AOSA/SCST Region 5
2018-2019 Referee Project

Association of Official Seed Analysts

Society of Commercial Seed Technologists

Region 5: AL, AR, FL, GA, KY, LA, MS, NC, SC, TN, VA

Prepared by: David M. Johnston, RST/CSA March 29, 2021

'Argentine' Bahiagrass

Bahiagrass Germination Test Temperature Harmonization Study

The objective of this study was to compare the total viability achieved from using germination testing temperatures of 30-35° C and 20-35° C for 'Argentine' bahiagrass, to determine if other *Paspalum notatum sp.* can utilize the same test temperature used for 'Pensacola' bahiagrass of 20-35° C.

'Pensacola' Bahiagrass

Region 5 Bahiagrass Referee

Introduction:

- Bahiagrass (*Paspalum notatum*) is a warm season forage/turf grass commonly grown in the Southeastern USA. Seed labs in the Southeastern region test several hundreds of samples of 'Pensacola' bahiagrass and 'Argentine' bahiagrass annually, with 'Pensacola' being the most prevalent cultivar.

- The AOSA Rules Volume 1 lists the germination test temperature for **'Pensacola' bahiagrass as 20-35° C** and the test temperature for "**All other cultivars" of bahiagrass as 30-35° C**. This requirement for different cultivars restricts labs from maximizing their germinator capacity by requiring dedicated germinators set for different cultivars.

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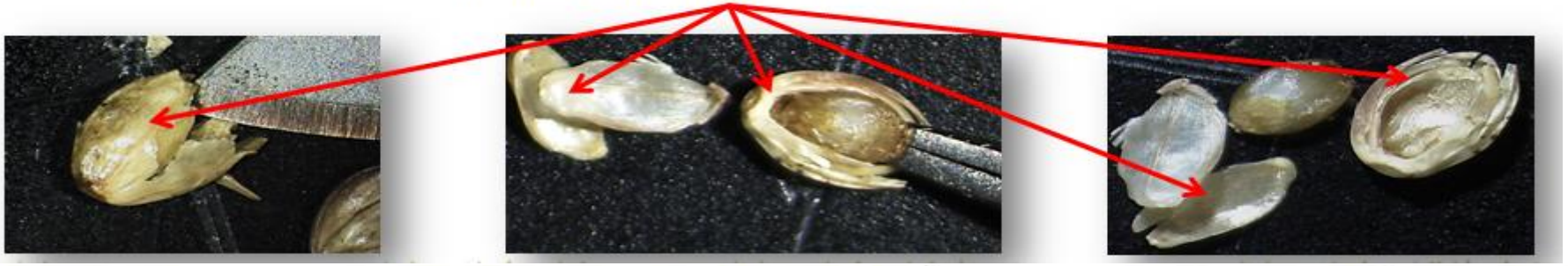
Participating Labs:

- AB Seed Lab
- Alabama State Seed Lab
- Florida State Seed Lab
- Georgia State Seed Lab
- Louisiana State Seed Lab
- North Carolina State Seed Lab
- Pennsylvania State Seed Lab
- South Carolina State Seed Lab

Test Samples and Testing Protocols:

- Five seed lots of 'Argentine' bahiagrass of varying viability levels were used
- AOSA Rules test methods, as well as special instructions for this study, were used
- Seedling evaluations conducted as stated in the AOSA Rules
- *Deviation* – Pure Seed Units were planted intact and ***DID NOT*** have the enclosing structures removed prior to the germination test, as required by the AOSA Rules

(Removing enclosing structures)



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Test Methods and Instructions:

- Each participating lab was provided test samples from five lots of 'Argentine' bahiagrass that contained only pure seed units
- Germination test was conducted on 400 seeds using 30-35° C using the petri dish method
- Germination test was conducted on 400 seeds using 20-35° C using the petri dish method
- Eight hours of light was provided during the high temperature cycle
- No dormancy breaking methods were used, i.e. KNO3, scratch caryopses
- At the end of 21 day germination test period, the total number of normal and abnormal seedlings were recorded for each test
- Post-germ TZ test was conducted on all remaining un-germinated seeds from all tests, with seeds being appropriately reported as dormant or dead

Statistical Data Analysis:

- All test data were sent to Riad Baalbaki, PhD. (Statistics Committee member) for analysis and conclusions (*data from one lab was omitted from study*)
- Data analysis supports changing the germination testing temperature of non-'Pensacola' cultivars to 20-35° C. *(See "Supporting Evidence" for more details)*

Table 1. Analysis of variance of germination, abnormal, dead, dormant-TZ and viability results of different seed lots subjected to two temperature treatments, at different labs.

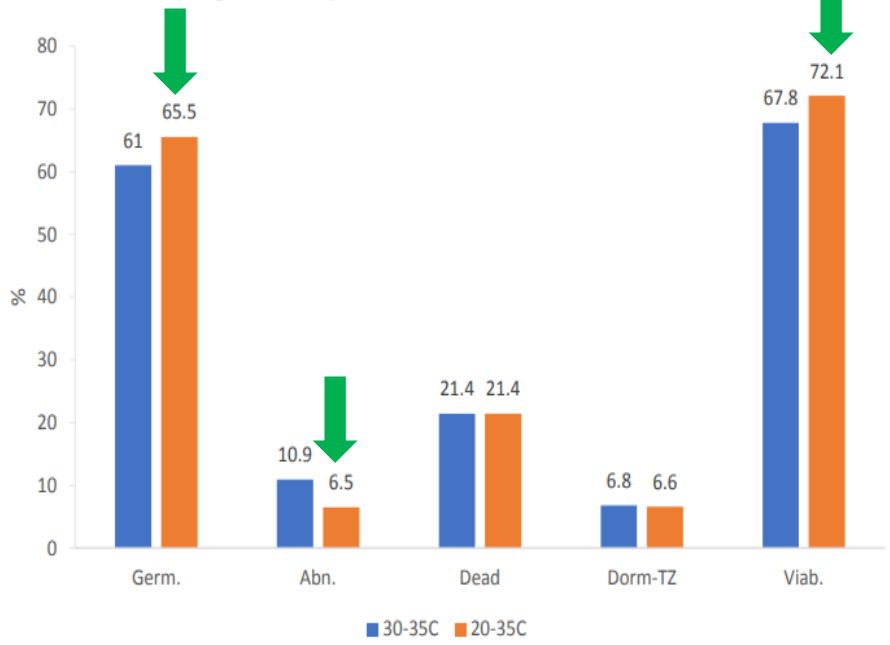
	df	Mean squares				
		Germination	Abnormals	Dead	Dormant-TZ	Total viability
Temperature treatment (T)	1	122.83**	194.11**	0.04	0.46	109.68**
Seed lot (S)	4	1075.97**	43.33*	571.86**	250.18**	648.83**
Lab (L)	6	261.22**	993.06**	281.85**	338.25**	631.97**
T x S	4	0.47	4.81	2.09	13.23	6.95
T x L	6	102.84**	66.18**	8.15	10.28	85.93**
S x L	24	13.03	25.04*	15.45**	18.51*	20.93
Error	24	13.72	10.41	4.17	7.37	12.48

*Significant at p 0.05 **Significant at p 0.01

Temperature treatments, averaged over all seed lots and labs, had a significant effect on germination, abnormals and total viability. It had no significant effect on dead or dormant-TZ results (Table 1).

Testing at the proposed 20-35° C significantly increased germination and viability, and significantly decreased abnormals (Fig. 1).

Figure 1. Effect of temperature treatments on germination test components. Percentage germination, abnormals and viability significantly differed.



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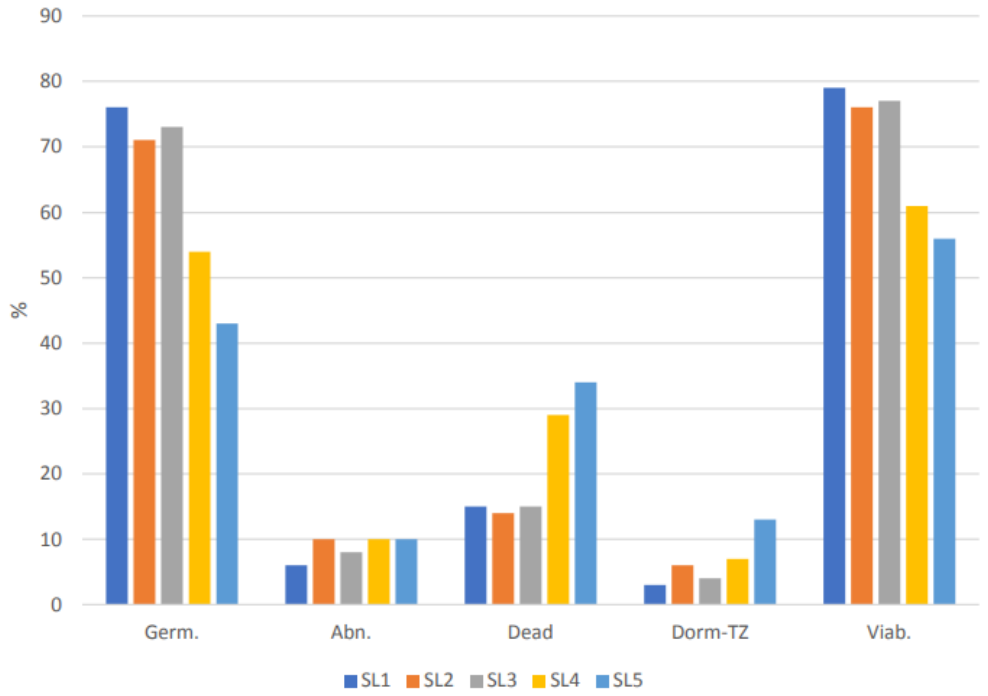
For all components, seed lots (SL) did significantly differ (Table 1), regardless of temperature or lab (Fig. 2), which confirms seed lots used were of varying viability levels, as required.

Figure 2. Range in germination test results among seedlots (SL).



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For all components, results from labs were not consistent, and there was a significant amount of variation among labs, regardless of temperature treatment or seed lot (Table 1).

However, variation in terms of ranges among labs, was significantly less when a temperature treatment of 20-35° C (T2) was used as compared to 30-35° C (T1) (Fig. 3).

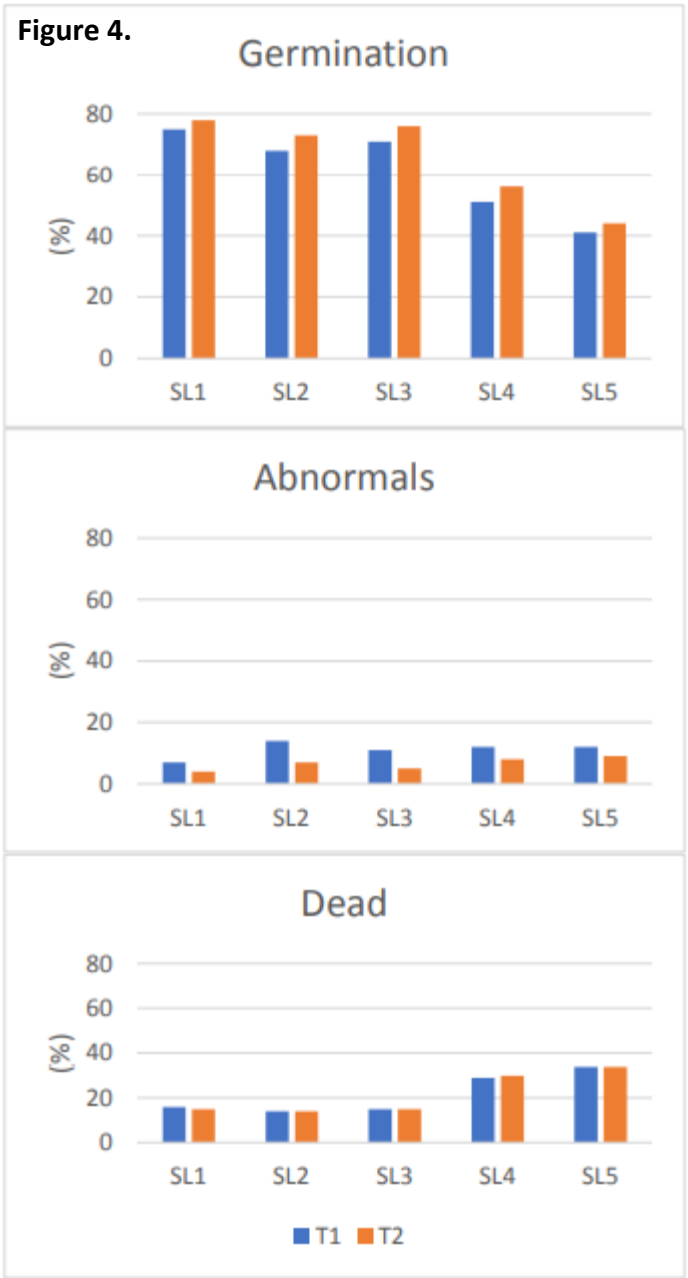
Significant variation of results across labs was observed, but no significant difference within the same lab was indicated.

Figure 3. Germination and viability test results from participating labs at two temperature treatments, T1 (30-35C) and T2 (20-35C), averaged over all seed lots.

Figure 4 illustrates the positive effect, per seed lot (SL), of subjecting seeds to a 20-35° C temperature treatment, with both germination and total viability showing a consistent increase compared to 30-35° C, while the number of abnormals was less at 20-35° C.

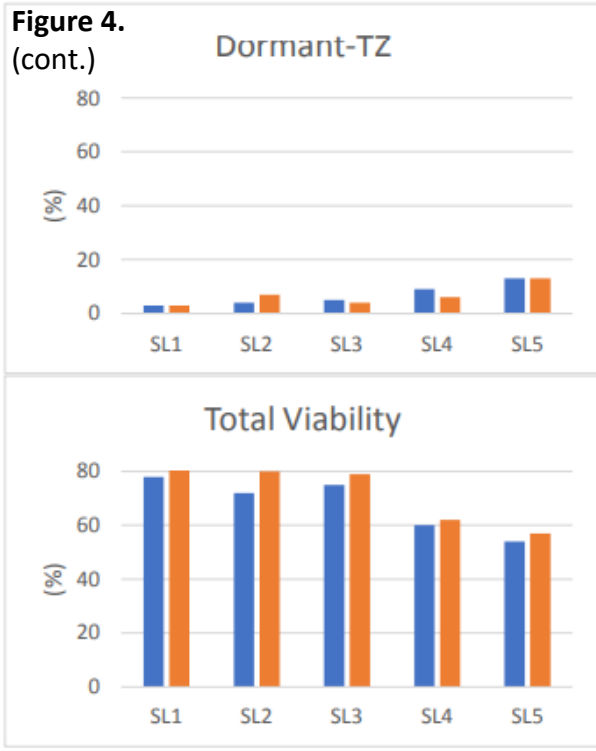
Percentage dead and dormant seeds per seed lot were largely unaffected by changes in temperature treatment.

Figure 4.



SL = Seed Lot
T1 = 30-35° C
T2 = 20-35° C

Figure 4. (cont.)



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Conclusions:

- The results of this validation study support the changing of the germination testing temperature from 30-35° C to 20-35° C for all *Paspalum notatum cvs*.

- In 2019, an AOSA Rule proposal was submitted to change the germination testing temperature of “all other cvs.” of Paspalum notatum to 20-35° C

- Variation across labs may be an indicator of potential testing non-uniformity, more referee testing with statistical analysis required to confirm

Participating Labs:

- AB Seed Lab (*provided PSUs*)
- Alabama State Seed Lab
- Florida State Seed Lab
- Georgia State Seed Lab
- Louisiana State Seed Lab
- North Carolina State Seed Lab
- Pennsylvania State Seed Lab
- South Carolina State Seed Lab

Thank you to Riad Baalbaki, PhD. for data analysis.