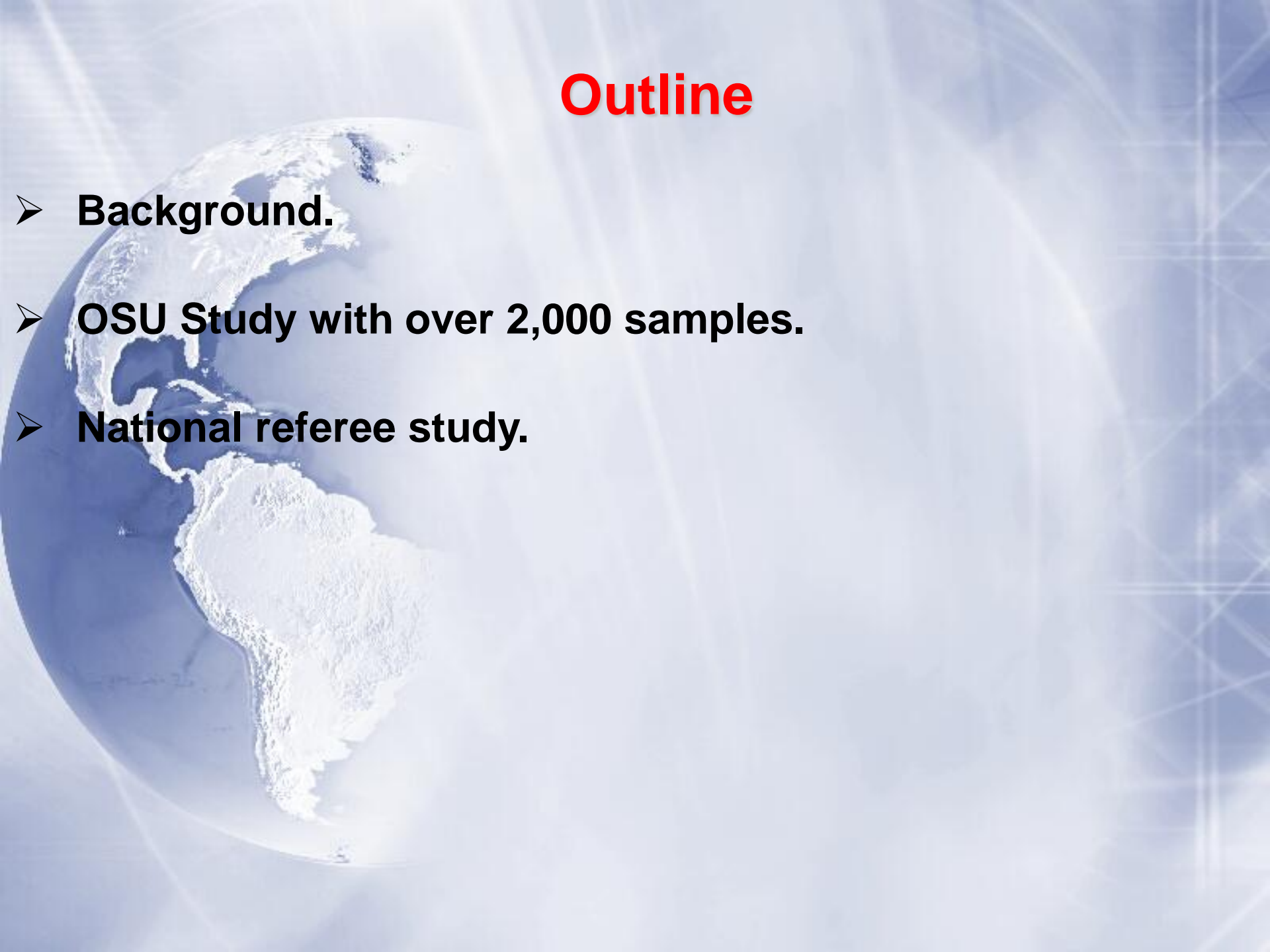
A large, semi-transparent globe of the Earth is visible on the left side of the slide, showing the continents of North and South America. The background is a light blue gradient with a subtle grid pattern.

**Feasibility of Shortening the
Germination and Fluorescence Test Period
Of Perennial Ryegrass**

Outline

- 
- **Background.**
 - **OSU Study with over 2,000 samples.**
 - **National referee study.**

Why is it important?

- **Perennial ryegrass (PRG) is harvested in August and has to be shipped by the end of September in the producing states or overseas (short time window).**
- **Freshly harvested seeds require: chilling (7 days), first count (7 day) and final count (14 day), a total of 21days.**
- **This lengthy testing process slows down labeling, shipping and meeting the needs of end users.**

Annual Ryegrass – Success Story

- **Based on research studies, the AOSA agreed in 2011, that the Germ & FL tests of ARG could be completed before the final count if the sample reaches max germination.**
- **Over 80% of ARG samples reached max germ in the first count after pre-chill and test results were delivered without unnecessary delay in the last two years.**
- **The seed industry asked OSU Seed Lab to conduct studies to determine whether it is feasible to do the same with PRG.**
- **Two studies have been conducted.**

The objective of the first study at OSU

- **Determine the germination and fluorescence results at 7 and 14-day counts on PRG samples that have been chilled.**

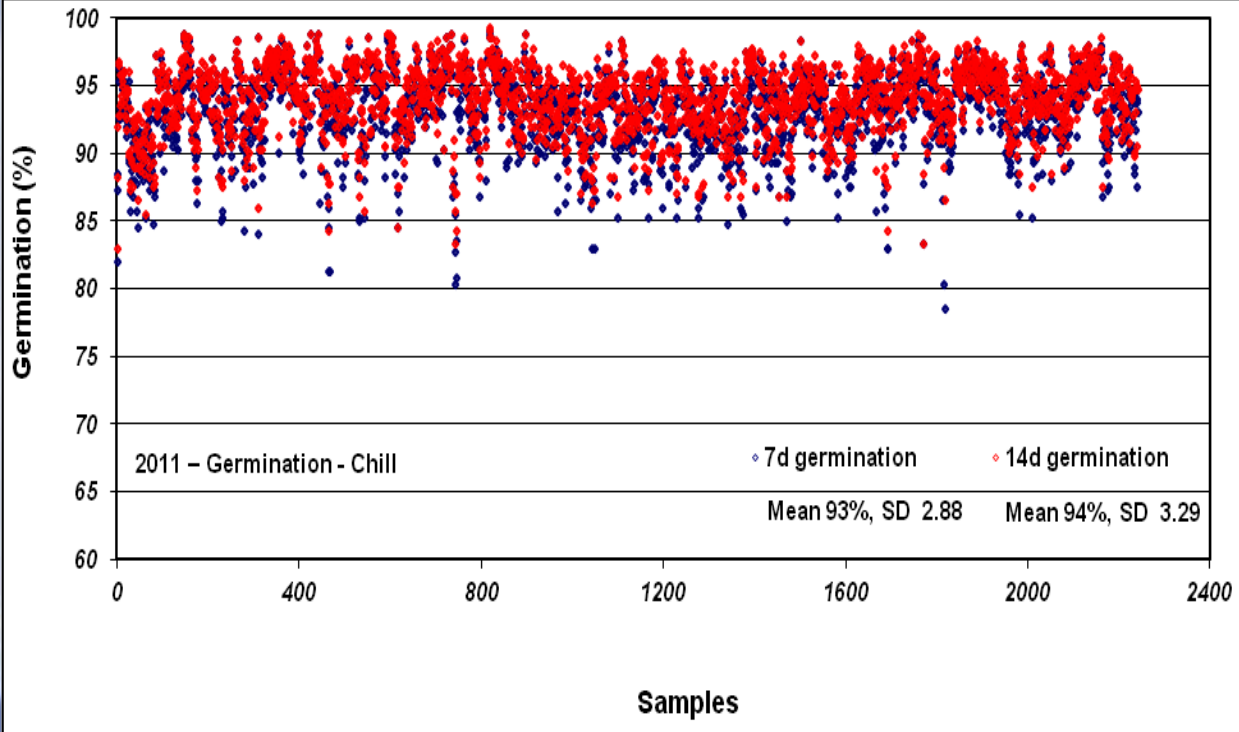
Materials and Methods

- **Data was collected from the OSU seed services database on 2242 PRG samples representing 203 cultivars harvested & tested in 2011.**
- **All samples were pre-chilled at 10°C for 7 days, then transferred to 15-25°C for germination (AOSA Rules).**
- **The first count was conducted after 7d and the final count after 14 d.**

Well-developed seedlings in the first count on a chilled sample



Figure 1. A perennial ryegrasses sample showing well developed seedlings and maximum germination capacity and fluorescence expression at the first count (7-day pre-chill + 7-day germination).



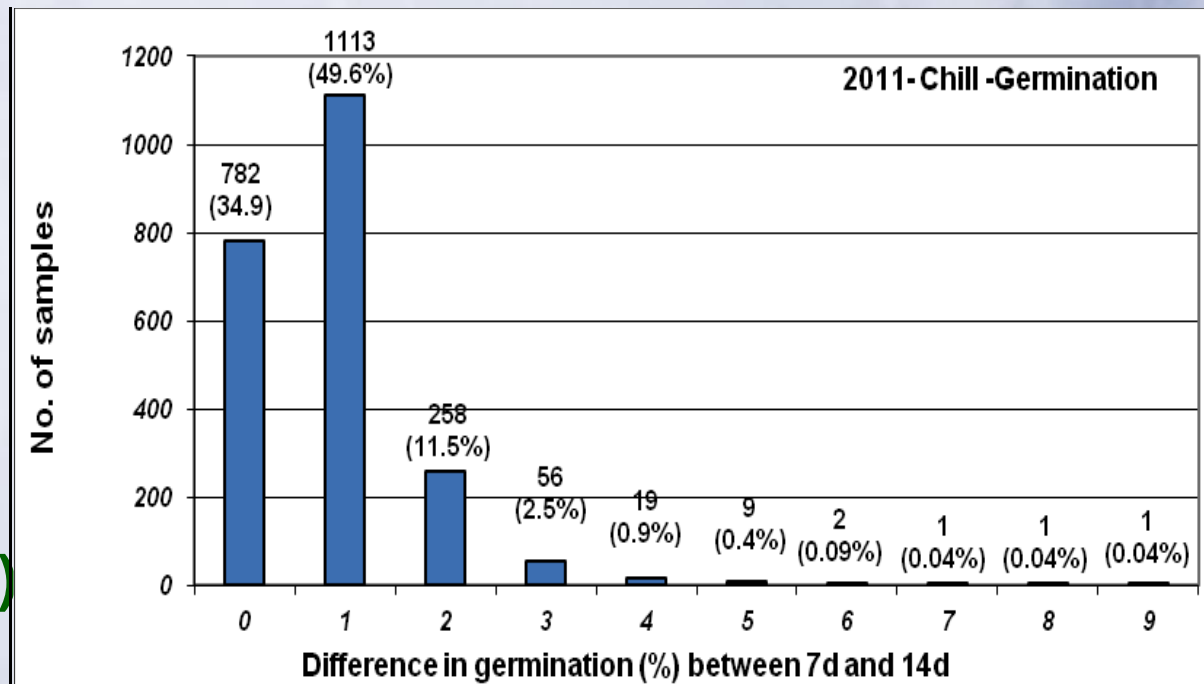
Germination Results

at 7-day & 14-day counts of 2242 PRG samples.

(Majority above 90%)

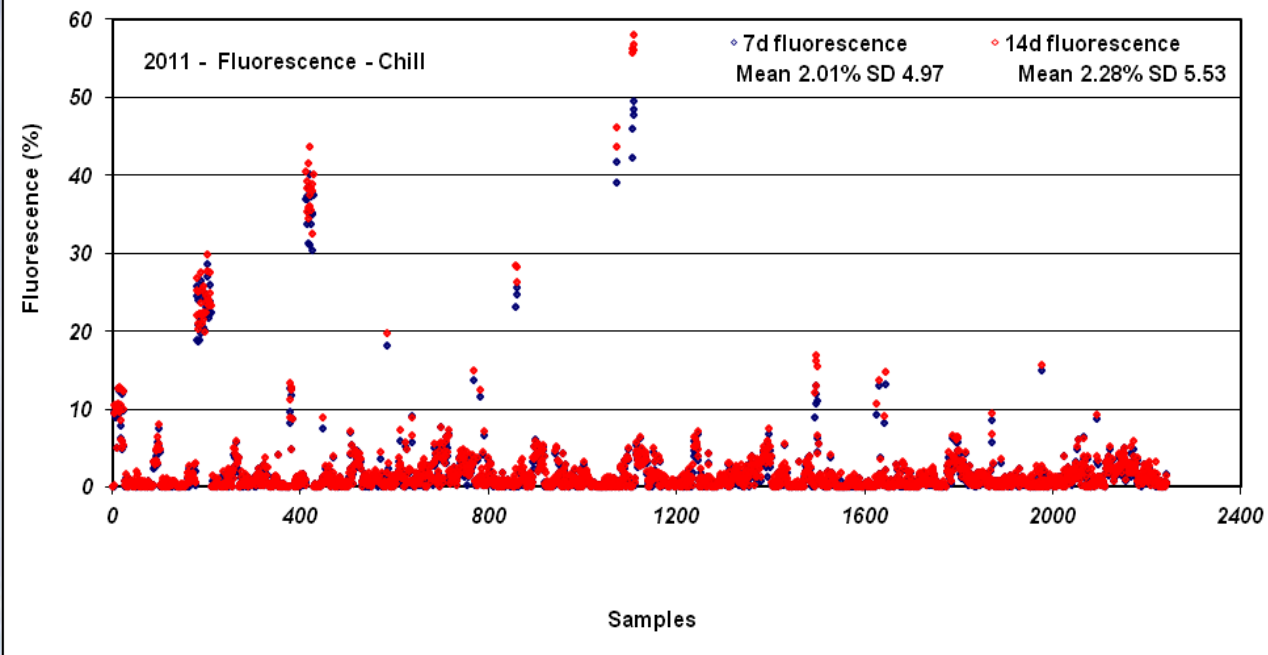
Magnitude of change in germination from 7-day count to 14-day count.

(96% of 7d count within 2% of 14d count)

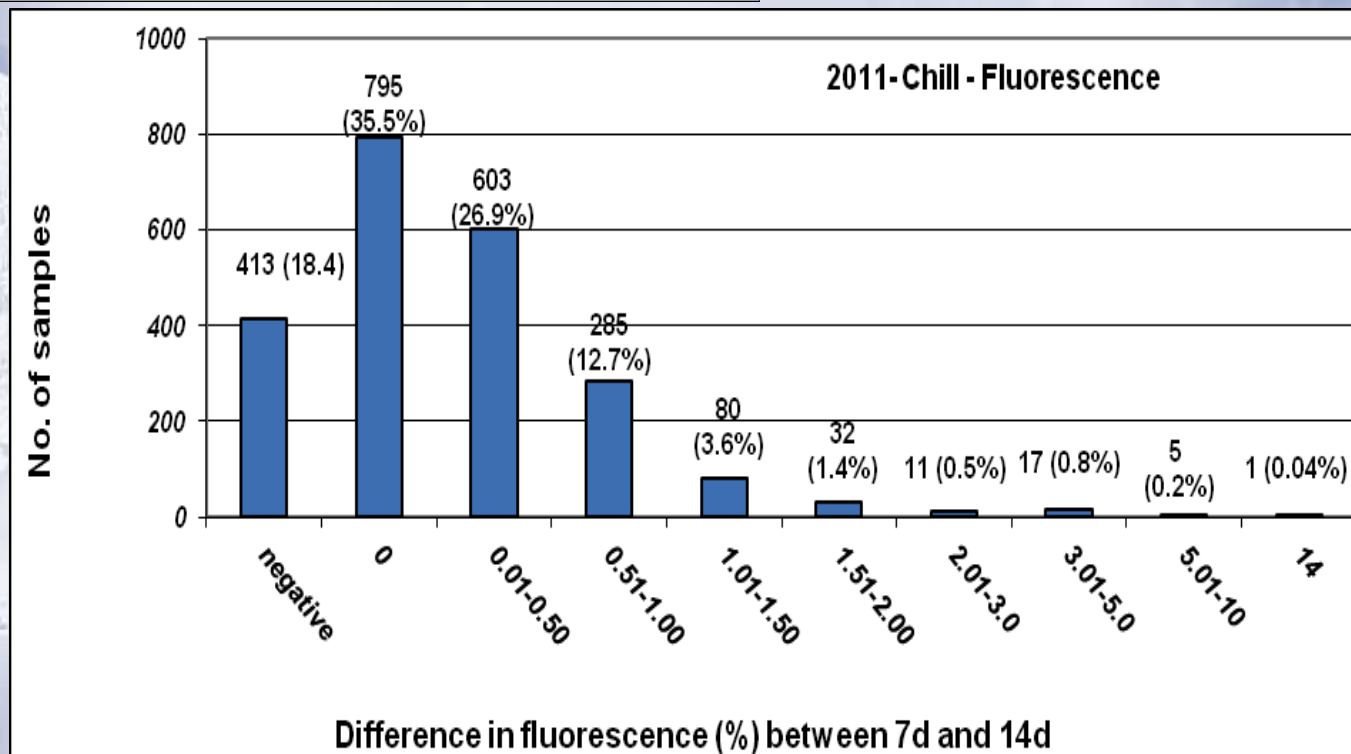


Fluorescence Results

at 7-day & 14-day counts of 2242 PRG samples



Magnitude of change in fluorescence from 7-day to 14-day count (~93% were within 1%)



Conclusions of OSU Study

- The majority (~ 90%) of 2242 PRG samples reached max germination & Fluorescence in the 1st count.
- Ending the germ & FL tests of such samples in the 1st count would not sacrifice accuracy and would speed up the delivery of test results.
- Samples that did not reach max germination in the 1st count, need to be germinated for the full 14 days before ending the test.

National Referee

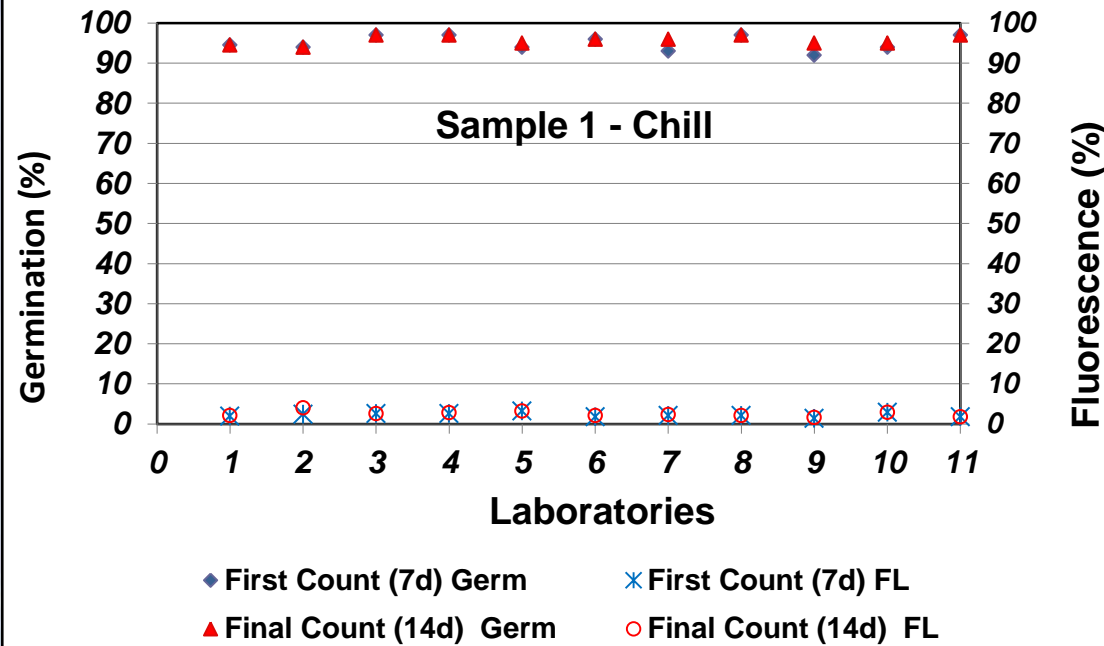
- **11 labs participated from OR, IL, ID, CA, WI, and UT.**
- **6 seed lots representing 6 cultivars from 2012 with different FL levels.**
- **Samples planted with and without pre-chilling (AOSA Rules).**
- **First and final counts of germination and FL were recorded.**
- **Data were analyzed to determine the difference between 7 and 14-day counts.**

Germination Results

- Mean 7d = 95% (sd 1.82; all above 90%)
- 14d = 96% (sd 1.13; effect of chill).

Fluorescence Results

- Mean 7d = 2.3% (sd 0.54)
- 14d = 2.5% (sd 0.69)
(low FL = Low variability).

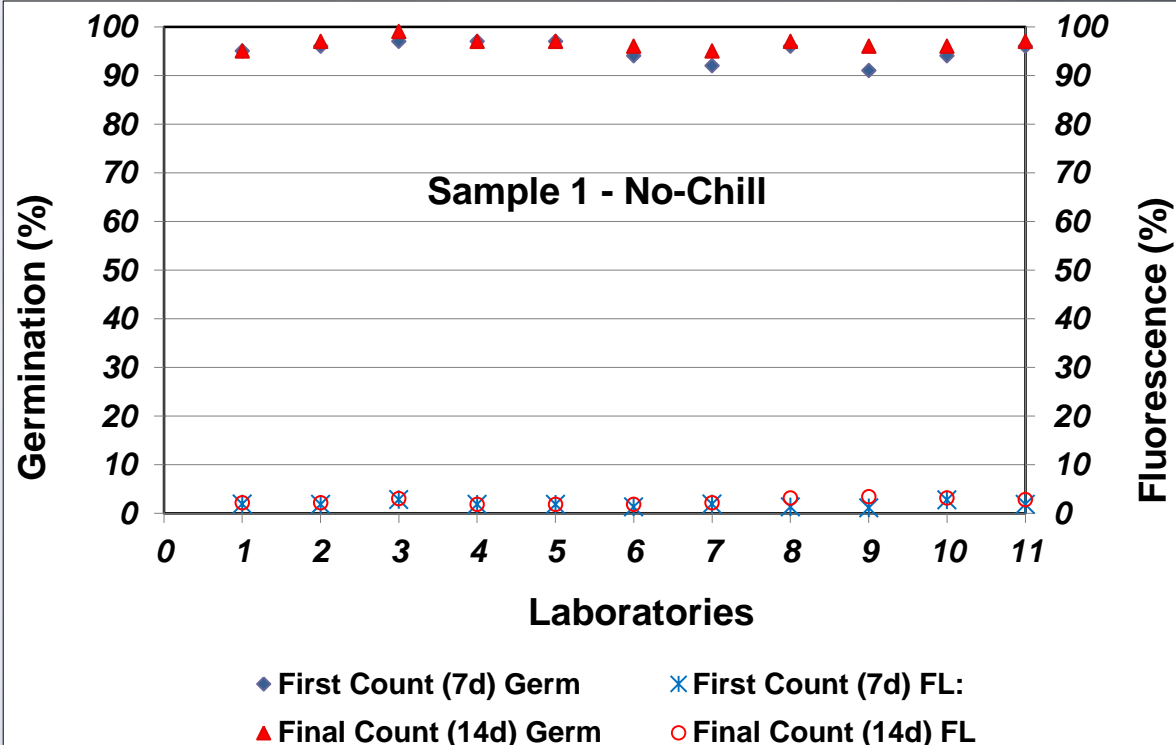


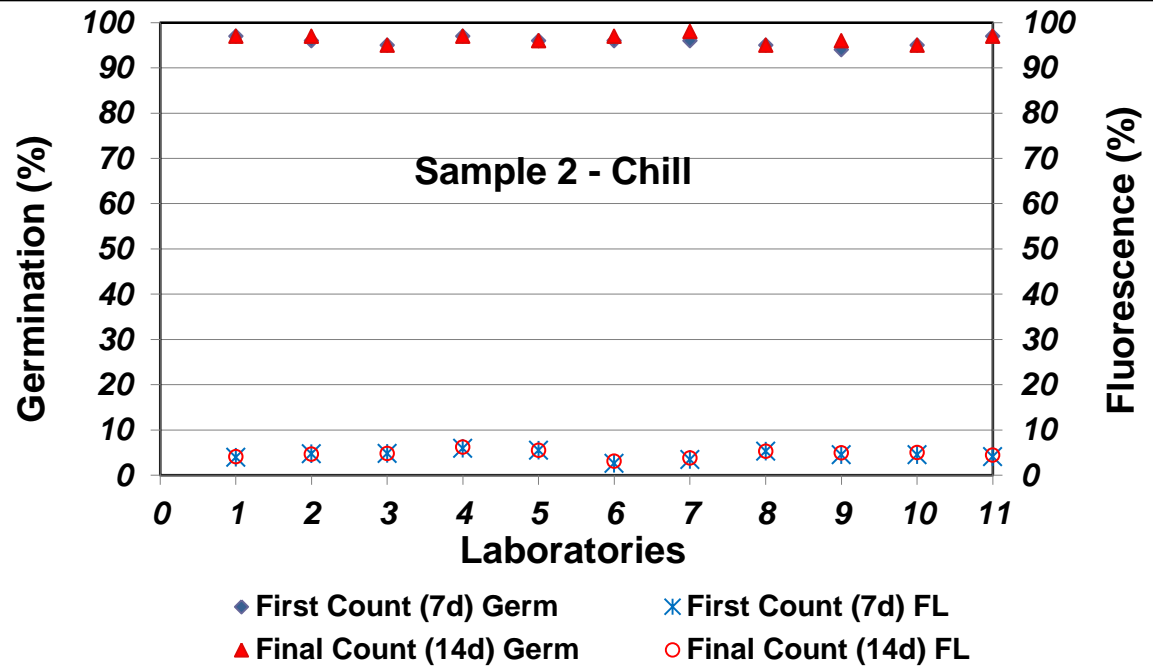
Germination Results

- Mean 7d = 95% (sd 2.05 all above 90%).
- 14d = 97% (sd 1.13).

Fluorescence Results

- Mean 7d = 1.8% (sd 0.53).
- 14d = 2.5% (sd 0.62).
(low FL = Low variability).





Germination Results

- Mean 7d = 96%; (low sd **0.98**, all above 90%).
- 14d = 96%; (sd 1.03, effect of chill).

Fluorescence Results

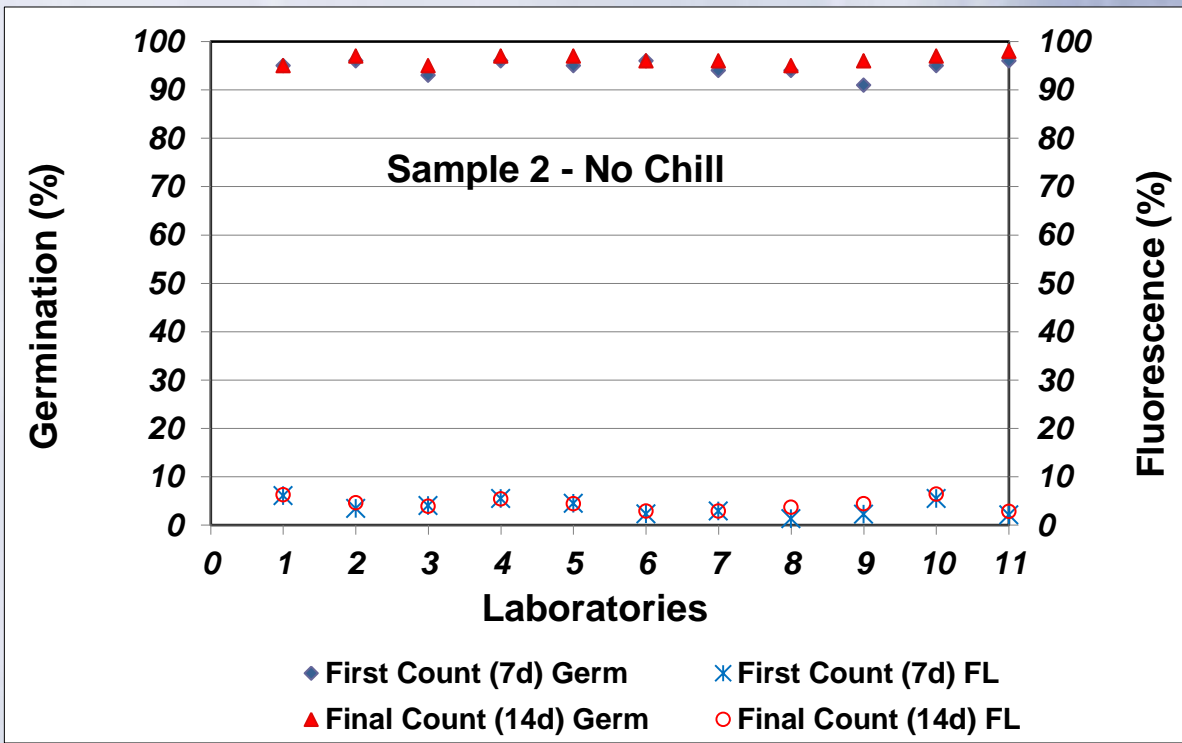
- Mean 7d = 4.5%; (sd 0.95).
- 14d = 4.7%; (sd 0.85).
(low FL= Low variability).

Germination Results

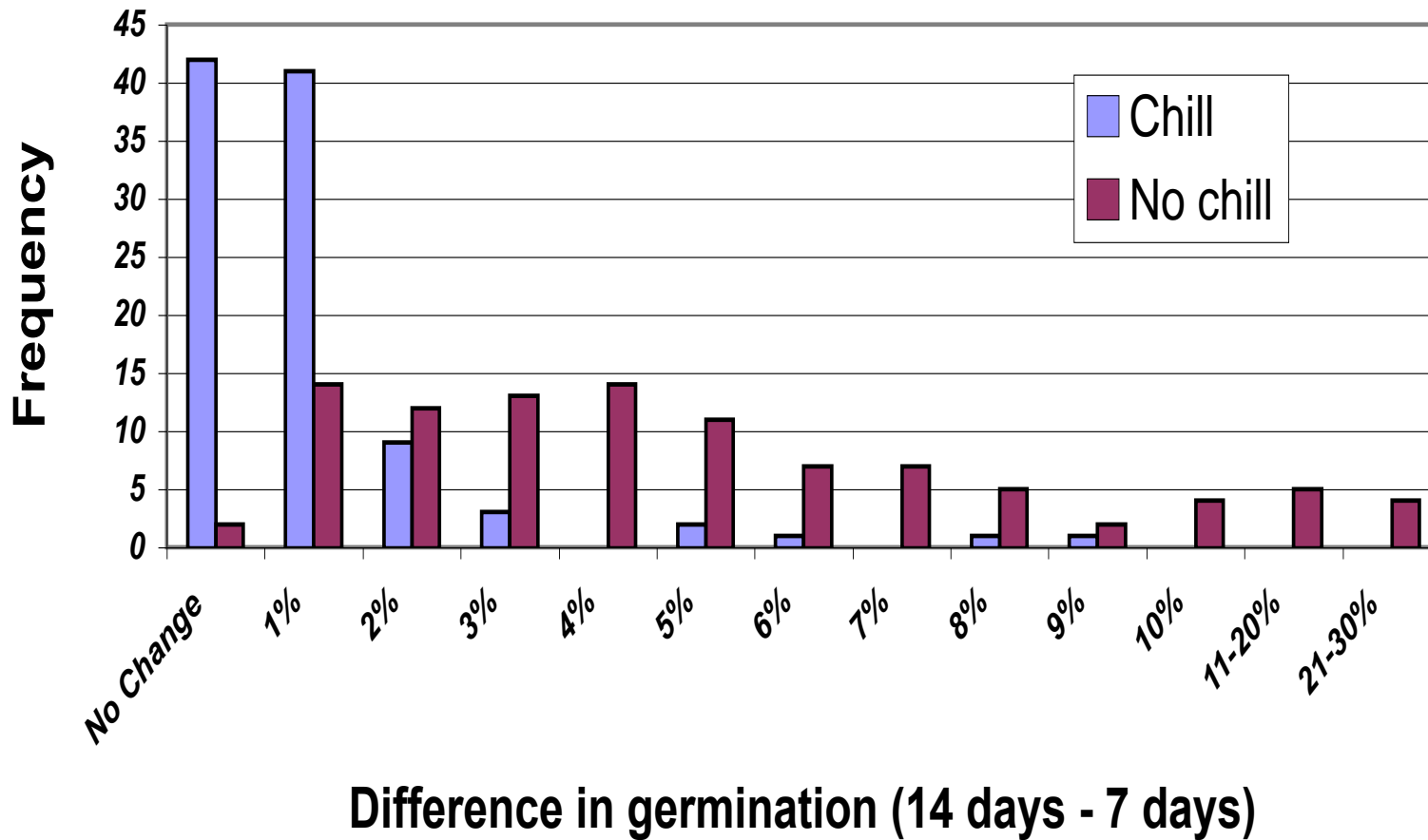
- Mean 7d = 95%; (sd 1.57, all above 90%).
- 14d = 96% (sd 1.01).

Fluorescence Results

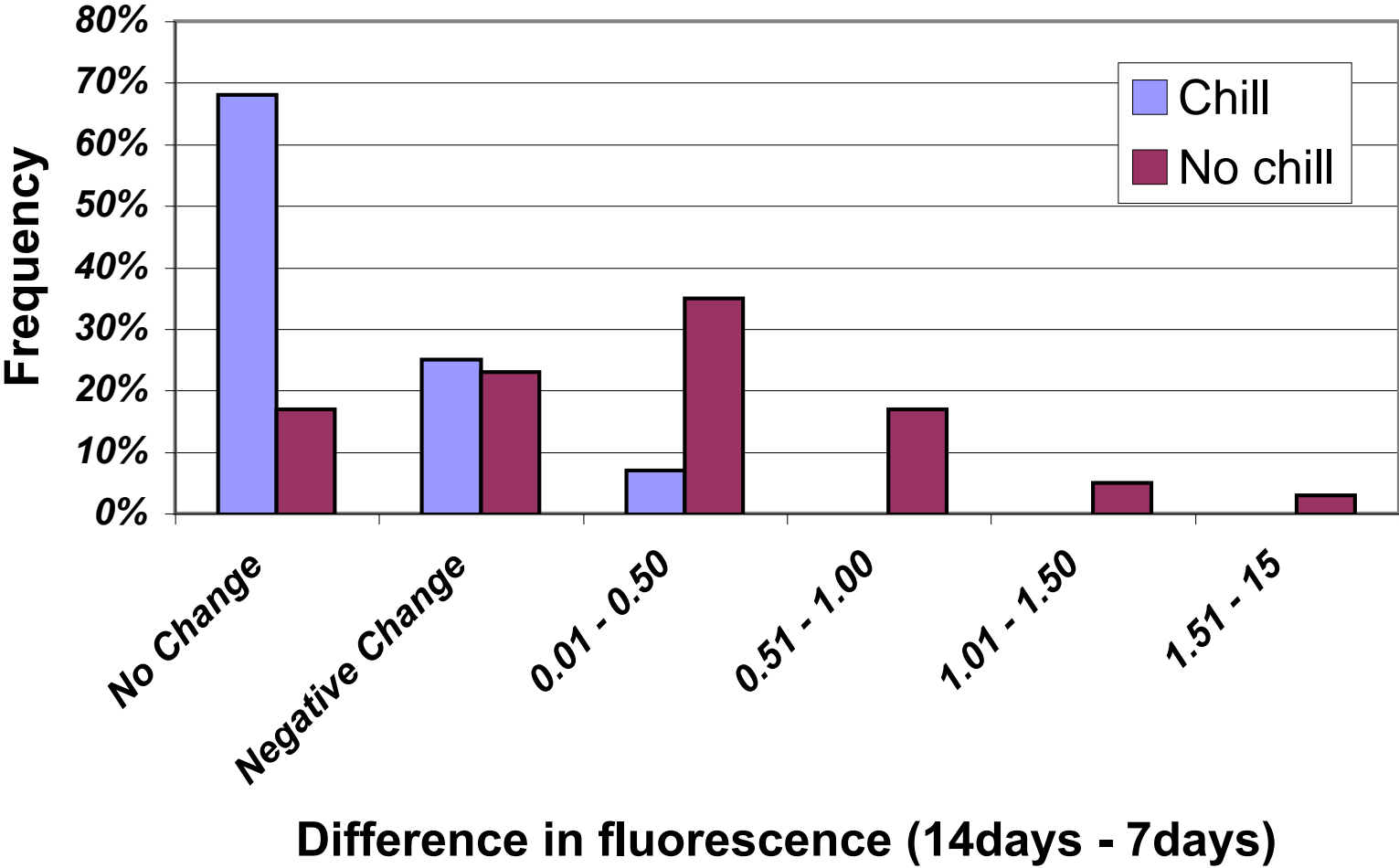
- Mean 7d = 3.6%; (sd 1.62)
- 14d = 4.3%; (sd 1.28).

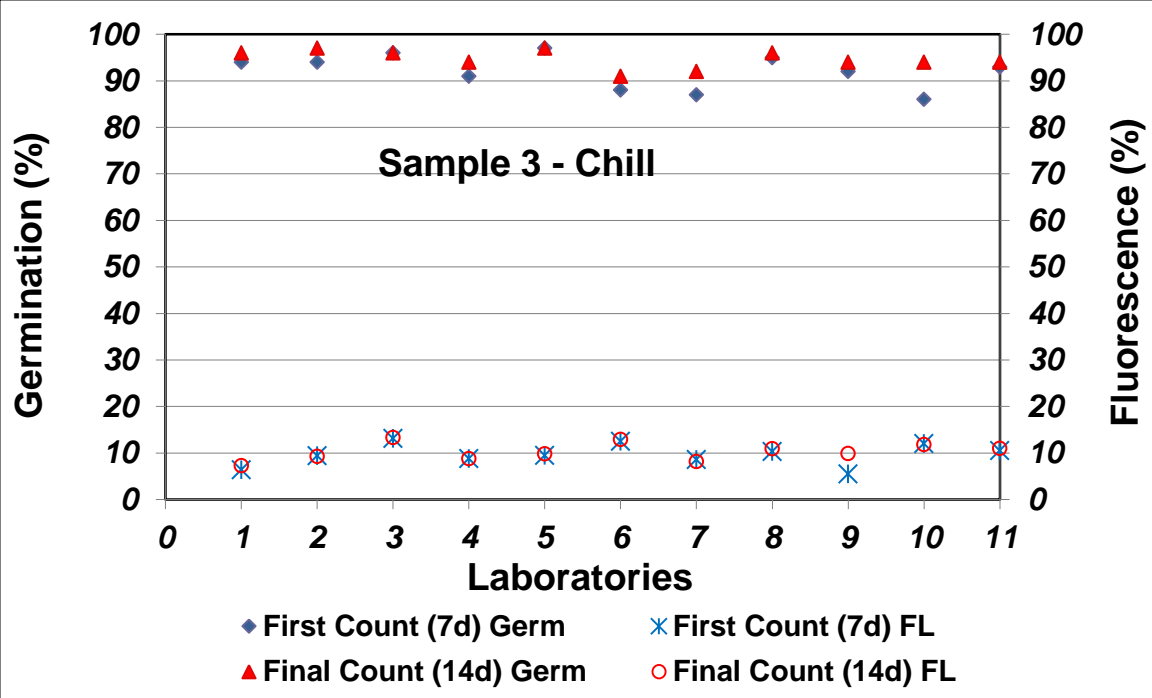


Germination of PRG after 7 and 14 days



Fluorescence level of perennial ryegrass samples after 7 and 14-day germination





Germination Results

- Mean 7d = 92%; (sd 3.70, all above 85%).
- 14d = 95%; (sd 1.96).

Fluorescence Results

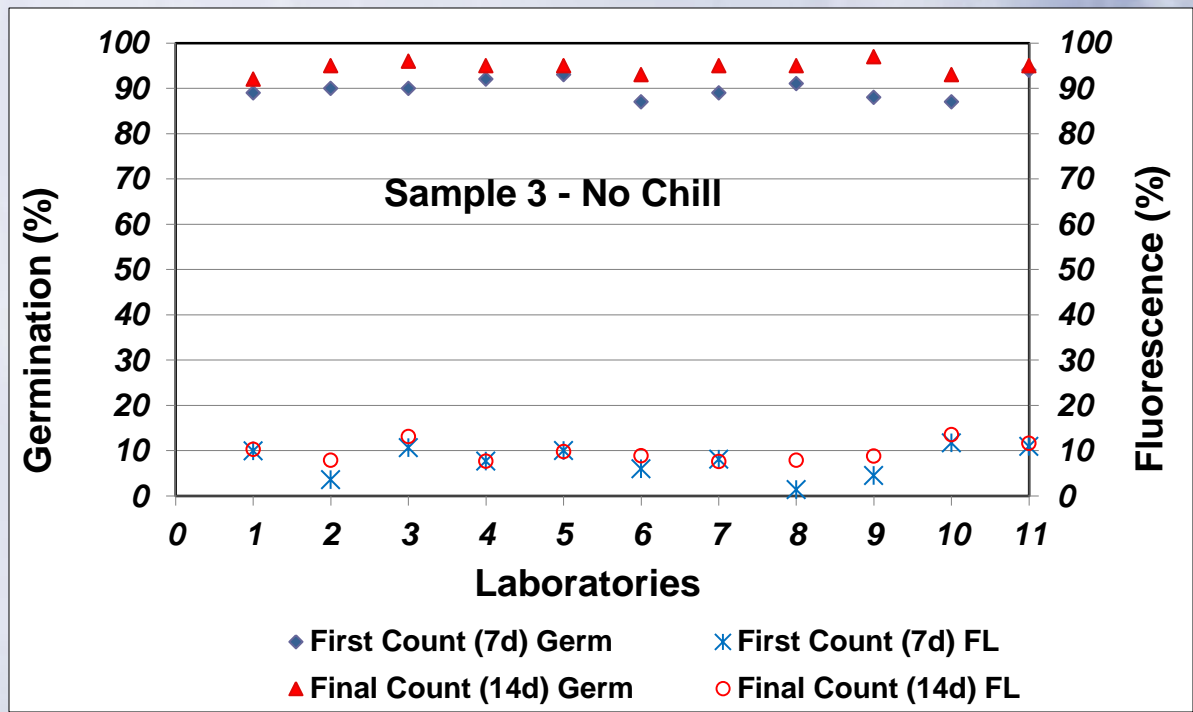
- Mean 7d = 9.7%; (sd 2.37).
- 14d = 10.3%; (sd 1.90).

Germination Results

- Mean 7d = 90% (all above 85%).
- 14d = 95%

Fluorescence Results

- Mean 7d = 7.7%; (sd 3.38).
- 14d = 9.7%; (sd = 2.15).
- (variability in seedlings development)

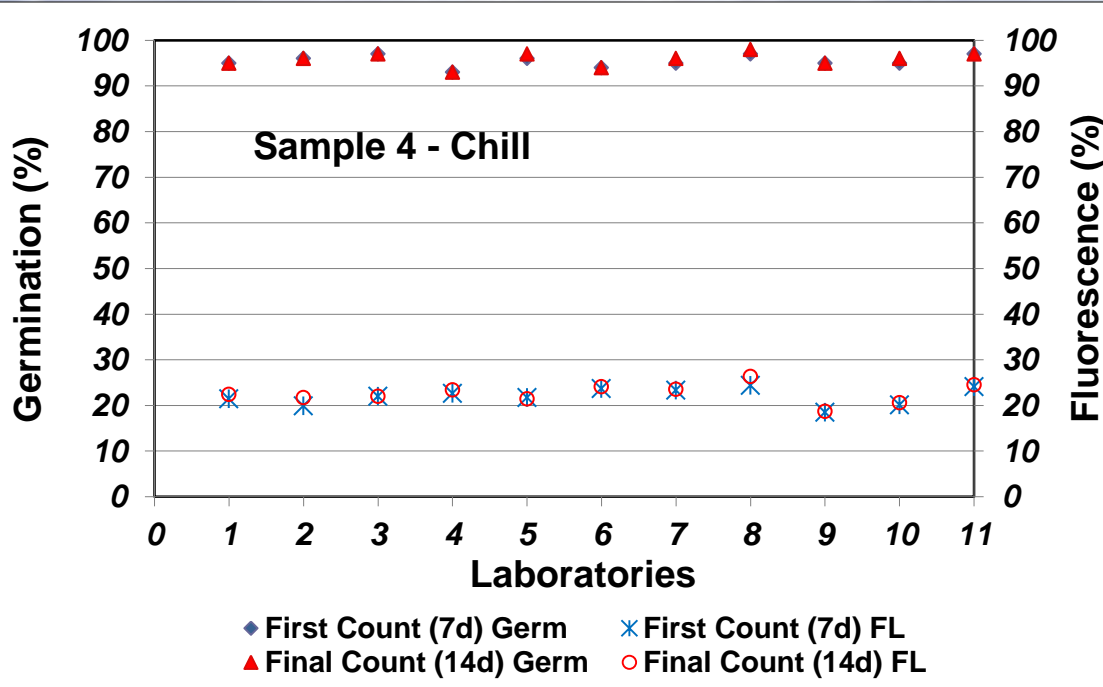


Germination Results

- Mean 7d = 95%; (sd 1.29, all above 90%).
- 14d = 96%; (sd 1.47).

Fluorescence Results

- Mean 7d = 22.0%; (sd 1.89).
- 14d = 22.6%; (sd 2.07).

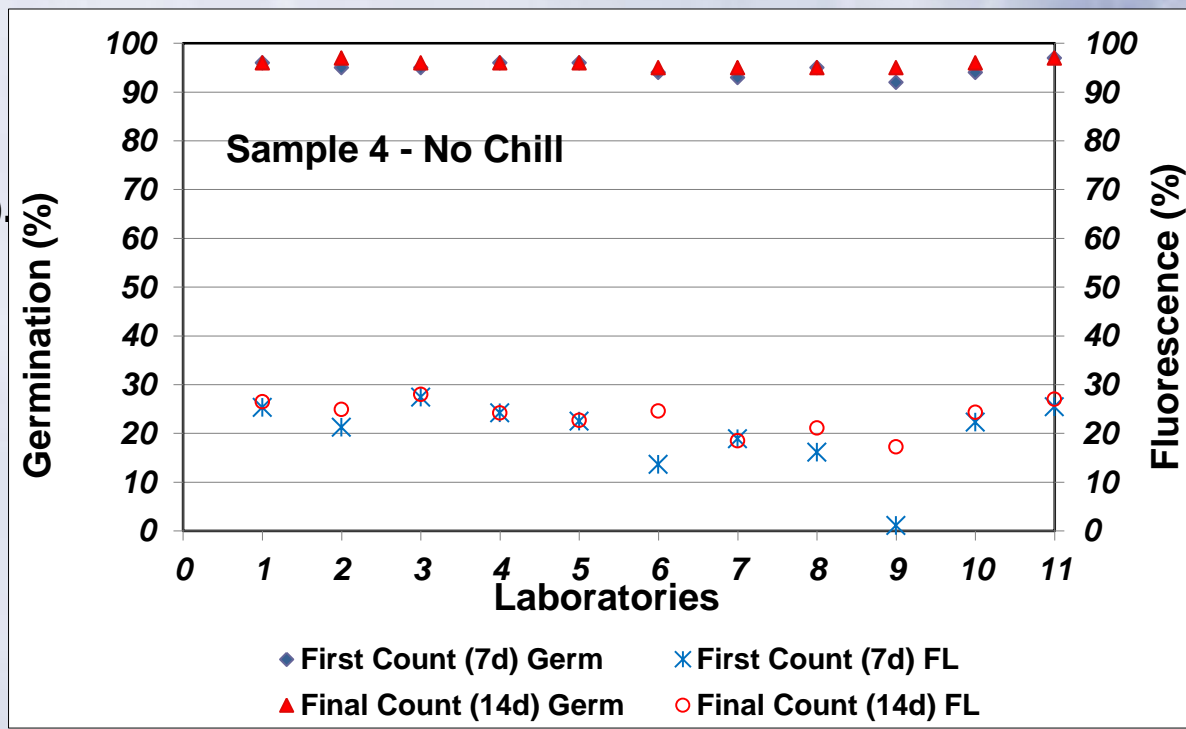


Germination Results

- Mean 7d = 95%; (sd 1.47, all above 90%).
- 14d = 96% ; (sd 0.75).

Fluorescence Results

- Mean 7d = 19.8%; (sd 7.46).
- 14d = 23.5%; (sd 3.42, variability in seedlings development).

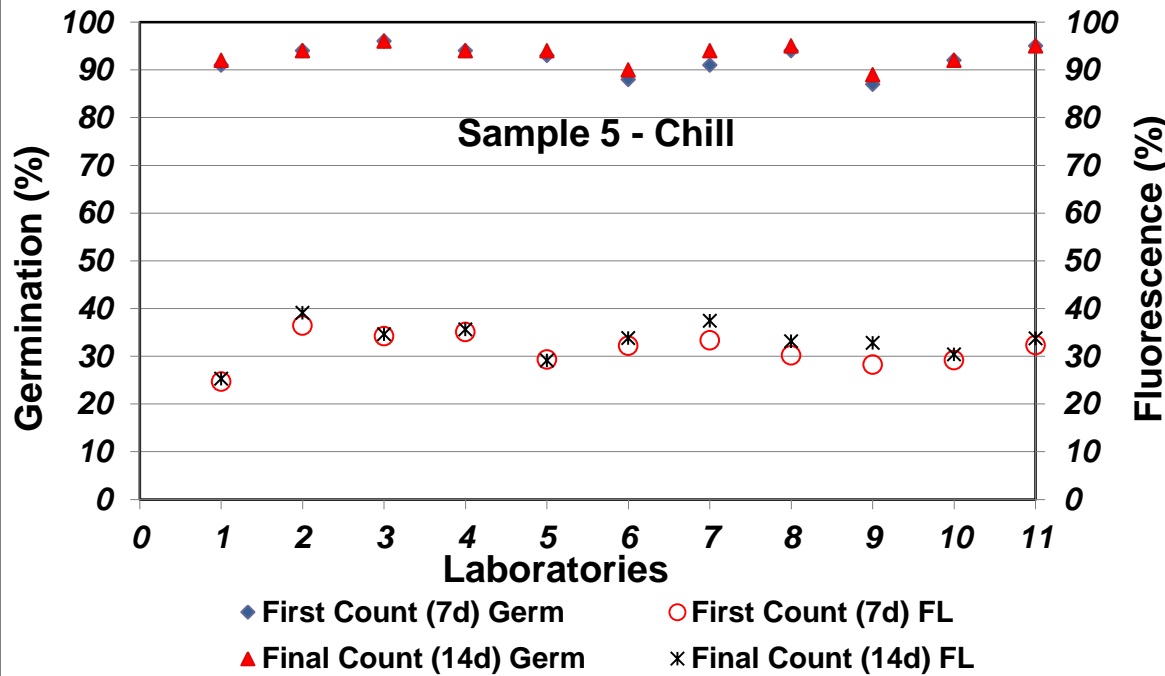


Germination Results

- Mean 7d = 92%; (sd 2.83, most are 90% or above).
- 14d = 93%; (sd 2.18).

Fluorescence Results

- Mean 7d = 31.4%; (sd 3.34).
- 14d = 33.2%; (sd 3.85).

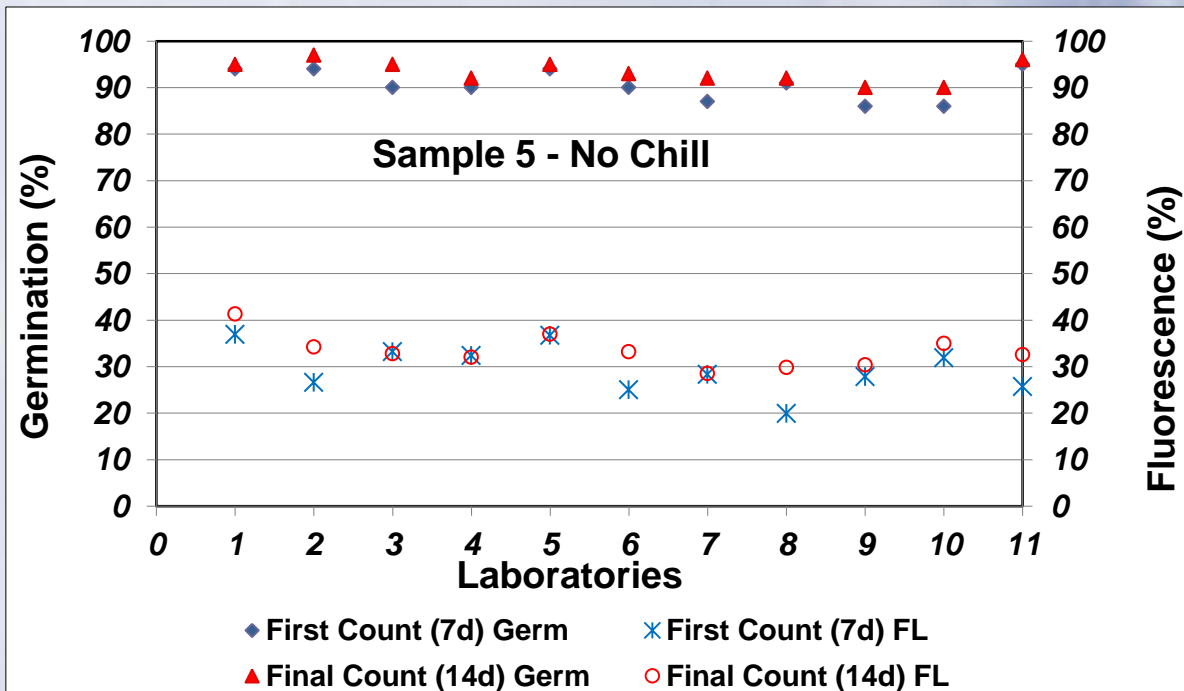


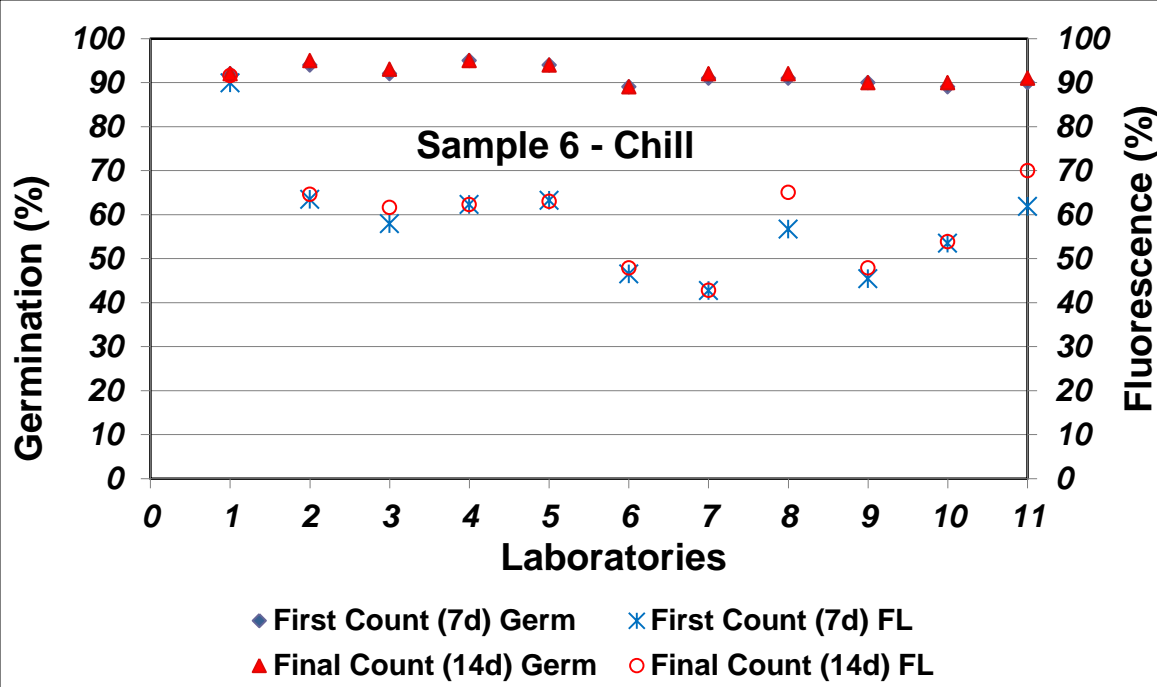
Germination Results

- Mean 7d = 91%; (sd 3.32, most are above 85%).
- 14d = 96%; (sd 2.38).

Fluorescence Results

- Mean 7d = 29.5%; (sd 5.23).
 - 14d = 33.3%; (sd 3.57).
- (as the FL % increases, variability increases).





Germination Results

- Mean 7d = 92%; (sd 2.07, most are 90% or above).
- 14d = 92%; (sd 2.02).

Fluorescence Results

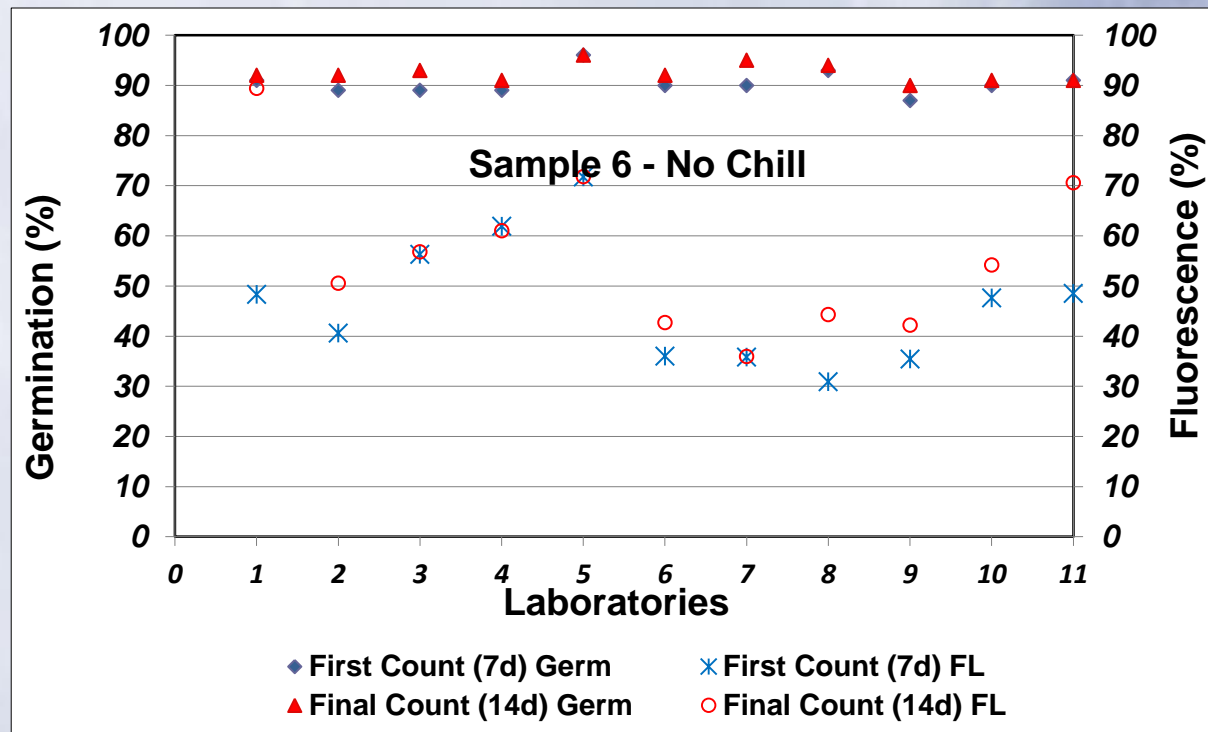
- Mean 7d = 58.5%; (sd 12.85).
- 14d = 61.0%; (sd 13.34).

Germination Results

- Mean 7d = 90%; (sd 2.38, most are above 85%).
- 14d = 92% (sd 1.86).

Fluorescence Results

- Mean 7d = 47.0%; (sd 12.66).
 - 14d = 56.0%; (se 15.95).
- (as the FL % increases, variability increases).



Tolerance Analysis of the National Referee

- 98.5% of the 7-day germination counts were in tolerance with the 14-day counts for the pre-chilled seeds (AOSA Table 14J).
- 89.5% of the 7-day germination counts were in tolerance with the 14-day counts for the non-chilled seeds (AOSA Table 14J).
- 100% of the 7-day Fluorescence % were in tolerance with the 14-day counts for the pre-chilled seeds (AOSA Table 14H).
- 88% of the 7-day Fluorescence % were in tolerance with the 14-day counts for the non-chilled seeds (AOSA Table 14H).

Conclusions of the National Referee

- The majority of PRG samples reached max germination & Fluorescence in the 1st count.
- Pre-chilling treatment speed up and produce uniform well-developed seedlings compared to non-chilled samples, as indicated by the standard deviations.
- Samples that did not reach max germination in the 1st count, need to be germinated for the full 14 days before ending the test.

Overall Conclusion

If the analyst is positive that maximum germination of a sample has been attained according to [6.9d(3)], the fluorescent test could be completed and reported before the 14th day.

Acknowledgements

Special thanks for all the labs that participated in the referee. We certainly appreciate the efforts and the time they spent in completing the study.