

2020 Rule Change Proposal 14

Purpose of Proposal: To extend the final count for three flower seed species (Snapdragon, Godetia, and Portulaca) and to harmonize the final counts with ISTA.

Present Rule:

Table 6A. Methods of testing for laboratory germination.

Kind of Seed	Substrata ^a	Temperature (°C)	First count (days)	Final count (days)	Specific requirements and notes	Dormant seed ^f
...						
<i>Antirrhinum</i> spp. snapdragon	P	20-30	5 ^b	12 ^c	Light	Some hybrids may require prechilling or 15°C and KNO ₃ for maximum prompt germination
<i>Clarkia amoena</i> , <i>C. concinna</i> godetia	TB	15	none ^b	8 ^c	Light	
<i>Portulaca grandiflora</i> portulaca	P	20-30	none ^b	7 ^c	Light	14-21 days prechilling at 5°C may be essential for certain new crop seed

Proposed Rule:

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<i>Portulaca grandiflora</i> portulaca	P	20-30	none ^b	14 ^c	Light	14-21 days prechilling at 5°C may be essential for certain new crop seed

Harmonization and Impact Statement:

If this proposal is adopted, the final counts for the three species would harmonize with those of ISTA: Snapdragon (*Antirrhinum* spp.), 21 days; Godetia (*Clarkia amoena*) 14 days; and Portulaca (*Portulaca grandiflora*) 14 days. None of these species are listed in the Canadian M & P.

Supporting Evidence:

The final counts for many flower seed species are considerably earlier for AOSA than they are for ISTA. Some flower seed species do not appear to reach the maximum potential given the

final count days listed in AOSA. After review, the authors of this proposal decided to conduct a referee using three species: Snapdragon, Godetia, and Portulaca. These three species have common germination temperature and media requirements for AOSA and ISTA and differ only in the number of days for the final count. A referee was conducted using the following materials and methods:

- Three lots of each species from Sakata Seed Company were selected, of varying quality.
- Samples from the nine lots were prepared and sent out to ten laboratories from six different states.
- Participants were asked to test each sample using 4 replicates of 100 seeds, using only white blotters (provided), at 15°C for Godetia and at 20-30°C for Portulaca and Snapdragon.
- Participants were asked to do a final count as they would for AOSA and then to extend the test to the final count for ISTA. The participants were instructed to use the Miscellaneous agricultural and horticultural seedling descriptions page 125, Volume 4 of the AOSA Rules for Godetia, and the guidelines for Scrophulariaceae on p. 111 for Snapdragon. For Portulaca, sheets from the ISTA Handbook on Flower Seed Testing were provided.

Final counts:

Snapdragon	AOSA 12 days	ISTA 21days
Portulaca	AOSA 7 days	ISTA 14 days
Godetia	AOSA 8 days	ISTA 14 days

Results are summarized below:

Species	Average % germination at final count over 9 lots and 10 labs			
		AOSA final count	ISTA final count	Average Difference
Snapdragon	Lot A	93.2	95.8	2.83%
	Lot B	75.1	77.8	
	Lot C	81.9	85.0	
Portulaca	Lot D	83.3	88.9	5.02%
	Lot E	87.3	91.8	
	Lot F	64.7	69.6	
Godetia	Lot G	92.2	95.2	8.72%
	Lot H	65.6	87.2	
	Lot I	91.0	92.6	

For Snapdragon, the additional 9 days in test yielded an average **2.83%** increase in germination. For Portulaca, the increase was **5.02%** with an additional 7 days in test. For Godetia, an additional **8.72%** germination was obtained with 6 additional days in test. The evidence supports the idea of harmonizing with ISTA in using their final counts for all three species tested, especially for the lower quality lots used in this referee.

The complete referee results are included in the Appendix.

The following statistical analysis was prepared by Dr. Riad Baalbaki of the Germination subcommittee:

“All differences in germination were statistically significant and higher when the test period was extended. Also, the variation among labs was reduced among labs every time the test was extended-another reason for extending the test.

TABLE 1. SNAPDRAGON analysis of variance results.

SV	df	SAMPLE		
		A	B	C
		MS		
LABS	9	187.87 ***	146.75 ***	116.06 ***
FINAL COUNT DAYS	1	160.05 ***	69.34 **	106.98 ***
INTERACTION	9	51.82 ***	5.44 NS	9.60 NS
ERROR	60	9.79	8.70	7.67
TOTAL	79	36.77	24.83	21.50

^{NS} Not significant

** Significant at $p \leq 0.01$

*** Significant at $p \leq 0.001$

TABLE 2. PORTULACA analysis of variance results.

SV	df	SAMPLE		
		D	E	F
		MS		
LABS	9	173.29 ***	199.33 ***	77.28 ***
FINAL COUNT DAYS	1	376.21 ***	245.42 ***	180.71 ***
INTERACTION	9	61.48 ***	81.64 ***	2.42 NS
ERROR	60	5.00	8.40	6.73
TOTAL	79	35.31	41.50	16.48

^{NS} Not significant

*** Significant at $p \leq 0.001$

TABLE 3. GODETIA analysis of variance results.

SV	df	SAMPLE		
		G	H	I
		MS		
LABS	9	63.16 ***	207.41 ***	70.37 ***
FINAL COUNT DAYS	1	268.04 ***	4311.99 ***	93.12 **
INTERACTION	9	5.89 NS	109.94 ***	5.20 NS
ERROR	60	12.72	7.94	11.38
TOTAL	79	20.92	96.77	18.43

^{NS} Not significant

** Significant at $p \leq 0.01$

*** Significant at $p \leq 0.001$

TABLE 4. Coefficient of variation (CV) of germination results from 10 labs, based on AOSA and ISTA final counts.

Species	Sample	CV (%)	
		AOSA final count	ISTA final count
Snapdragon	A	9.02	6.07
	B	8.21	7.87
	C	7.80	5.74
Portulaca	D	10.29	5.46
	E	11.41	4.99
	F	7.12	6.66
Godetia	G	5.69	5.38
	H	15.92	4.61
	I	6.04	5.31

Germination data was subjected to two-factor analysis of variance, with labs and final count days as factors, in a completely randomized design. For each species, samples were analyzed separately. Count data were arc-sine transformed before analysis to stabilize the variance. Original percentage results are presented.

Extending the test following ISTA rules resulted in statistically significant increases in percentage germination of all samples, regardless of quality, for all three species (you should include your figure or table numbers here that show your germination results, and a reference to Tables 1-3 in the attachment that show analysis results). Moreover, the variation among labs, calculated as CV (%), was reduced when test period was extended, for all samples tested (Table 4). In some cases, reductions in variation were slight (e.g., snapdragon-sample B), but in few cases, extending the test resulted in large reductions in variation (e.g., Portulaca-sample E and Godetia-sample H)."

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