_3 , in petri dishes. The seeds from a fascicle should be arranged so they will not be confused with seeds from other fascicles during the test. The seeds are then prechilled at 5°C for 7 days and tested at 30°C in light for 21 additional days. Firm ungerminated seeds remaining at the conclusion of the test should be scratched lightly and left in test for 7 additional days.

(5) *Cotton (*Gossypium* spp.); dormant samples.* Samples of cottonseed which do not respond to the usual method should be placed in a closed container with water and shaken until the lint is thoroughly wet. The excess moisture should then be blotted off.

(6) *Endive (*Cichorium endivia*); dormant samples.* Add about $\frac{1}{8}$ inch of tap water at the beginning of the test and remove excess water after 24 hours.

(7) *Green needlegrass;* two test methods as prescribed in table 2 shall be used on each sample:

(i) For method 1, acid scarify 400 seeds for 10 minutes in concentrated sulfuric acid (95 to 98 percent H_2SO_4). Rinse seeds and dry on blotters for 16 hours, then place seeds on blotters moistened with a solution of 0.055 percent (500 ppm gibberellic acid GA_3) and 0.46 percent (3,000 ppm) thiram and germinate 14 days.

(ii) For method 2, plant 400 seeds on blotters moistened with a 0.2 percent solution of KNO_3 and germinate 14 days. Refer to §201.57a(c).

(iii) Report the results of method 2 as the percentage germination. If the number in method 2 is less than method 1, subtract the results of method 2 from method 1 and report the difference as dormant seed.

(8) *Rescue grass (*Bromus catharticus*); dormant samples.* Wash for 48 hours in running water, or soak for 48 hours, changing the water and rinsing each morning and night.

(9) *Rice (*Oryza sativa*)—Alternate method.* Plant the seeds in moist sand. On the seventh day of the test add water to a depth of one-fourth inch above the sand level and leave for the remainder of the test. Only a final count is made.

Dormant seeds: Presoak 24 to 48 hours in 40 °C. water. For deeply dormant seeds, presoak 24 hours in 1,000 p.p.m. ethylene chlorohydrin or 5 percent solution of sodium hypochlorite (clorox at bottle strength).

(10) *Ryegrass; fluorescence test.* The germination test for fluorescence of ryegrass shall be conducted in light [not to exceed 100 foot candles (1,076 lux)] with white filter paper as the substratum. The white filter paper should be nontoxic to the roots of ryegrass and of a texture that will resist penetration of ryegrass roots. Distilled or deionized water shall be used to moisten the filter paper. The test shall be conducted in a manner that will prevent the contact of roots of different seedlings. Roots of some seedlings produce fluorescent lines on white filter paper when viewed under ultraviolet light. First counts shall not be made before the eighth day; at that time remove only normal fluorescent seedlings. Evaluation of fluorescence shall be made under F15T8-BLB or comparable ultraviolet tubes in an area where light from other sources is excluded. If there are over 75 percent normal fluorescent seedlings present at the time of the first count, break the contact of the roots of the nonfluorescent seedlings from the substratum and reread the fluorescence at the time of the final count. At the final count, lift each remaining seedling, observing the path of each root since sometimes faint fluorescence will show on the substratum as the root is lifted. Abnormal seedlings and dead seeds are not evaluated for fluorescence. See §201.58a(a).

(11) *Trifolium, Medicago, Melilotus, and Vicia faba; temperature requirements.* A temperature of 18 °C. is desirable for *Trifolium* spp., *Medicago* spp., *Melilotus* spp., and *Vicia faba*.

(12) *Garden bean; use of calcium nitrate.* If hypocotyl collar rot is observed on seedlings, the sample involved shall be retested using a 0.3 to 0.6 percent solution of calcium nitrate (CaNO_3) to moisten the substratum.

(13) *Fourwing Saltbush (*Atriplex canescens*); preparation of seed for test.* DE-wing seeds and soak for 2 hours in 3 liters of water after which rinse with approximately 3 liters of distilled water. Remove excess water, air dry for

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7 days at room temperature, then test for germination as indicated in Table 2.

(c) Procedures for coated seed:

(1) Germination tests on coated seed shall be conducted in accordance with methods in paragraphs (a) and (b) of this section. However, kinds for which soaking or washing is specified in paragraph (b) shall not be soaked or washed in the case of coated seed.

(i) Coated seed units shall be placed on the substratum in the condition in which they are received without rinsing, soaking, or any other pretreatment.

(ii) Coated seed units in mixtures which are color coded or can otherwise be separated by kinds shall be germinated as separate kinds without removing the coating material.

(iii) Coated seed units in mixtures which cannot be separated by kinds without removing the coating material shall be de-coated and germinated as separate kinds. The coating material shall be removed in a manner that will not affect the germination capacity of the seeds.

(2) The moisture level of the substratum is important. It may depend on the water-absorbing capacity of the coating material. A retest may be necessary before satisfactory germination of the sample is achieved.

(3) Phytotoxic symptoms may be evident when germinating coated seeds in paper substrata. In such cases a retest in sand or soil may be necessary.

TABLE 2—GERMINATION REQUIREMENTS FOR INDICATED KINDS

Name of seed	Substrata	Temperature (° C)	First count days	Final count days	Additional directions	
					Specific requirements	Fresh and dormant seed
AGRICULTURAL SEED						
Agroticum	B, T, S	20; 15	4	7		Prechill at 5 or 10 °C for 5 days.
Alfalfa	B, T, S	20	4	17	See ¶(b)(11)	
Alfilaria	B, T	20–30	3	14	Clip seeds	
Alyceclover	B, T	35	4	21	See ¶(b)(1) for swollen seeds	
Bahiagrass:						
Var. Pensacola	P, S	20–35	7	28	Light; see ¶(b)(2)	See § 201.57a
All other vars.	P	30–35	3	21	Light; remove glumes; see ¶(b)(2).	Scratch caryopses; KNO ₃ ; see § 201.57a
Barley	B, T, S	20; 15	4	7		Prechill 5 days at 5 or 10 °C or predry
Barreiclover	B, T	20	4	14	Remove seeds from bur; see ¶(b)(11).	
Bean:						
Adzuki	B, T, S	20–30	4	110		
Field	B, T, S, TC	20–30; 25	5	18		
Mung	B, T, S	20–30	3	17		
Beet, field	B, T, S	20–30	3	14	See ¶(b)(3)	
Beet, sugar	B, T, S	20–30; 20	3	10	See ¶(b)(3)	
Beggarweed, Florida	B, T	30	5	28		
Bentgrass:						
Colonial	P	15–30; 10–30; 15–25	7	28	Light; KNO ₃	Prechill at 5 or 10 °C for 7 days.
Creeping	P	15–30; 10–30; 15–25	7	28	Light; KNO ₃	Prechill at 5 or 10 °C for 7 days.
Velvet	P	15–25; 20–30	7	21	Light; KNO ₃	
Bermudagrass	P	20–35	7	21	Light; KNO ₃ ; see ¶(a)(9)	
Bermudagrass, giant	P	20–35	7	21	Light; KNO ₃ ; see ¶(a)(9)	Prechill at 10 °C for 7 days and then test at 20–35 °C; continue tests of hulled seed for 14 days and of unhulled seed for 21 days
Bluegrass:						
Annual	P	20–30	7	21	Light	
Bulbous	P, S	10	10	35	KNO ₃ or soil	Prechill all samples at 5 °C for 7 days.
Canada	P	15–25; 15–30	10	28	Light; KNO ₃	10–30 °C.
Glaucantha	P	15–25; 15–30	10	28	Light; KNO ₃	
Kentucky	P	15–25; 15–30	10	28	Light; KNO ₃	Prechill at 10 °C for 5 days.
Nevada	P	20–30	7	21	Light; KNO ₃	
Rough	P	20–30	7	21	Light	
Texas	P	20–30	7	28	Light; KNO ₃	Prechill at 5 °C for 2 weeks.
Wood	P	20–30	7	28	Light	
Bluejoint	TB, P	15–25	10	21	Light and KNO ₃ optional	Prechill at 5 °C for 5 days
Bluestem:						
Big	P, TS	20–30	7	14	Light; KNO ₃	Prechill at 5 °C for 2 weeks; see § 201.57a.
Little	P, TS	20–30	7	14	Light; KNO ₃	Prechill at 5 °C for 2 weeks; see § 201.57a.
Sand	P, TS	20–30	7	14	Light; KNO ₃	Prechill at 5 °C for 2 weeks; see § 201.57a.
Yellow	P, TS	20–30	5	14	Light; KNO ₃	Prechill at 5 °C for 2 weeks; see § 201.57a.
Bottlebrush-squirreltail	P, B	20; 15	10	14		See § 201.57a.

TABLE 2—GERMINATION REQUIREMENTS FOR INDICATED KINDS—Continued

Name of seed	Substrata	Temperature (° C)	First count days	Final count days	Additional directions	
					Specific requirements	Fresh and dormant seed
Brome:						
Field	P, TB	15–25; 20–30	6	14	Light	Prechill at 10 °C for 5 days.
Meadow	B, T, TB	20–30	6	14	Light optional	
Mountain	P	20–30	6	14	Light	
Smooth	P, B, TB	20–30	6	14	Light optional	Prechill at 5 or 10 °C for 5 days, then test at 30 °C for 9 additional days.
Broomcorn	B, T, S	20–30	3	10		
Buckwheat	B, T	20–30	3	6		
Buffalograss:						
(Burs)	P,TB,TS	20–35	7	14	Light;KNO ₃	Prechill at 5 °C for 2 weeks; See § 201.57a.
(Caryopses)	P	20–35	5	14	Light;KNO ₃	
Buffelgrass	S	30	7	28	Light; press fascicles into well-packed soil and prechill at 5 °C for 7 days.	See ¶(b)(4); see § 201.57a.
Burclover, California	B, T	20	4	114	Remove seeds from bur; see ¶(b)(11).	
Burclover, spotted	B, T	20	4	114	Remove seeds from bur; see ¶(b)(11).	
Burnet, littler	B, T	15	5	14		
Buttonclover	B, T	20	4	110	See ¶(b)(11)	15 °C.
Canarygrass	B, T	20–30	3	7		
Canarygrass, reed	P	20–30	5	21	Light; KNO ₃	
Carpetgrass	P	20–35	10	21	Light	KNO ₃ .
Castorbean	T, S	20–30	7	14	Remove caruncle if mold interferes with test.	
Chess, soft	P	20–30	7	14	Light	Prechill at 5 or 10 °C for 7 days.
Chickpea	T,S	20–30	3	117		
Clover:						
Alsike	B, T, S	20	3	17	See ¶(b)(11)	15 °C.
Arrowleaf	B, T	20; 15	4	114	See ¶(b)(11)	
Berseem	B, T, S	20	3	17	See ¶(b)(11)	15 °C.
Cluster	B, T	20	4	110	See ¶(b)(11)	15 °C.
Crimson	B, T, S	20	4	17	See ¶(b)(11)	15 °C.
Kenya	B, T, S	20	3	17		
Ladino	B, T, S	20	3	17	See ¶(b)(11)	15 °C.
Lappa	B, T	20	3	17	See ¶(b)(11)	15 °C.
Large hop	B, T	20	4	114	See ¶(b)(11)	15 °C.
Persian	B, T	20	3	17	See ¶(b)(11)	15 °C.
Red	B, T, S	20	4	17	See ¶(b)(11)	15 °C.
Rose	B, T	20	4	110	See ¶(b)(11)	15 °C.
Small hop	B, T	20	4	114	See ¶(b)(11)	15 °C.
Strawberry	B, T	20	3	17	See ¶(b)(11)	15 °C.
Sub	B, T	20	4	114	See ¶(b)(11)	15 °C.
White	B, T, S	20	3	17	See ¶(b)(11)	15 °C.

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Corn:					
Field	B, T, S, TC	20-30; 25	4	7	
Pop	B, T, S, TC	20-30; 25	4	7	
Cotton	B, T, S	20-30; 30	4	112	Test by alternate method; see ¶ (b)(5).
Cowpea	B, T, S	20-30	5	18	
Crambe	T, B	20; 25	4	7	KNO ₃
Crested dogtail	P	20-30	10	21	Light
Crotalaria:					
Lance	B, T, S	20-30	4	110	
Showy	B, T, S	20-30	4	110	
Slenderleaf	B, T, S	20-30	4	110	
Striped	B, T, S	20-30	4	110	
Sunn	B, T, S	20-30	4	110	
Crownvetch	B, T, TB, S	20	7	114	
Dallisgrass	P	20-35	7	21	Light; KNO ₃
Dichondra	B, T	20-30	7	128	
Drop seed, sand	P	5-35; 15-35	5	14	Light; KNO ₃
Emmer	B, T, S	20; 15	4	7	Prechill at 5 °C for 4 weeks; see § 201.57a. Prechill at 5 or 10 °C for 5 days or predry.
Fescue:					
Chewings	P	15-25	7	21	Light and KNO ₃ optional
Hair	P	10-25	10	28	KNO ₃
Hard	P	15-25	7	21	Light and KNO ₃ optional
Meadow	P	15-25; 20-30	5	14	Light and KNO ₃ optional
Red	P	15-25	7	21	Light and KNO ₃ optional
Sheep	P	15-25	7	21	Light and KNO ₃ optional
Tall	P	15-25; 20-30	5	14	Light and KNO ₃ optional
Flatpea	T	15-25; 20	14	128	Prechill at 5 or 10 °C for 5 days and test for 21 days.
Flax	B, T, S	20-30	3	7	
Foxtail, creeping	P	15-30	7	21	Light; KNO ₃ .
Foxtail, meadow	P	20-30	7	14	Light.
Galletagrass	P, B	20; 25; 20-30	4	10	See § 201.57a
Gramma:					
Blue	P, TB	20-30	7	14	Light
Side-oats	P	15-30	7	14	Light; KNO ₃
Guar	B, T, S	30; 20-30	5	114	KNO ₃ ; see § 201.57a. See § 201.57a.
Guineagrass	P	15-35	10	28	Light; KNO ₃ optional
Hardinggrass	P	10-30	7	28	Light
Alternate method	P	15-25	7	14	Light; presoak at 15 °C for 24 hrs.
Hemp	B, T	20-30	3	7	
Indiangrass, yellow	P, TS	20-30	7	14	Light; KNO ₃
Indigo, hairy	B, T	20-30	5	114	
Japanese lawngress	P	35-20	10	28	Light; KNO ₃
Johnsongrass	P	20-35	7	35	Light
Kenaf	T, B	20-30	4	18	KNO ₃ ; see § 201.57a.
Kochia, forage	P	20	4	14	See § 201.57a.
Kudzu	B, T	20-30	5	114	
Lentil	B, T	20	5	110	
Lespedeza:					
Korean	B, T, S	20-35	5	114	

TABLE 2—GERMINATION REQUIREMENTS FOR INDICATED KINDS—Continued

Name of seed	Substrata	Temperature (° C)	First count days	Final count days	Additional directions	
					Specific requirements	Fresh and dormant seed
Sericea	B, T, S	20-35	7	121		
Siberian	B, T, S	20-35	7	121		
Striate	B, T, S	20-35	7	114		
Lovegrass, sand	P	20-30	5	14	Light; KNO ₃	Prechill at 5 or 10 °C for 6 weeks; see § 201.57a. KNO ₃ ; see § 201.57a.
Lovegrass, weeping	P	20-35	5	14	Light	
Lupine:						
Blue	B, T, S	20	4	110		
White	B, T	20	3	110		
Yellow	B, T	20	7	110		
Manilagrass	P	35-20	10	28	Light; KNO ₃	
Medic, black	B, T, S	20	4	17	See ¶ (b)(11)	
Milkvetch	B, T	20	6	114		
Alternate method	B, TB, T	15-25	10	121		
Millet:						
Brown top	B, P, T	20-30; 30	4	14	Light and KNO ₃ optional	Predry at 35 or 40 °C for 7 days and test at 30 °C.
Alternate method	B, P, T	5-35	4	14	Light; KNO ₃	
Foxtail	B, T	15-30; 20-30	4	10		
Japanese	B, T	20-30	4	10		
Pearl	B, T	20-30	3	7		
Proso	B, T	20-30	3	7		
Molassesgrass	P	20-30	7	21	Light	
Mustard:						
Black	P	20-30	3	7	Light	KNO ₃ and prechill at 10 °C for 3 days. Prechill at 10 °C for 7 days and test for 5 days; KNO ₃ .
India	P	20-30	3	7	Light	
White	P	20-30	3	5	Light	
Napiergrass	B, T	20-30	3	10		
Needlegrass, green:						
Method 1	P	15-30	7	14	H ₂ SO ₄ , GA ₃ and thiram; dark; see ¶(b)(7).	
Method 2	P	15-30	7	14	KNO ₃ ; dark; see (b)(7)	
Oat	B, T, S	20; 15	5	10	Prechill at 5 or 10 °C for 5 days and test for 7 days or predry and test for 10 days..	
Oatgrass, tall	P	20-30	6	14	Light	
Orchardgrass	P, TS	15-25	7	21	Light; germination more rapid on soil.	Prechill at 5 or 10 °C for 7 days.
Panicgrass, blue	P, TS	20-30	7	28	Light	
Panicgrass, green	P	15-35	10	28	Light; KNO ₃ optional	
Pea, field	B, T, S	20	3	18		
Peanut	B, T, S	20-30; 25	5	110	Remove shells	Ethephon or ethylene; see ¶ (a) (10) and (11).
Rape:						
Annual	B, T	20-30	3	7		
Bird	P	20-30	3	10	Light	KNO ₃ .
Turnip	B, T	20-30	3	7		

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Winter	B, T	20-30	3	7		
Redtop	P, TB	20-30	5	10	Light	KNO ₃
Rescuegrass	P, S	10-30	7	28	Light; see ¶ (b)(8) for alternate method.	In soil at 15 °C.
Rhodesgrass	P	20-30	6	14	Light; KNO ₃	
Rice	T, S	20-30; 30	5	14	See ¶ (b)(9) for alternate method.	Presoak; see ¶ (b)(9).
Ricegrass, Indian	P	15	7	42	.....	Prechill at 5 °C for 4 weeks and test for 21 additional days; see §201.57a.
Alternate method	S	5-15; 15; 15-25	7	28	.....	Dark; prechill in soil at 5 °C for 4 weeks; see §201.57a.
Roughpea	B, T	20	7	14	.....
Rye	B, T, S	20; 15	4	7	.....	Prechill at 5 or 10 °C for 5 days or predry.
Rye, mountain	B, T	20; 15	4	7	.....	See §201.57a.
Ryegrass:						
Annual	P, TB	15-25	5	14	Light optional; see ¶ (b)(10) for fluorescence test.	Light; KNO ₃ ; prechill at 5 or 10 °C for 5 days and test at 15-25 °C; if still dormant prechill for 3 days and continue test at 15-25 °C an additional 4 days.
Intermediate	P, TB	15-25	7	14	Light	KNO ₃ and prechill at 5 or 10 °C for 5 days and test at 15-25 °C; if still dormant rechill for 3 days and continue test at 15-25 °C an additional 4 days.
Perennial	P, TB	15-25	5	14	Light optional; see ¶ (b)(10) for fluorescence test.	Light; KNO ₃ ; prechill at 5 or 10 °C for 5 days and test at 15-25 °C; if still dormant rechill for 3 days and continue test at 15-25 °C an additional 4 days.
Wimmera	P, TB	15-25; 20-30	5	14	Light optional	Light; KNO ₃ ; prechill at 5 or 10 °C for 5 days and test at 15-25 °C; if still dormant rechill for 3 days and continue test at 15-25 °C an additional 4 days.
Safflower	P, B, T, S	15; 20	4	14	Light at 15 °C	
Sagewort, Louisiana	P	15-25	7	14	Light	
Sainfoin	B, T	20-30	4	14	.....
Saltbush, fourwing	B	20	5	14	See ¶ (b)(13)	Prechill at 5 °C for 7 days.
Alternate method	B	15	3	21	.....
Sesame	B, T, TB	20-30	3	6	.....
Sesbania	B, T	20-30	5	17	.....
Smilo	P	20-30	7	42	Light	Prechill at 5 °C for 2 weeks; see §201.57a.
Sorghum	B, T, S	20-30	4	10	.....	Prechill grain vars. at 5 ° or 10 °C for 5 days; test sweet vars. at 30-45 °C, maintaining 45 °C for 2-4 hours per day.
Sorghum alnum	T, S	20-35; 15-35	5	21	.....	Prechill at 5 °C for 5 days; on the 10th day of test, clip or pierce the distal end of ungerminated seeds.
Sorghum-sudangrass	B, T, S	20-30; 25	4	10	.....	Prechill at 5 or 10 °C for 5 days.
Sorghum ²	B, T, S	15-35; 20-35	5	21	.....	Prechill at 5 or 10 °C for 7 days.
Sourclover	B, T	20	3	14	See ¶ (b)(11)	
Soybean	B, T, S, TC	20-30; 25	5	18	.....
Spelt	B, T, S	20; 15	4	7	.....	Prechill at 5 or 10 °C for 5 days, or predry.
Sudangrass	B, T, S	20-30; 15-30	4	10	.....	Prechill at 10 °C for 5 days.
Sunflower	T, B	20	4	7	.....
Sweetclover:						
White	B, T, S	20	4	17	See ¶ (b)(11)	
Yellow	B, T, S	20	4	17	See ¶ (b)(11)	
Sweet vernalgrass	P	20-30	6	14	Light	
Sweetvetch, northern	B, TB, T	15-25; 20	14	28	.....

TABLE 2—GERMINATION REQUIREMENTS FOR INDICATED KINDS—Continued

Name of seed	Substrata	Temperature (° C)	First count days	Final count days	Additional directions	
					Specific requirements	Fresh and dormant seed
Switchgrass	P, TS	15-30	7	14	Light; KNO ₃	Prechill at 5 °C for 2 weeks; see § 201.57a.
Timothy	P, TB	15-25; 20-30	5	10	Light; see ¶ (a)(9)	KNO ₃ and prechill at 5 or 10 °C for 5 days.
Timothy, turf	P, TB	15-25; 20-30	5	10	Light	KNO ₃ and prechill at 5 or 10 °C for 5 days.
Tobacco	P, TB	20-30	7	14	Light	
Trefoil:						
Big	B, T	20	5	12		
Birdsfoot	B, P, T	20	5	12		
Triticale	B, T, S	20; 15	4	7		Prechill at 5 or 10 °C for 5 days, or predry.
Vaseygrass	P	20-35	7	21	Light	KNO ₃ .
Veldtgrass	P	10-30	7	28	Light	See § 201.57a.
Velvetbean	B, T, S, C	20-30	3	14		
Velvetgrass	P	20-30	6	14	Light	
Vetch:						
Common	B, T	20	5	10		
Hairy	B, T	20	5	14		
Hungarian	B, T	20	5	10		
Monantha	B, T	20	5	10		
Narrowleaf	B, T	20	5	14		
Purple	B, T	20	5	10		
Woollypod	B, T	20	5	14		Prechill at 10 °C for 5 days, test at 15 °C.
Wheat:						
Common	B, T, S	20; 15	4	7		Prechill at 5 or 10 °C for 5 days, or predry.
Club	B, T, S	20; 15	4	7		Prechill at 5 or 10 °C for 5 days, or predry.
Durum	B, T, S	20; 15	4	10		Prechill at 5 or 10 °C for 5 days, or predry.
Polish	B, T, S	20; 15	4	7		Prechill at 5 or 10 °C for 5 days, or predry.
Poulard	B, T, S	20; 15	4	7		Prechill at 5 or 10 °C for 5 days, or predry.
Wheat Agroticum	B, T, S	20; 15	4	7		Prechill at 5 or 10 °C for 5 days, or predry.
Wheatgrass:						
Beardless	P, TB	15-25	7	14	Light and KNO ₃ optional	KNO ₃ and prechill at 5 or 10 °C for 7 days.
Fairway crested	P, TB	15-25; 20-30	5	14	Light and KNO ₃ optional	KNO ₃ and prechill at 5 or 10 °C for 7 days.
Standard crested	P, TB	15-25; 20-30	5	14	Light and KNO ₃ optional	KNO ₃ and prechill at 5 or 10 °C for 7 days.
Intermediate	P	15-25	5	28	Light and KNO ₃ optional	KNO ₃ and prechill at 5 or 10 °C for 7 days.
Alternate method	P	20-30	5	28	Light	
Pubescent	P	15-25	5	28	Light and KNO ₃ optional	KNO ₃ and prechill at 5 or 10 °C for 7 days.
Alternate method	P	20-30	5	28	Light	
Siberian	P, TB	15-25	7	14	Light and KNO ₃ optional	KNO ₃ and prechill at 5 or 10 °C for 7 days.
Slender	P, TB	15-25; 10-30	5	14	Light and KNO ₃ optional	Prechill at 5 or 10 °C for 5 days; if still dormant on the 10th day, rechill 2 days, then place at 20-30 °C for 4 days.
Streambank	P, TB	15-25	5	14	Light and KNO ₃ optional	Prechill at 5 or 10 °C for 5 days.
Tall	P	15-25	5	21	Light and KNO ₃ optional	Prechill at 5 or 10 °C for 5 days.
Alternate method	P	20-30	5	21	Light	Prechill at 5 or 10 °C for 5 days.
Western	B, P, T	15-30	7	28	Dark	KNO ₃ or soil; see § 201.57a.
Wildrye:						
Basin	P	15-25	10	21		See § 201.57a.

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Canada	P	15-30	7	21	Light	Prechill at 5 °C for 2 weeks.
Russian	P	20-30	5	14	Light	Prechill at 5 or 10 °C for 5 days.
VEGETABLE SEED						
Artichoke	B, T	20-30	7	21		
Asparagus	B, T, S	20-30	7	21		
Asparagusbean	B, T, S	20-30	5	18		
Bean:						
Garden	B, T, S, TC	20-30; 25	None	18		See ¶(b)(12).
Lima	B, T, C, S	20-30	5	19		
Runner	B, T, S	20-30	5	19		
Beet	B, T, S	20-30	3	14	See ¶(b)(3)	
Broadbean	S, C	20	4	14	See ¶(b)(11)	Prechill at 10 °C for 3 days.
Broccoli	B, P, T	20-30	3	10		Prechill at 5 or 10 °C for 3 days; KNO ₃ and light.
Brussels sprouts	B, P, T	20-30	3	10	Prechill at 5 or 10 °C for 3 days; KNO ₃ and light.	
Burdock, great	B, T	20-30	7	14		
Cabbage	B, P, T	20-30	3	10		Prechill at 5 or 10 °C for 3 days; KNO ₃ and light.
Cabbage, Chinese	B, T	20-30	3	7		
Cabbage, tronchuda	B, P	20-30	3	10		Prechill at 5 or 10 °C for 3 days; KNO ₃ and light.
Cardoon	B, T	20-30	7	21		
Carrot	B, T	20-30	6	14		
Cauliflower	B, P, T	20-30	3	10		Prechill at 5 or 10 °C for 3 days; KNO ₃ and light
Celeriac	P	5-25; 20	10	21	Light; see ¶(a)(9)	
Celery	P	15-25; 20	10	21	Light; see ¶(a)(9)	
Chard, Swiss	B, T, S	20-30	3	14	See ¶(b)(3)	
Chicory	P, TS	20-30	5	14	Light; KNO ₃ or soil; see ¶(a)(9)	
Chives	B, T	20	6	14		
Citron	B, T	20-30	7	14	Soak seeds 6 hrs	Test at 30 °C.
Collards	B, P, T	20-30	3	10		Prechill at 5 or 10 °C for 3 days; KNO ₃ and light .
Corn, sweet	B, T, S, TC	20-30; 25	4	7		
Cornsalad	B, T	15	7	28	Test at 10 °C..	
Cowpea	B, T, S	20-30	5	18		
Cress:						
Garden	B, P, T	15	4	10		Light.
Upland	P, TB	20-35	4	7	Light; KNO ₃	
Water	P	20-30	4	14	Light	
Cucumber	B, T, S	20-30	3	7	Keep substratum on dry side; see ¶(a)(3).	
Dandelion	P, TB	20-30	7	21	Light; see ¶(a)(9)	
Dill	B, T	20-30	7	21		
Eggplant	P, TB, RB, T	20-30	7	14	Light; KNO ₃ ..	
Endive	P, TS	20-30	5	14	Light; KNO ₃ or soil	See ¶(b)(6).
Gherkin, West India	B, T, S	20-30	3	7	Test at 30 °C..	
Kale	B, P, T	20-30	3	10		Prechill at 5 ° or 10 °C for 3 days; KNO ₃ and light.
Kale, Chinese	B, P, T	20-30	3	10		Prechill at 5 or 10 °C for 3 days; KNO ₃ and light.
Kale, Siberian	B, P, T	20-30; 20	3	7		
Kohlrabi	B, P, T	20-30	3	10		Prechill at 5 or 10 °C for 3 days; KNO ₃ and light.
Leek	B, T	20	6	14		
Lettuce	P	20	None	7	Light	Prechill at 10 °C for 3 days or test at 15 °C.

TABLE 2—GERMINATION REQUIREMENTS FOR INDICATED KINDS—Continued

Name of seed	Substrata	Temperature (° C)	First count days	Final count days	Additional directions	
					Specific requirements	Fresh and dormant seed
Melon	B, T, S	20-30	4	10	Keep substratum on dry side; see ¶ (a)(3).	
Mustard, India	P	20-30	3	7	Light	Prechill at 10 °C for 7 days and test for 5 additional days; KNO ₃ .
Mustard, spinach	B, T	20-30	3	7		
Okra	B, T	20-30	4	¹ 14		
Onion	B, T	20	6	10		
Alternate method	S	20	6	12		
Onion, Welsh	B, T	20	6	10		
Pak-choi	B, T	20-30	3	7		
Parsley	B, T, TS	20-30	11	28		
Parsnip	B, T, TS	20-30	6	28		
Pea	B, T, S	20	5	¹ 8		
Pepper	TB, RB, T	20-30	6	14		Light and KNO ₃ .
Pumpkin	B, T, S	20-30	4	7	Keep substratum on dry side; see ¶ (a)(3).	
Radish	B, T	20	4	6		
Rhubarb	TB, TS	20-30	7	21	Light	
Rutabaga	B, T	20-30	3	14		
Sage	B, T, S	20-30	5	14		
Salsify	B, T	15	5	10	Prechill at 10 °C for 3 days..	
Savory, summer	B, T	20-30	5	21		
Sorrel	P, TB, TS	20-30	3	14	Light	Test at 15 °C.
Soybean	B, T, S, TC	20-30; 25	5	¹ 8		
Spinach	TB, T	15;10	7	21	Keep substratum on dry side; see ¶ (a)(3).	
Spinach, New Zealand ..	T	15; 20	5	21	Soak fruits overnight (16 hrs), air dry 7 hrs; plant in very wet towels; do not rewater unless later counts exhibit drying out.	On 21st day scrape fruits and test for 7 additional days.
Alternate method	B, T	15	5	21	Remove pulp from basal end of fruit.	
Squash	B, T, S	20-30	4	7	Keep substratum on dry side; see ¶ (a)(3).	
Tomato	B, P, RB, T	20-30	5	14		Light; KNO ₃ .
Tomato, husk	P, TB	20-30	7	28	Light; KNO ₃	
Turnip	B, T	20-30	3	7		
Watermelon	B, T, S	20-30; 25	4	14	Keep substratum on dry side; see ¶ (a)(3).	Test at 30 °C.

¹Hard seeds may be present. (See § 201.57)
²Rhizomatous derivatives of a johnsongrass sorghum cross or a johnsongrass sudangrass cross.

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EDITORIAL NOTE: For FEDERAL REGISTER citations affecting §201.58, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and on GPO Access.

EXAMINATIONS IN THE ADMINISTRATION OF THE ACT

§ 201.58a Indistinguishable seeds.

When the identification of the kind, variety, or type of seed or determination that seed is hybrid is not possible by seed characteristics, identification

may be based upon the seedling, growing plant or mature plant characteristics according to such authentic information as is available.

(a) *Ryegrass.* In determining the pure seed percentage of perennial ryegrass and annual ryegrass, 400 seeds shall be grown on white filter paper and the number of fluorescent seedlings determined under ultraviolet light at the end of the germination period (see §201.58(b)(10)).

(1) Fluorescence results are to be determined as test fluorescence level (TFL) to two decimal places as follows:

$$\% \text{ TFL} = \frac{\text{Number of normal fluorescent seedlings}}{\text{Total number of normal seedlings}} \times 100$$

(2) The percentage of perennial ryegrass is calculated as follows:

$$\% \text{ Perennial ryegrass} = \frac{\% \text{ VFL (annual)} - \% \text{ TFL}}{\% \text{ VFL (annual)} - \% \text{ VFL (perennial)}} \times \% \text{ Pure ryegrass}$$

where VFL=Variety fluorescence level.

(3) Using results from the above formula, the percentage of annual ryegrass is calculated as follows:

$$\% \text{ Annual Ryegrass} = \% \text{ Pure Ryegrass} - \% \text{ Perennial Ryegrass}$$

(4) If the test fluorescence level (TFL) of a perennial ryegrass is equal to or less than the variety fluorescence level (VFL) described for the variety, all pure ryegrass is considered to be perennial ryegrass and the formula is not applied.

(5) If the test fluorescence level (TFL) of an annual ryegrass is equal to or greater than the variety fluorescence level (VFL) described for the variety, all pure ryegrass is considered to be annual ryegrass and the formula is not applied.

(6) A list of variety fluorescence level (VFL) descriptions for perennial ryegrass varieties which are more than 0 percent fluorescent and annual ryegrass varieties which are less than 100 percent fluorescent is maintained and published by the National Grass Variety Review Board of the Association of

Official Seed Certifying Agencies (AOSCA). If the variety being tested is not stated or the fluorescence level has not been described, the fluorescence level shall be considered to be 0 percent for perennial ryegrass and 100 percent for annual ryegrass. Both VFL (annual) and VFL (perennial) values must always be entered in the formula. If a perennial ryegrass variety is being tested, the VFL (annual) value is 100 percent. If an annual ryegrass variety is being tested, the VFL (perennial) value is 0 percent. For blends the fluorescence level shall be interpolated according to the portion of each variety claimed to be present.

(b) *Sweetclover.* To determine the presence of yellow sweetclover in samples of white sweetclover, at least 400 seeds shall be subjected to the chemical test as follows:

(1) Preparation of test solution: Add 3 grams of cupric sulfate (CuSO₄) to 30 ml of household ammonia (NH₄ OH, approximately 4.8 percent) in a stoppered bottle to form tetraamminecopper sulfate ([Cu(NH₃)₄]SO₄) solution used for