Methods to Address Dormancy in Hemp

Colorado Seed Laboratory

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Purpose

The purpose of this referee is to evaluate and expand on methods for germination and breaking dormancy in hemp to promote precision, standardization, and uniformity among seed laboratories. This referee focuses on using prechill and KNO_3 to break dormancy in new hemp seed

Experimental Methods

- **Test 1** Current Methods under AOSA rules:
- 20-30 C
- First in 3 days
- Final in 7 days
- H2O
- **Test 2**:
- 20-30 C
- Prechill at 5 C for 7 days
- First in 3 days
- Final in 7 days
- H2O
- **Test 3**:
- 20-30 C
- Prechill at 5 C for 7 days
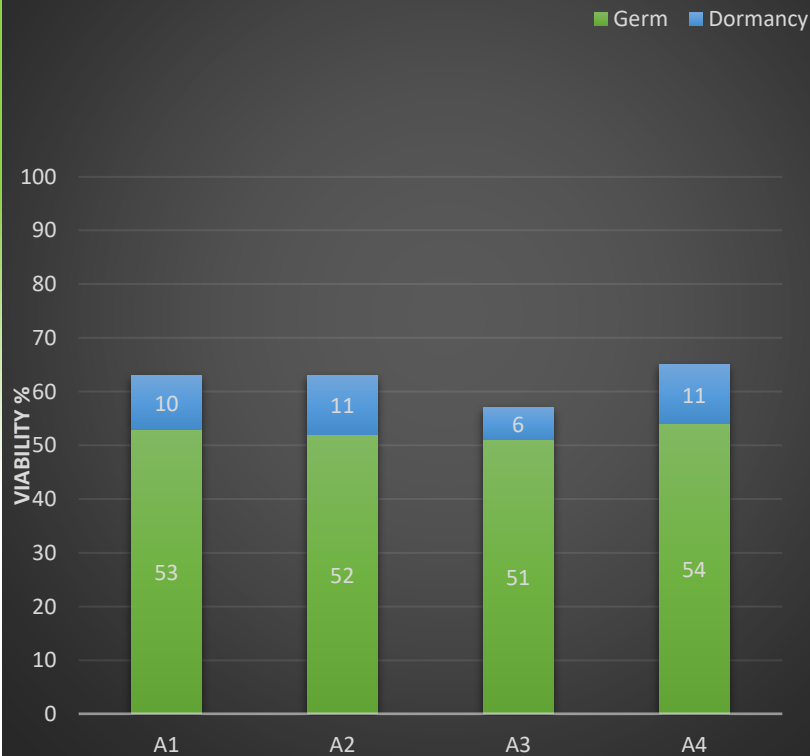- First in 3 days
- Final in 7 days
- KNO3
- **Test 4**:
- 20-30 C
- First in 3 days
- Final in 7 days
- KNO3

- After the final day of each germination test, any non-germinated seeds had a TZ test done to check for viability and these seeds were recorded as dormant seed.

- This referee was sent to 8 labs including CSL

Results

Total Viability Averages for Lot A
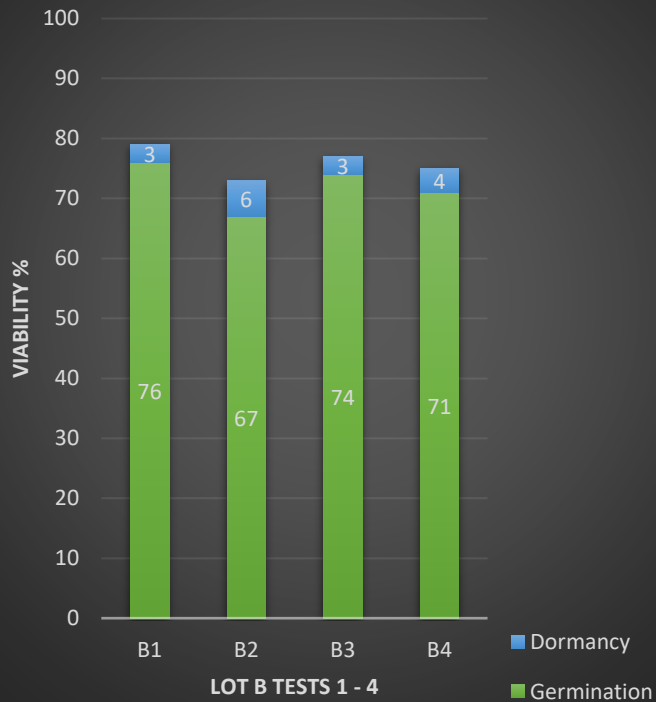
A1: Current AOSA methods (NO PC and H2O)
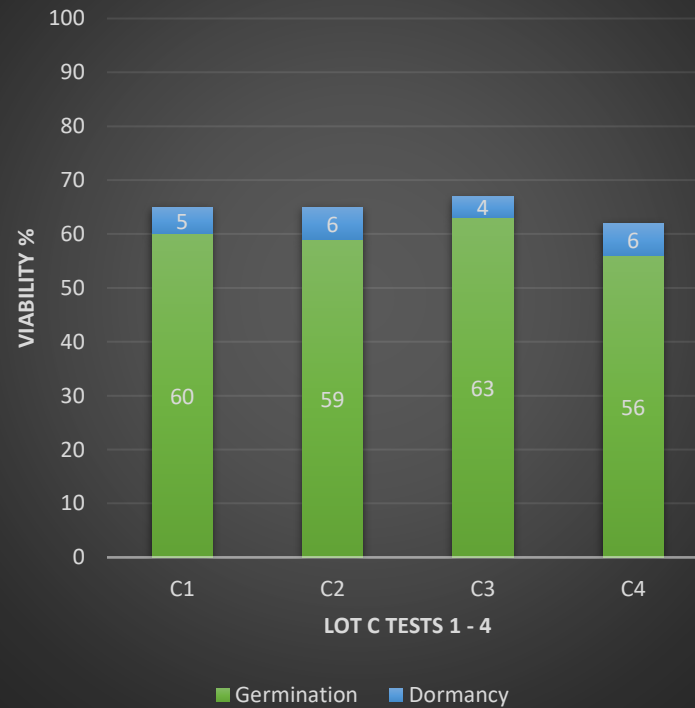
A2: 7 day PC and H2O

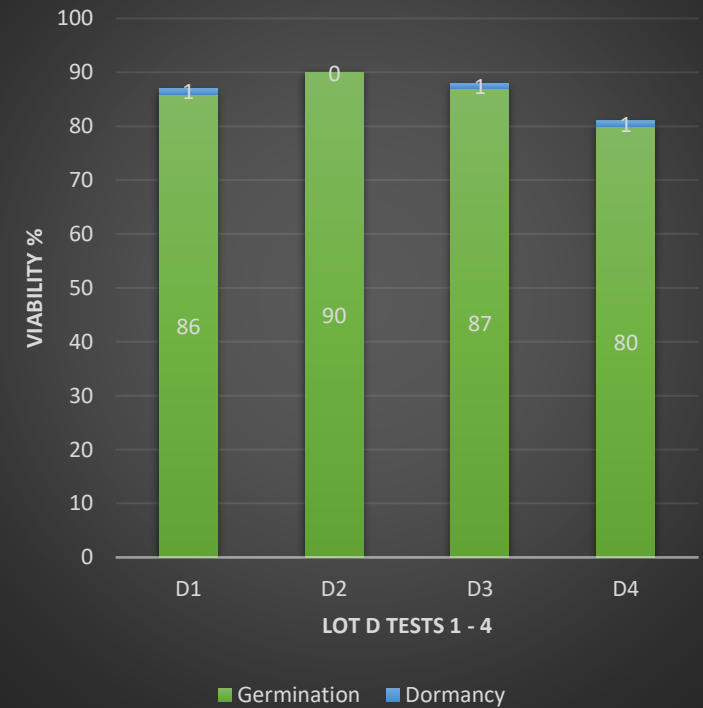A3: 7 day PC and KNO3

A4: No PC and KNO3

Results

Total Viability Averages for Lot B

Total Viability Averages for Lot C
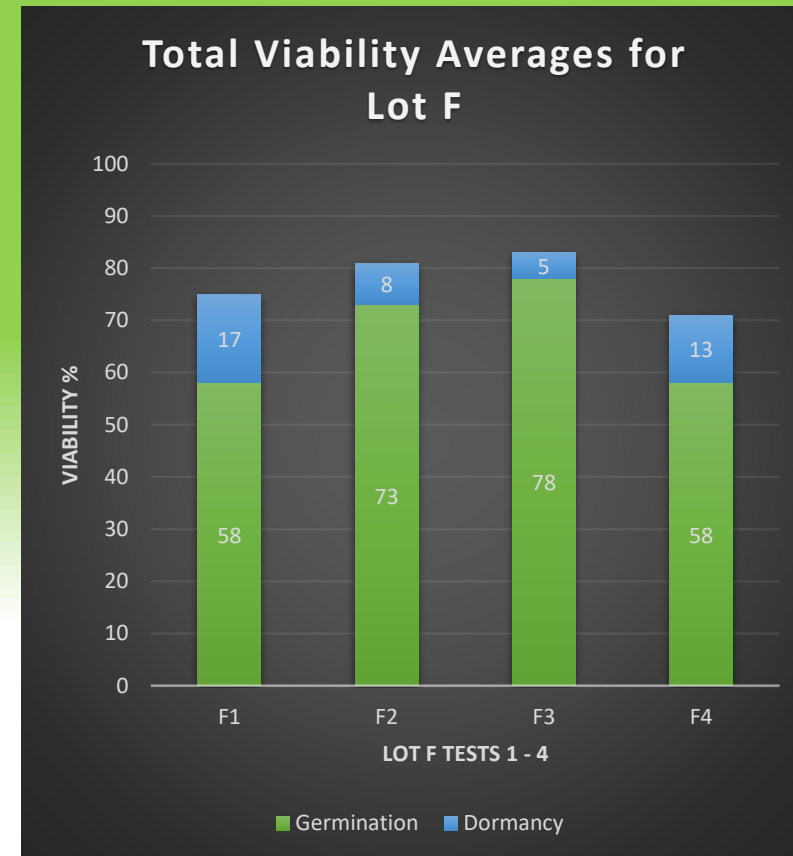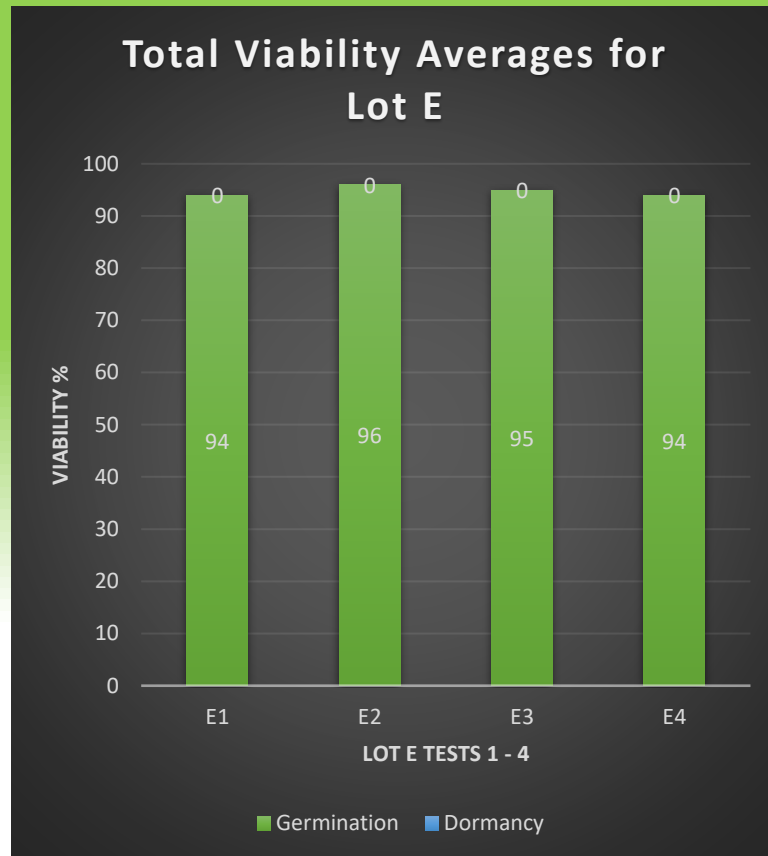
Total Viability Averages for Lot D

Results

Total Viability Averages for Lot E

Total Viability Averages for Lot F
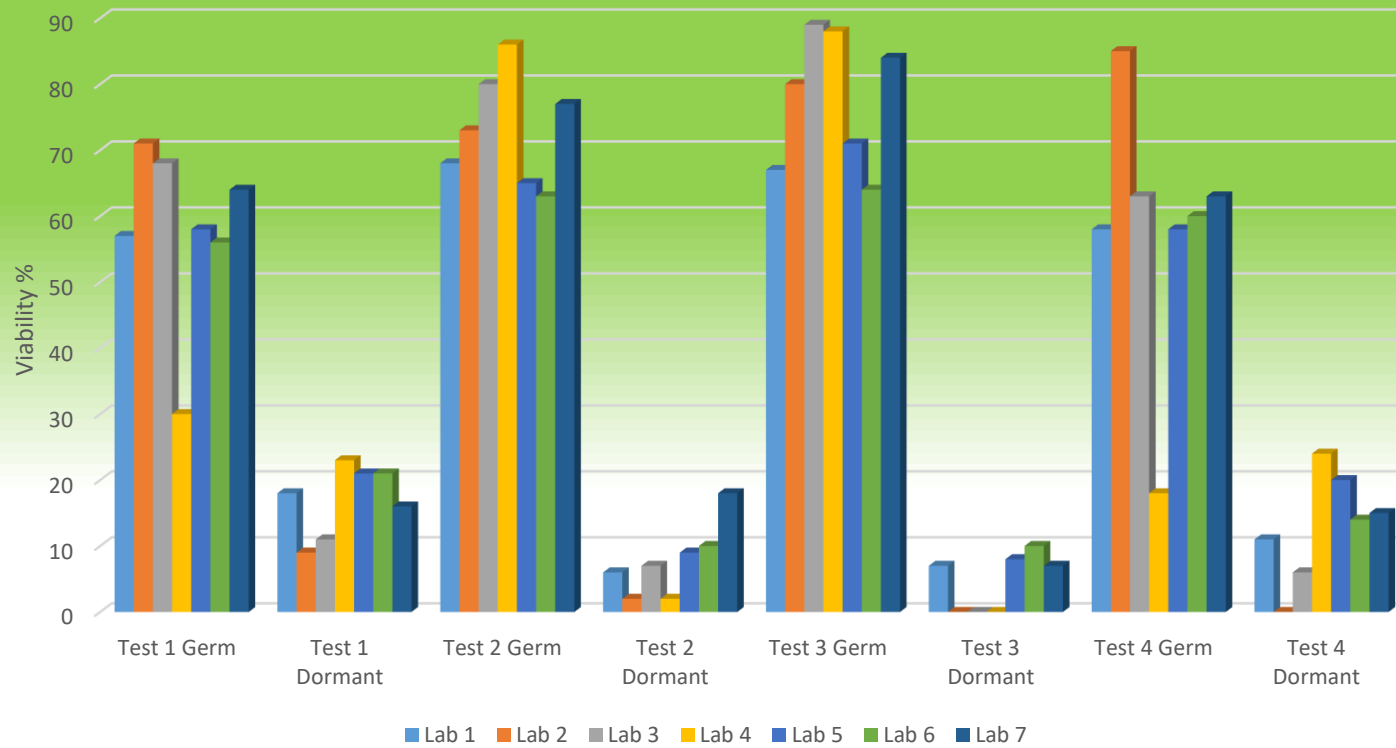
Comparison of Labs

Comparison of Lot F Tests Between All Labs

Statistics Committee Results

The ANOVA Table indicated that methods of germination had no significant effect on final germination results at P ≤ 0.05 (Table 1)

Table 1. Analysis of variance for sources of variation and their effects on germination of six hemp seed lots tested by four germination methods in seven different laboratories.

Source	df	Sum of Squares	Mean Square	F Value	P ≤ 0.05
Labs (L)	6	2733.3	455.6	5.9	0.00
Methods (M)	3	498.4	166.1	2.2	0.10
Seed Lots (SL)	5	36761.0	7352.2	95.4	0.00
(M) x (SL)	15	2156.7	143.8	1.9	0.03
Error	138	10636.4	77.1		

Table 2. Mean, minimum, maximum, and standard deviation of germination of six hemp seed lots tested in seven labs using germination method 1 (Current AOSA method- No Prechill, 7 day germ test @ 20-30°C with H_2O). Tolerances among minimum and maximum germination was calculated.

Lots	Mean 7 labs	Min	Max	Diff	Tolerance	SD	Quality rank
Lot A	53	48	61	13	11	4.5	6
Lot B	75	66	85	19	9	6.8	3
Lot C	60	51	71	20	10	7.3	4
Lab D	86	80	97	17	7	5.8	2
Lot E	94	87	99	12	4	4.1	1
Lot F	58	30	71	41	11	13.5	5
					Mean	7.0	

Discussion

- This referee has shown the **problem of uniformity** between labs on this new crop. Perhaps more practice and education is needed on hemp testing.

- There was **no difference** in dormancy detected between the chosen methods. Several factors affected the results of this referee including lack of new seed lots.

Conclusions

- More experiments need to be conducted to support changing the AOSA rule for Hemp germination

- In a future referee, **fresh seed** will need to be used to find out if there is a difference in breaking dormancy between the methods. Finding the right seed lots could be difficult.

- As we move forward, we hope that more labs will gain experience testing hemp. This could mean a more uniform referee in the future.
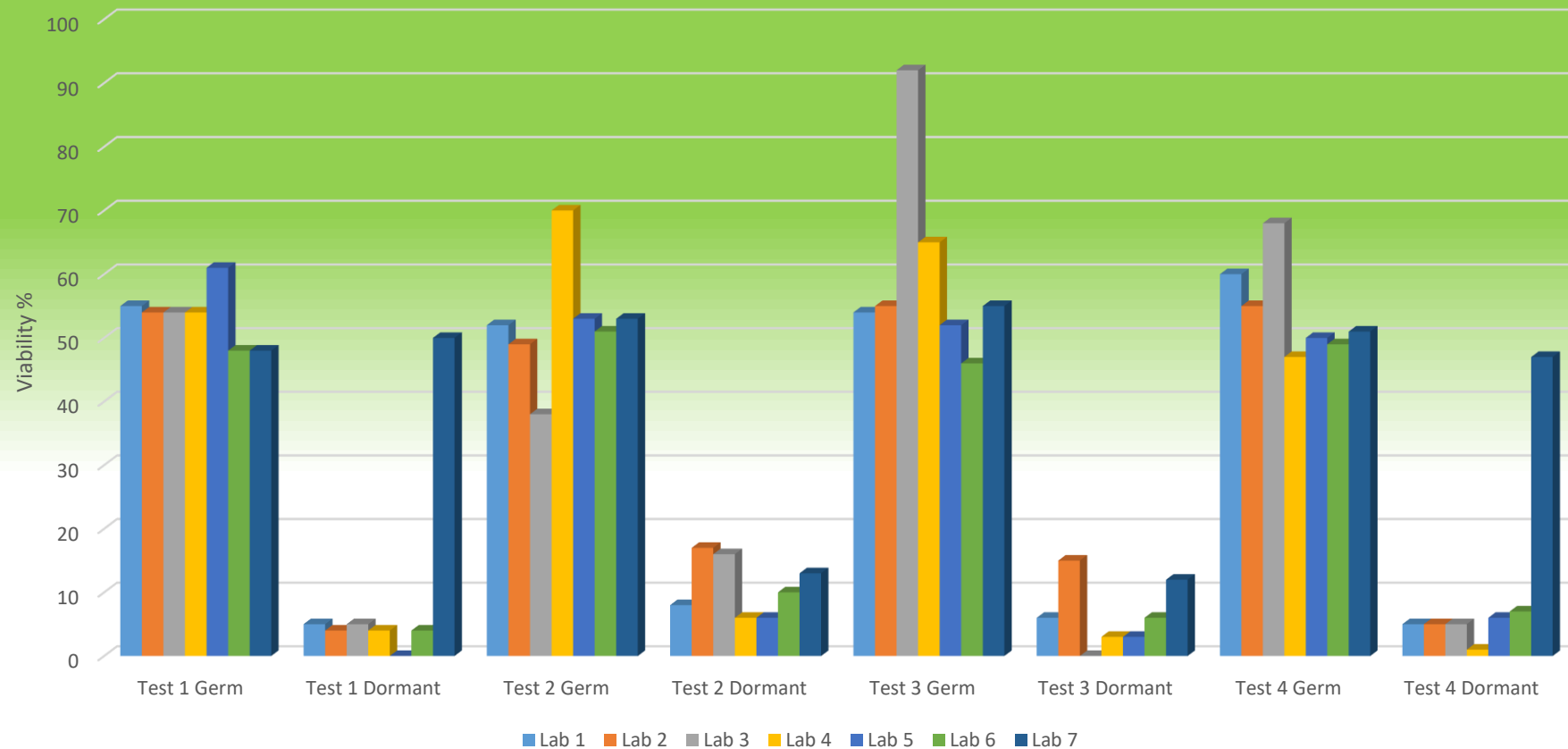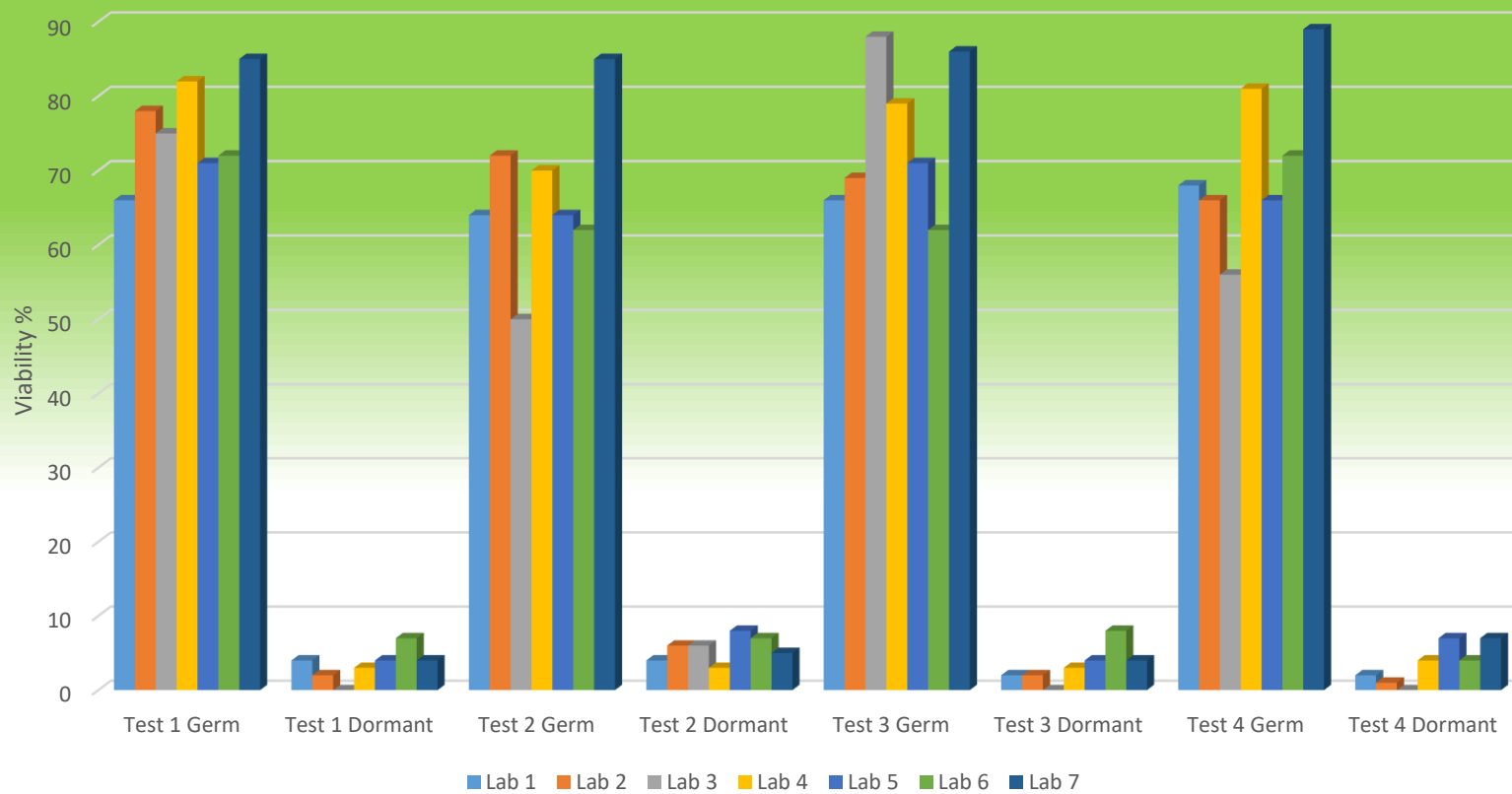
Questions
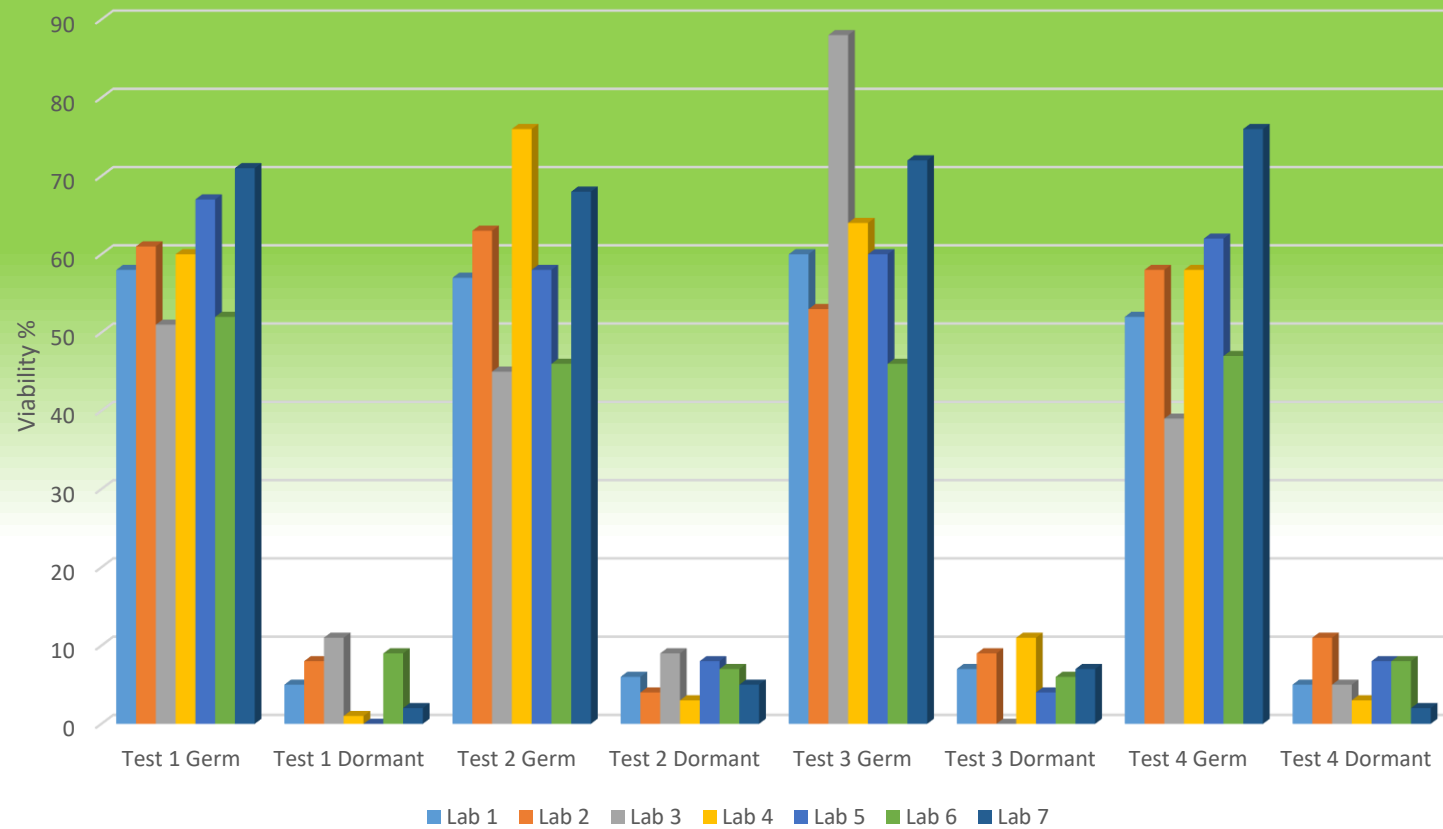
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Appendix – Expanded Results
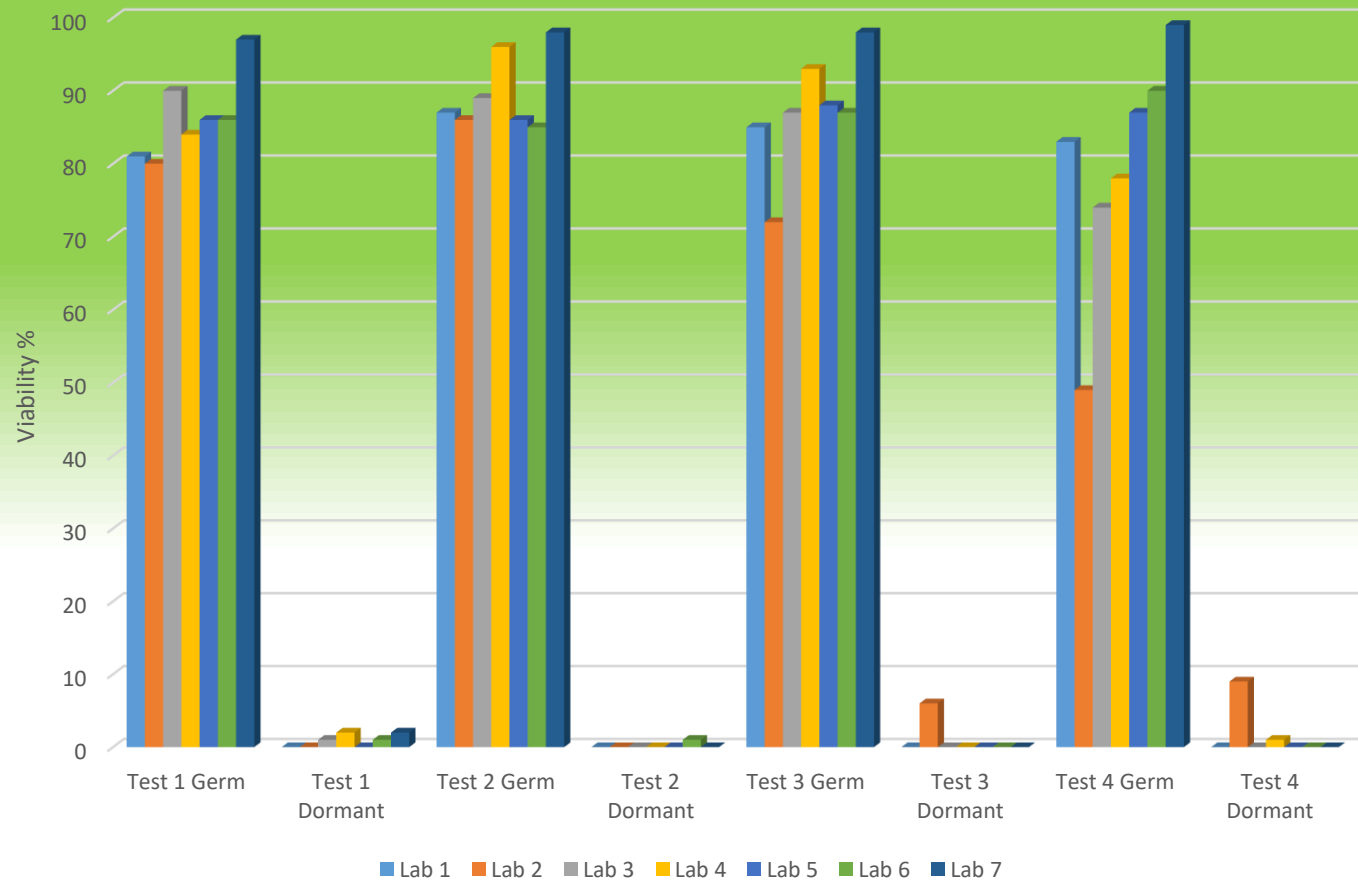

Comparison of Lot A Tests Between All Labs

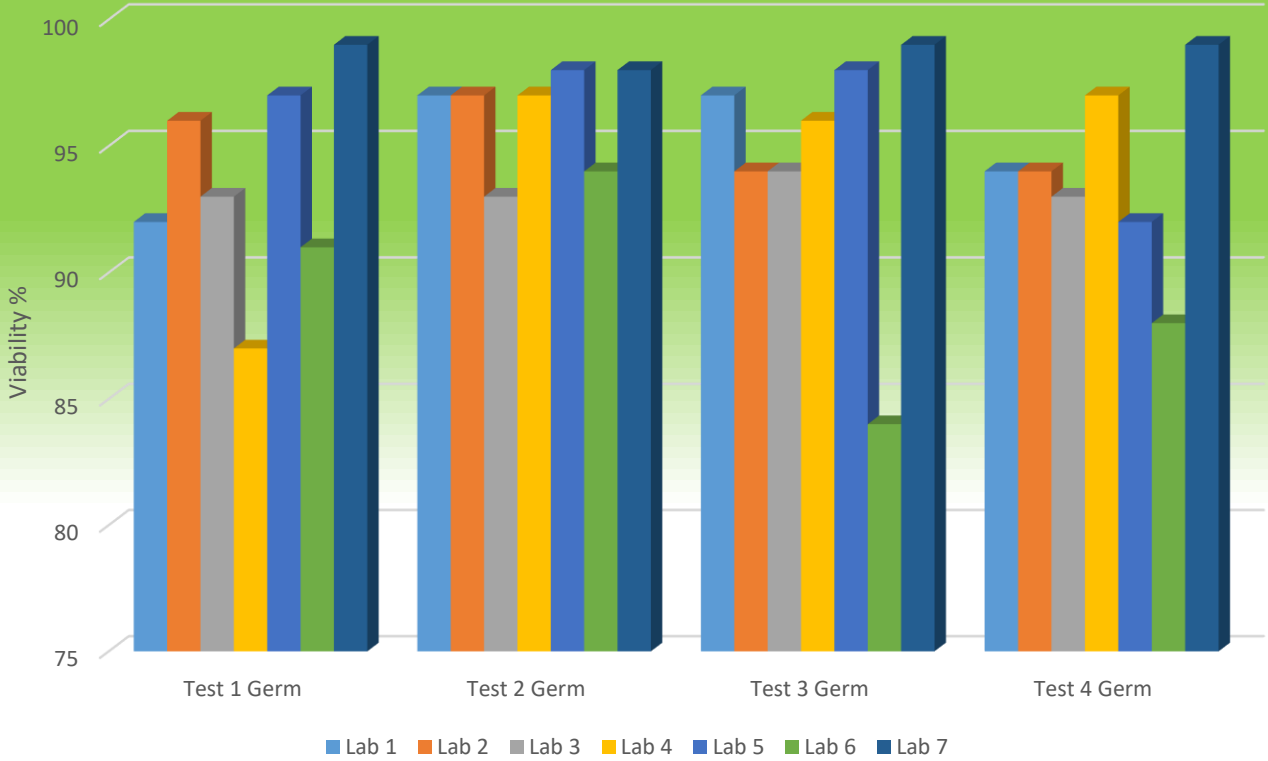Comparison of Lot B Tests Between All Labs

Comparison of Lot C Tests Between All Labs

Comparison of Lot D Tests Between All Labs

Comparison of Lot E Tests Between All Labs

*Lot E did not show any dormancy