ANNUAL REPORT
ISCDA MULTI-LOCATION SWEET CORN SEED TREATMENT TRIAL – 2023

INTRODUCTION

The Seed Treatment Committee of the International Sweet Corn Development Association (ISCDA) organizes an annual multi-location trial to identify seed treatments to maximize sweet corn stands across diverse planting environments. The 2023 trial evaluated 14 seed treatment mixtures (and a non-treated control) using two *sh2* sweet corn varieties (Natalie and XTH1473) at eight locations.

METHODS

TRIAL ESTABLISHMENT & EVALUATION: A non-treated control and 14 seed treatments were evaluated using two sweet corn varieties from seed lots that were selected by committee members: Natalie (*sh2*) (HM Clause) (warm germ. 97%, cold germ. 89%, 4,695 SPP), and XTH1473 (*sh2*) (Illinois Foundation Seeds) (warm germ. 97%, cold germ. 92%, 3,121 SPP). Most of the seed treatments included mixtures of conventional fungicide products, most included one or two insecticides, some included microbial products, and many included micronutrients (Table 1). Treatment 8 was an insecticide only. Treatment 10 included only organic products (OMRI-approved). Three treatments did not include insecticides (Treatments 10, 12, and 15). Seed treatments were sponsored by: Albaugh LLC.; Bayer CropScience, LP; Lallemand, Inc.; Nufarm Americas, Inc.; The McGregor Company; Syngenta Crop Protection, LLC; and Wilbur-Ellis, Inc. The committee also included a treatment with insecticide only (Treatment 8) and a standard fungicide seed treatment blend with an insecticide (Treatment 3, Standard 2) (note that this treatment has been included for many years as "Standard 2" and was not renamed, though "Standard 1" was recently dropped from the trial). The treatments were applied to the seeds at a facility operated by The McGregor Company. The treated seed was packaged by personnel at the Crookham Company Seed Lab. Sets of treated seeds were mailed to cooperating researchers at eight locations in six states for planting and evaluation (ID-1, ID-2, IL-1, NY-1, VA-1, WA-1, WI-1, and WI-2) (locations and cooperators are listed below). The experimental design at each location varied, but all sites established randomized plots with at least four replications, with 80-100 seeds per plot. Planting dates ranged from April to May. Stand counts and weak plant counts were recorded for each plot, usually at the 5-6 leaf stage. Weak plants were defined as plants that were two or more leaves behind the average seedlings in the plot, and are reported as the % slows, which was calculated by dividing the number of weak plants by the number of emerged plants. An adjusted % stand was calculated by subtracting the number of weak plants from the number of emerged plants. Vigor ratings were assigned to each plot on a qualitative visual scale of 1-5 (1=extremely weak, 2=weak, 3=fair, 4=vigorous, 5=very vigorous).

SOIL ASSAYS: Soil samples (0–6-inch depth) were collected at seven locations for soil pathogen screening (*Pythium* spp. and *Fusarium* spp.). The samples were assayed at the Oregon State University Plant Pathology Lab in Hermiston. *Pythium* and *Fusarium* species were quantified by soil dilution plating on culture media and are reported as the number of colony-forming units (CFU) per gram of soil. *Pythium* colonies were subjected to 10 ppm of metalaxyl to determine if they are sensitive to the fungicide; colonies with unrestricted growth were deemed metalaxyl-resistant. Soil pH was also tested.

DATA ANALYSIS: The % stand results for each variety at each location were subjected to an outlier analysis; % stand results that were less than or greater than 1.5 times the interquartile range of replicates for the treatment were considered extreme outliers, and all data from outlier plots (also including weak plant counts, vigor ratings, and yield) were excluded from further analysis. The results at each location were compared for varieties, individually and then combined, using an analysis of variance (ANOVA). Standard deviation was calculated to measure variability in treatment results, and in trial results. Treatment means were compared using the Tukey's Honestly Significant Difference method, HSD ($P \leq 0.05$). The results were then averaged across all locations, for each variety individually and then combined, and were analyzed with ANOVA. The summarized treatment means were compared using Tukey's HSD ($P \leq 0.05$). Data were analyzed using ARM 2023.7 and Summary Across Trials ST 2023.7 software (Gylling Data Management, Inc.).

TABLE 1: 2023 ISCDA Trial Seed Treatments

No.	Sponsor	Treatment	Active Ingredients	Rate
1	Control	No Treatment	none	
2	Nufarm	Apron XL Dividend Extreme Thiram 480 Captan 4L ST Vitavax 34 Cruiser 5 FS Trunemco Sembolite	mefenoxam difenoconazole+mefenoxam captan thiram carboxin thiamethoxam (microbial) (nutrient)	0.32 oz/cwt 5.00 oz/cwt 2.50 oz/cwt 2.50 oz/cwt 4.00 oz/cwt 0.50 mg ai/seed 0.30 oz/cwt 0.60 oz/cwt
3	ISCDA Standard 2	Apron XL Dividend Extreme Thiram 480 Captan 4L ST Vitavax 34 Cruiser 5 FS	mefenoxam difenoconazole+mefenoxam thiram captan carboxin thiamethoxam	0.32 oz/cwt 5.00 oz/cwt 2.50 oz/cwt 2.50 oz/cwt 4.00 oz/cwt 0.50 mg ai/seed
4	Syngenta 1	Vibrance CINCO Dividend Extreme Vayantis Fortenza Cruiser 5 FS	mefenoxam azoxystrobin fludioxonil sedaxane thiabendazole difenoconazole+mefenoxam picarbutrazox cyantraniliprole thiamethoxam	0.077 mg ai/seed 2.00 oz/cwt 0.0063 mg ai/seed 0.0228 mg ai/seed 0.50 mg ai/seed

No.	Sponsor	Treatment	Active Ingredients	Rate
5	Syngenta 2	Vibrance CINCO	mefenoxam azoxystrobin fludioxonil sedaxane thiabendazole	0.077 mg ai/seed
		Dividend Extreme	difenoconazole+mefenoxam	2.00 oz/cwt
		Vayantis	picarbutrazox	0.0063 mg ai/seed
		Cruiser 5 FS	thiamethoxam	0.50 mg ai/seed
6	Albaugh 1	Anchor 3L ST	mefenoxam	0.38 oz/cwt
		Thiabendazole 4L ST	thiabendazole	0.24 oz/cwt
		Ace	ipconazole	0.16 oz/cwt
		Azoxystrobin 100ST	azoxystrobin	0.24 oz/cwt
		Difenoconazole 3L ST	difenoconazole	1.24 oz/cwt
		Tebustar 250 ST	tebuconazole	0.74 oz/cwt
		Legend 5L ST	thiamethoxam	7.063 oz/cwt
		Bio ST VPH 9.0	(amendment)	1.00 oz/cwt
		Intego	ethaboxam	0.20 oz/cwt
7	Albaugh 2	Anchor 3L ST	mefenoxam	0.38 oz/cwt
		Thiabendazole 4L ST	thiabendazole	0.24 oz/cwt
		Ace	ipconazole	0.16 oz/cwt
		Azoxystrobin 100ST	azoxystrobin	0.24 oz/cwt
		Difenoconazole 3L ST	difenoconazole	1.24 oz/cwt
		Tebustar 250 ST	tebuconazole	0.74 oz/cwt
		Legend 5L ST	thiamethoxam	7.063 oz/cwt
		BioST VPH 9.0	(amendment)	1.00 oz/cwt
		Intego	ethaboxam	0.20 oz/cwt
		BioST Nematicide	(microbial)	0.70 oz/cwt
8	ISCDA	Cruiser	thiamethoxam	0.50 mg ai/seed
9	Lallemand 1	Apron XL	mefenoxam	0.32 oz/cwt
		Dividend Extreme	difenoconazole+mefenoxam	5.00 oz/cwt
		Thiram 480	thiram	2.50 oz/cwt
		Captan 4L ST	captan	2.50 oz/cwt
		Vitavax 34	carboxin	4.00 oz/cwt
		Cruiser 5 FS	thiamethoxam	0.50 mg ai/seed
		LALRise Start SC	(microbial amendment)	0.50 oz/cwt
10	Lallemand 2 Organic	K61	(microbial biofungicide)	0.25 oz/cwt

No.	Sponsor	Treatment	Active Ingredients	Rate
11	McGregor 1	Apron XL Dividend Extreme Thiram 480 Captan 4L ST Vitavax 34 Cruiser 5 FS Seed Start Root[2]	mefenoxam difenoconazole+mefenoxam thiram captan carboxin thiamethoxam micronutrients	0.32 oz/cwt 5.00 oz/cwt 2.50 oz/cwt 2.50 oz/cwt 4.00 oz/cwt 0.50 mg ai/seed 8.00 oz/cwt
12	Bayer 2	Allegiance FL Redigo 480 Trifloxystrobin Flowable EverGol Prime	metalaxyl prothioconazole trifloxystrobin penflufen	0.75 oz/cwt 0.96 oz/cwt 0.32 oz/cwt 0.32 oz/cwt
13	Wilbur Ellis 1	Vibrance Cinco Dividend Extreme Cruiser 5 FS PhycoTerra-ST	mefenoxam azoxystrobin fludioxonil sedaxane thiabendazole difenoconazole+mefenoxam thiamethoxam (microbial)	0.077 mg ai/seed 2.00 oz/cwt 0.50 mg ai/seed 4.00 oz/cwt
14	Wilbur Ellis 2	Vibrance CINCO Dividend Extreme Cruiser 5 FS NuVytal ZMFC	mefenoxam azoxystrobin fludioxonil sedaxane thiabendazole difenoconazole+mefenoxam thiamethoxam micronutrients	0.077 mg ai/seed 2.00 oz/cwt 0.50 mg ai/seed 8.00 oz/cwt
15	Bayer 1	Allegiance FL Redigo 480	metalaxyl prothioconazole	0.20 oz/cwt 0.66 oz/cwt
Also included: 1.5 oz/cwt red color, 2 oz/cwt 2120 polymer, and water; or 0.5 oz/cwt organic blue color and water.				

2023 ISCDA Seed Treatment Committee Chairs

Richard Fillmore, Co-Chair, The McGregor Company
Rick Winn, Co-Chair, HM Clause Inc.
Carrie Wohleb, Research Coordinator, Washington State University

2023 ISCDA Seed Treatment Trial Cooperating Researchers

Trial	Locations	Planting Dates	Participating Researchers or Contacts
ID-1	Huston, ID	May 16, 2023	Marija Topic, Crookham Company
ID-2	Nampa, ID	May 24, 2023	Pedee Ewing, HM Clause
IL-1	Tolono, IL	April 13, 2023	Eric Brucker, IFSI
NY-1	Aurora, NY	May 19, 2023	Margret Smith and Sherrie Norman, Cornell University
VA-1	Painter, VA	April 26, 2023	Doug Higgins, Virginia Tech
WA-1	Pasco, WA	May 25, 2023	Carrie Wohleb, Washington State University
WI-1	Plover, WI	May 15, 2023	Probir Kumar Das, IFSI
WI-2	Sun Prairie, WI	May 26, 2023	Tim Gustafson, HM Clause

RESULTS

This summary of result is followed by tables showing results at each location, and by tables and charts to summarize and illustrate the results across locations.

RESULTS – SOIL PATHOGEN ASSAYS

Soil pathogen assay results are shown in Table 2. Soil samples were not submitted from WI-2. *Pythium* was isolated from soil from 6 of 7 locations, but none of them had *Pythium* isolates in the sample that were sensitive to metalaxyl. *Fusarium* species were detected at all seven locations with soil tests. It is important to recognize that these soil assays do not identify the organisms beyond their genera and do not determine whether they are pathogenic on sweet corn.

TABLE 2. 2023 ISCDA Seed Treatment Trial – Soil Pathogen Assays

LOCATION	*Pythium* CFU/g soil	Metalaxyl-Resistant *Pythium* CFU/g soil	*Fusarium* CFU/g soil	Soil pH
ID-1	0	NA	1768	7.16
ID-2	75	0	2724	7.57
IL-1	11	0	2089	7.56
NY-1	187	0	3247	6.57
VA-1	124	0	1970	4.79
WA-1	182	0	2532	7.55
WI-1	98	0	1035	5.83

RESULTS - % STAND

The treatment means and standard deviation for % stand at each location are shown in Tables 3 a-c and are summarized across eight locations in Table 3 d. Box and whisker charts show the distribution of combined treatment means for % stand for both varieties, Natalie only, and XTH1473 only (Figures 1-3).

Most of the trials had reasonably small variation in the data sets for % stand (i.e., coefficients of variation (CV) were less than ~15%), except for the XTH1473 trial at NY-1 where a large CV for the trial and large standard deviations for treatments indicate widely dispersed results. There were no significant differences among treatments at the NY-1 location, and the results were not included in the analyses for the summary across locations.

NATALIE: Grand means for % stand at the various locations ranged from 69.1% (VA-1) to 92.2% (WA-1) and averaged 83.3% for all Natalie trials. The VA-1 trial noted problems with billbugs (grubs), geese, and yellow nutsedge. The ANOVAs indicated significant treatment effects (with a p value ≤ 0.05) for % stand at only 3 of 8 locations planted with Natalie (ID-1, VA-1, and WA-1). Treatment 10 resulted in the lowest Natalie stands when averaged across locations (76.6%), but it was not significantly different from stands with Treatments 1, 8, 9, 14, or 15. Treatment 6 resulted in the highest stands (87.6%), but it was only significantly higher when compared to Treatments 10, 1, 8, and 15. The ANOVA for Natalie trials across eight locations indicated a significant location x treatment interaction for % stand, so the results were not consistent across locations.

XTH1473: Grand means for % stand at eight locations ranged from 50.4% (VA-1) to 86.7% (WI-1) and averaged 70.3%. The VA-1 trial noted problems with billbugs (grubs), geese, and yellow nutsedge. The ANOVAs indicated significant treatment effects (with a p value ≤ 0.05) for % stand at 5 of 8 locations planted with XTH1473 (ID-1, IL-1, VA-1, WA-1, and WI-2). The non-treated control, Treatment 8, and Treatment 10 had the lowest stands when the results were summarized across XTH1473 trials (54.7%, 55.9%, 58.4%, respectively), followed by Treatment 15 (64.1%). Treatments 3, 4, 6, 9, and 11 had the highest stand counts for XTH1473 trials averaged across locations (ranging 78.2% to 77.3%), but they were not significantly different from averaged stands with Treatments 2, 5, 7, 13, and 14 (ranging 80.5% to 85.6%). The ANOVA comparing XTH1473 trials across eight locations indicated significant location x treatment interactions for % stand, so the results were not consistent across locations.

SUMMARY ACROSS LOCATIONS & VARIEITES: The non-treated control, Treatment 8, and Treatment 10 had the lowest stands when the results were summarized across all trials (67.6 %, 68.3% 67.3% respectively), followed by Treatment 15 (72.3%). Treatments 6 and 11 had the highest stand counts when combined across varieties and locations (82.3% and 81.8%), but they were not significantly different from combined stands with Treatments 2, 3, 4, 5, 7, 9, 13, and 14 (ranging 77.3% to 81.1%). The ANOVAs for stand results across eight locations x two varieties indicated significant variety x treatment x location interactions.

RESULTS - % SLOWS

The weak plant (or slows) assessments were intended to account for plants that emerged but were not likely to produce useable ears if assessments were continued to harvest. Weak plants tend to produce undersized ears or ears with delayed maturity (see the 2012 ISCDA Multi-location Sweet Corn Seed Treatment Trial Annual Report). Table 4 a-c presents the treatment means and standard deviation for % slows at each location, and Table 4 d shows the results summarized across seven locations. Weak plants were not assessed at NY-1.

NATALIE: Grand means for % slows at the various locations ranged from 2.2% (WI-2) to 18.5% (VA-1) and averaged 8.7% for all Natalie trials where slows were assessed. When compared across all Natalie trials, the non-treated control and Treatment 8 had more weak plants (14.0% and 13.7%, respectively) compared to all other treatments (slows ranging 7.6% to 10.3%), except Treatments 10 and 15 (11.8% and 10.1%). Treatment 11 had the fewest weak plants (5.6%), though not significantly fewer than Treatments 2, 3, 4, 5, 6, 7, 9, 12, 13, and 14 (ranging 6.6% to 8.7%). The ANOVA for Natalie trials across seven locations indicated a significant treatment x location interaction for % slows.

XTH1473: Grand means for % slows at the various locations ranged from 2.8% (WA-1) to 19.4% (VA-1) and averaged 13.8% for all XTH1473 trials where slows were assessed. Treatment 8 had more weak plants when combined across XTH1473 trials (17.4%) and compared to Treatment 13 (11.2%), but it was not significantly different from all other treatments. The ANOVA for XTH1473 trials across seven locations indicated a significant treatment x location interaction for % slows.

SUMMARY ACROSS LOCATIONS & HYBRIDS: When combined across seven locations and both varieties, the non-treated control and Treatment 8 resulted in the most weak plants (15.5% and 15.6%), followed by Treatment 10 (14.2%), then Treatment 15 (12.2%). The ANOVAs for the combined % slows results across seven locations x two varieties indicated a significant variety x treatment x location interaction.

RESULTS - ADJUSTED % STAND

The adjusted % stand in each plot was calculated to account for non-emerged seeds and weak seedlings that were not likely to produce usable ears. Tables 5 a-c show treatment means and standard deviation for adjusted % stand results at each location, and Table 5 d shows the adjusted % stand results summarized across seven locations. Figures 4-6 are box and whisker graphs showing the distribution of treatment means for adjusted % stand across locations for both varieties, Natalie only, and XTH1473 only. Figure 7 shows graphs that compare the treatment means for % stand and adjusted % stand for the Natalie and XTH1473 trials. Adjusted stand counts were not assessed at NY-1.

NATALIE: Grand means for adjusted % stand at seven locations for Natalie trials ranged from 57.3% (VA-1) to 89.7% (WA-1) and averaged 77.0%. Accounting for weak plants decreased the Natalie grand means for adjusted % stand by 1.8% to 11.7% and averaged 6.7%. The non-treated control resulted in the lowest adjusted stand when averaged across Natalie trials (69.5%), but it was not significantly different

from adjusted stands with Treatments 3, 8, 10, and 15 (ranging 69.8% to 76.8%). The ANOVA for Natalie trials across seven locations indicated a significant treatment x location interaction for adjusted % stand.

XTH1473: Grand means for adjusted % stand at seven locations ranged from 38.8% (VA-1) to 82.1% (WI-1) and averaged 62.5%. Accounting for weak plants decreased the XTH1473 grand means for adjusted % stand by 2.0% to 14.6% and averaged 9.3%. The non-treated control and Treatment 8 had the lowest adjusted stand counts across XTH1473 trials (42.9% and 47.6%, respectively). Treatments 4, 5, 6, 9, 11, 13 and 14 had the highest adjusted stands across XTH1473 trials (ranging 67.7% to 70.9%), but they were not significantly different from results for Treatments 2, 3, 4, 7, 9, and 14 (ranging 65.0% to 66.6%). The ANOVA comparing adjusted % stand for XTH1473 across seven locations indicated a significant treatment x location interaction.

SUMMARY ACROSS LOCATIONS & VARIEITES: The non-treated control and Treatment 8 had the lowest adjusted stand counts when summarized across all trials (56.5% and 58.5%, respectively). Treatments 5, 6, 11, and 13 had the highest adjusted stands across locations and varieties (ranging 74.1% to 76.2%), but these results were not significantly different from results for Treatments 2, 3, 4, 7, 9, and 14 (ranging 71.7% to 73.9%). The ANOVA for adjusted % stand results across seven locations x two varieties indicated a significant variety x treatment x location interaction.

RESULTS – VIGOR

The treatment means for vigor at each location are shown in Tables 6 a-c and are summarized across six locations in Table 6 d. There are also box and whisker graphs showing the distribution of treatment means for vigor across locations for both varieties, Natalie only, and XTH1473 only (Figures 8-10). Vigor was not assessed at ID-1 or NY-1.

NATALIE: Grand means for vigor at six locations with Natalie ranged from 2.7 (VA-1) to 4.3 (WI-2) and averaged 3.7. There were no significant differences in vigor ratings for treatments across Natalie trials.

XTH1473: Grand means for vigor at four locations with XTH1473 ranged from 2.3 (VA-1) to 4.6 (WA-1) and averaged 3.0. Treatments 1 and 10 had the lowest vigor ratings in the summary across XTH1473 trials (2.16 and 2.35, respectively), followed by Treatments 8 and 12 (2.66 and 2.84). The ANOVA comparing XTH1473 trials across six locations indicated a significant treatment x location interaction for vigor.

SUMMARY ACROSS LOCATIONS & VARIETIES: The non-treated control had the lowest vigor rating when averaged across all trials (2.77), followed by Treatments 10, 15, and 8 (2.90, 3.04, 3017, respectively). Treatments 4 and 6 had the highest vigor ratings in the summary (3.67 and 3.76). The ANOVA for the summarized vigor results across six locations x two varieties indicated a significant variety x treatment x location interaction.

RESULTS NOTES

- SUMMARY ACROSS LOCATIONS: All of the results that were analyzed across locations had significant treatment x location interactions, indicating that summarized results do not represent performance at all locations. This should be kept in mind when reviewing the results. The summarized results are shown to demonstrate trends rather than predictable results for any given location.

- SLOWS vs. SEED LOSS in ADJUSTED % STAND: Accounting for slows (a.k.a. weak plants) further reduced stand counts for Natalie by an average of 6.7% across locations, and reduced stand counts for XTH1473 by an average of 9.3%. Seed losses (due to seed rot, blighted seedlings, or other causes) accounted for more stand reduction than weak plants.

- SOIL PATHOGEN ASSAYS: It is important to recognize that the soil assays performed for this study did not identify the organisms found to their species (only genera) and did not determine whether they are pathogenic on sweet corn.

- INSECT DAMAGE: Dr. Doug Higgins noted significant numbers of billbugs (larvae or "grubs" of *Sphenophorus* spp. weevils, commonly called snout beetles) at the VA-1 site (also geese and yellow nutsedge). The treatments that did not include insecticides (Treatments 1, 10, 12, and 15) resulted in significantly reduced stand counts compared to all other treatments at VA-1. This was the result for both varieties, though XTH1473 had more drastically reduced stands than Natalie.

- This trial includes several comparisons of seed treatments that substituted products or added products (see Table 1). Many of these comparisons were not discussed in this report, but the data for each location are presented in the tables. A close inspection of the results should provide useful information to seed treatment formulators and other sweet corn industry personnel. Comparing treatment means using a larger p-value (e.g., 0.10 vs. 0.05) may be useful for evaluating similar seed treatment mixtures.

- For more information about the 2023 ISCDA Seed Treatment Trial, or about participation in future trials contact Carrie Wohleb at cwohleb@wsu.edu or (509) 707-3510.

TABLE 3a. 2023 ISCDA Seed Treatment Trial - % STAND – Natalie and XTH1473.

Planting date in italics. Means in columns followed by the same letter are not significantly different (P≤0.05). Results averaged across varieties are only shown when there were significant treatment effects (P≤0.05) and there was no variety x treatment interaction (P≤0.05).

TREATMENT NO.	ID-1 *May 16, 2023*				ID-2 *May 16, 2023*				IL-1 *April 13, 2023*			
	NATALIE		XTH1473		NATALIE		XTH1473		NATALIE		XTH1473	
	MEAN	**SD**	**MEAN**	**SD**	**MEAN**	**SD**	**MEAN**	**SD**	**MEAN**	**SD**	**MEAN**	**SD**
1	89.3 ab	5.6	79.0 bc	4.3	91.5	16.6	49.3	13.7	73.3	1.9	37.0 c	6.5
2	91.0 ab	6.5	88.0 abc	7.9	91.3	13.6	71.0	19.3	73.9	1.7	66.0 ab	8.1
3	92.3 ab	3.2	79.9 abc	1.5	79.5	17.5	81.5	7.0	74.8	10.0	68.0 ab	5.9
4	81.3 b	11.7	91.3 ab	9.1	82.3	4.3	81.5	11.0	83.8	9.7	72.8 ab	2.1
5	87.3 ab	6.5	91.0 abc	1.6	97.3	3.0	74.5	7.6	84.0	6.6	72.3 ab	5.9
6	94.3 a	2.9	95.0 ab	5.3	90.3	4.9	63.5	3.9	81.8	10.0	70.0 ab	9.1
7	96.0 a	2.9	89.0 abc	7.3	85.0	4.5	61.0	15.0	88.0	6.3	74.5 a	8.1
8	86.5 ab	3.0	74.8 c	10.2	78.5	4.7	54.5	19.5	79.8	2.8	26.7 c	3.2
9	88.5 ab	9.0	92.0 ab	2.4	85.3	8.8	82.5	2.9	73.5	8.1	72.2 ab	3.1
10	85.8 ab	2.6	84.0 abc	3.4	79.6	4.0	57.8	12.8	81.0	6.8	35.6 c	0.7
11	91.3 ab	3.8	91.3 ab	6.4	95.9	3.6	85.5	5.4	81.8	8.3	69.8 ab	6.0
12	96.5 a	5.2	88.5 abc	5.8	94.6	5.6	64.0	21.0	86.3	5.7	65.3 ab	4.0
13	94.3 a	1.0	84.5 abc	11.4	86.6	4.0	78.3	16.0	80.5	7.5	79.3 a	5.6
14	91.3 ab	4.5	96.0 a	5.2	89.3	0.5	60.0	17.6	77.5	11.9	69.3 ab	4.9
15	96.0 a	1.6	91.5 ab	5.4	87.8	5.9	60.0	18.0	84.3	1.7	58.3 b	6.2
GRAND MEAN/ GRAND SD	**90.8**	**5.1**	**87.7**	**6.4**	**87.7**	**8.3**	**68.3**	**14.2***	**80.3**	**7.5**	**62.5**	**6.1**
ANOVA: TRT	0.0034		0.0007		0.0612		0.0093		0.1373		0.0001	
HSD (P=0.05)	*12.98*		*16.42*		*21.31*		*36.31*		*19.14*		*15.61*	
CV	5.62		7.34		9.52		20.84*		9.34		9.63	

TABLE 3b. 2023 ISCDA Seed Treatment Trial - % STAND – Natalie and XTH1473.

Planting date in italics. Means in columns followed by the same letter are not significantly different (P≤0.05). Results averaged across varieties are only shown when there were significant treatment effects (P≤0.05) and there was no variety x treatment interaction (P≤0.05).

TREATMENT NO.	NY-1 *May 19, 2023*				VA-1 *April 26, 2023*				WA-1 *May 25, 2023*			
	NATALIE		XTH1473		NATALIE		XTH1473		NATALIE		XTH1473	
	MEAN	**SD**	**MEAN**	**SD**	**MEAN**	**SD**	**MEAN**	**SD**	**MEAN**	**SD**	**MEAN**	**SD**
1	86.5	2.6	70.5	8.2	44.3 cd	18.6	4.3 c	3.8	81.0 d	7.0	54.0 d	1.6
2	87.0	3.2	24.7	4.4	74.2 ab	2.9	63.0 a	14.2	90.3 a-d	4.5	84.8 ab	8.2
3	88.6	0.7	75.7	1.6	79.0 a	3.9	66.8 a	5.7	92.3 abc	3.2	93.9 a	0.6
4	85.8	7.8	63.8	14.1	76.8 a	9.6	73.3 a	8.0	99.0 a	0.7	85.3 ab	6.5
5	74.3	7.8	48.0	31.9	80.0 a	5.7	71.8 a	3.9	88.5 a-d	5.4	80.8 ab	5.0
6	84.6	2.9	64.5	14.6	81.5 a	3.1	75.5 a	3.2	97.0 ab	3.2	85.8 ab	4.8
7	80.3	11.1	45.8	27.2	80.8 a	1.8	71.0 a	4.2	93.3 abc	3.8	79.5 ab	11.4
8	86.3	6.5	53.3	30.7	62.0 abc	8.0	35.0 b	2.4	88.0 bcd	2.6	47.0 d	10.3
9	74.5	11.4	64.8	22.8	82.8 a	2.1	70.5 a	12.0	95.5 abc	1.7	89.0 ab	2.2
10	69.5	8.8	67.8	10.9	38.8 d	11.6	6.5 c	3.5	86.8 cd	4.6	61.0 cd	7.8
11	88.3	3.4	71.0	10.2	69.8 abc	10.0	63.0 a	7.6	93.5 abc	2.9	87.3 ab	4.3
12	77.3	11.3	62.0	22.4	57.0 a-d	7.8	14.0 c	10.7	93.3 abc	2.5	81.5 ab	6.6
13	75.0	18.3	42.0	20.8	82.4 a	1.6	64.0 a	8.8	94.5 abc	1.2	74.8 bc	9.9
14	78.7	4.2	76.2	1.6	73.3 ab	6.8	62.0 a	6.6	96.0 abc	2.2	85.5 ab	4.4
15	68.8	5.4	51.0	33.0	53.3 bcd	11.5	15.8 bc	11.6	93.5 abc	0.6	79.9 ab	0.6
GRAND MEAN/ GRAND SD	**80.4**	**8.4**	**58.7**	**21.3***	**69.1**	**8.9**	**50.4**	**7.6**	**92.2**	**3.7**	**78.0**	**7.0**
ANOVA: TRT	0.0108		0.1442		0.0001		0.0001		0.0001		0.0001	
HSD (P=0.05)	*21.40*		*54.4**		*22.62*		*19.37*		*9.52*		*17.83*	
CV	10.45		36.22*		12.90		15.22		4.03		8.93	
			highly variable data									

TABLE 3c. 2023 ISCDA Seed Treatment Trial - % STAND – Natalie and XTH1473.

Planting date in italics. Means in columns followed by the same letter are not significantly different (P≤0.05). Results averaged across varieties are only shown when there were significant treatment effects (P≤0.05) and there was no variety x treatment interaction (P≤0.05).

TREATMENT NO.	WI-1 *May 15, 2023*				WI-2 *May 26, 2023*					
	NATALIE		XTH1473		NATALIE		XTH1473			
	MEAN	**SD**	**MEAN**	**SD**	**MEAN**	**SD**	**MEAN**	**SD**		
1	95.3	2.7	86.6	3.9	83.0	5.3	65.5 bc	9.7		
2	88.1	5.8	84.0	3.6	81.0	0.0	65.8 abc	4.6		
3	81.8	17.1	88.8	7.5	81.5	3.0	69.0 abc	6.7		
4	85.5	3.5	85.0	12.3	81.8	3.2	72.5 abc	4.7		
5	82.5	14.0	76.8	15.7	85.0	2.2	72.3 abc	3.3		
6	89.9	2.9	88.0	1.4	84.5	1.9	73.0 abc	5.2		
7	79.0	14.9	91.3	6.1	82.5	0.6	71.0 abc	7.0		
8	89.6	0.4	82.5	16.1	81.3	4.9	66.5 abc	6.5		
9	78.3	13.9	95.3	2.7	79.8	3.5	66.3 abc	6.6		
10	93.6	6.0	87.8	2.5	83.5	7.4	61.3 c	3.8		
11	89.5	4.8	83.3	11.6	83.5	6.5	69.5 abc	7.1		
12	84.8	0.5	91.0	7.1	88.0	1.0	78.6 ab	1.1		
13	81.3	14.9	82.0	16.1	83.8	6.8	75.3 abc	4.5		
14	73.8	8.5	88.4	4.8	78.3	2.5	79.8 a	2.4		
15	80.8	14.2	90.3	7.3	83.3	2.2	70.0 abc	5.3		
GRAND MEAN/ GRAND SD	**84.9**	**10.0**	**86.7**	**9.7**	**82.7**	**4.1**	**70.4**	**5.5**		
ANOVA: TRT	0.2722		0.6336		0.3674		0.0019			
HSD (P=0.05)	*25.75*		*24.84*		*10.56*		*14.05*			
CV	11.89		11.19		5.00		7.84			

TABLE 3d. 2023 ISCDA Seed Treatment Trial – SUMMARY ACROSS 8 LOCATIONS
% STAND – Natalie and XTH1473. Means in columns followed by the same letter are not significantly different (P≤0.05). *Significant treatment x variety interactions indicate responses were not uniform across trials.

TREATMENT NO.	SUMMARY ACROSS LOCATIONS					
	ALL NATALIE		ALL XTH1473		BOTH VARIETIES	
	MEAN	**SD**	**MEAN**	**SD**	**MEAN**	**SD**
1	80.0 bc	17.6	54.7 d	26.0	67.6 d	25.4
2	85.6 ab	8.8	69.5 abc	20.1	77.3 abc	17.5
3	83.5 ab	10.6	77.3 a	10.7	80.6 ab	11.0
4	84.1 ab	8.7	78.2 a	11.8	81.1 ab	10.8
5	84.8 ab	9.0	73.4 ab	16.4	79.1 ab	14.3
6	87.6 a	7.1	77.4 a	12.6	82.3 a	11.5
7	85.8 ab	8.9	72.9 abc	18.0	79.2 ab	15.6
8	81.1 bc	9.5	55.9 d	22.3	68.3 d	21.3
9	82.3 abc	10.2	78.7 a	14.4	80.5 ab	12.4
10	76.6 c	17.6	58.4 d	25.8	67.3 d	23.8
11	86.2 ab	9.3	77.6 a	12.0	81.8 a	11.5
12	84.1 ab	13.4	67.8 bc	26.1	75.8 bc	22.2
13	84.3 ab	10.7	72.5 abc	17.3	78.1 ab	15.6
14	82.5 abc	9.9	76.8 ab	14.2	79.7 ab	12.5
15	80.5 bc	14.7	64.1 cd	27.0	72.3 cd	23.1
GRAND MEAN/ GRAND SD	**83.3**	**7.3**	**70.3**	**10.9**	**76.7**	**9.3**
ANOVA: TRT	0.0001		0.0001		0.0001	
HSD (P=0.05)	*6.2*		*9.3*		*5.6*	
CV	8.75		15.54		12.11	
INTERACTION	0.0001*		0.0001*		0.0001*	

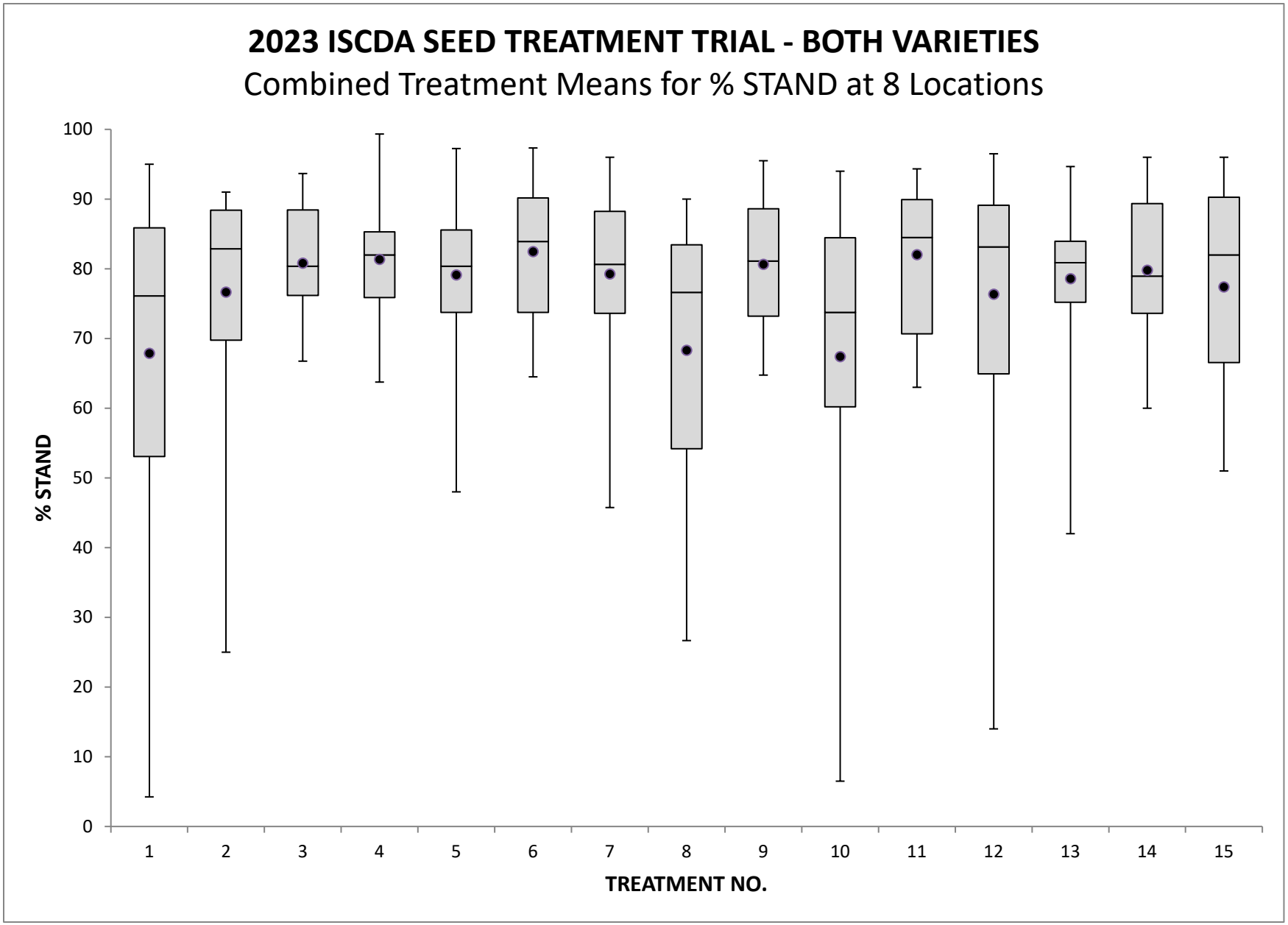


FIGURE 1. 2023 ISCDA Seed Treatment Trial – Box and whisker plot of combined treatment means for % STAND for BOTH SWEET CORN VARIETIES at 8 locations. The mean for each treatment is indicated by •. The box indicates the interquartile range for results (divided by the median), and the whiskers span to the minimum and maximum results for each treatment.

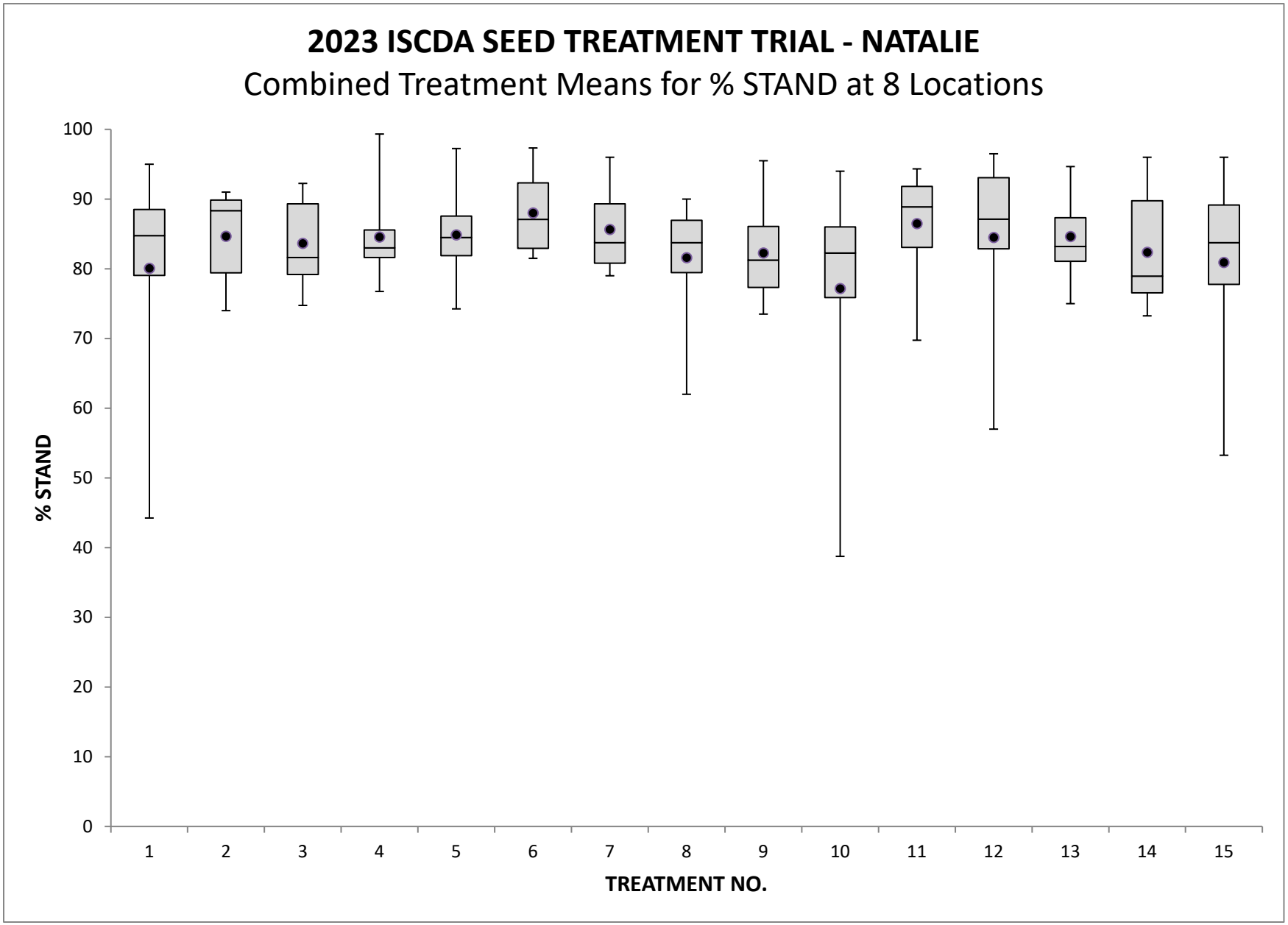


FIGURE 2. 2023 ISCDA Seed Treatment Trial – Box and whisker plot of combined treatment means for % STAND for NATALIE at 8 locations. The mean for each treatment is indicated by •. The box indicates the interquartile range for results (divided by the median), and the whiskers span to the minimum and maximum results for each treatment.

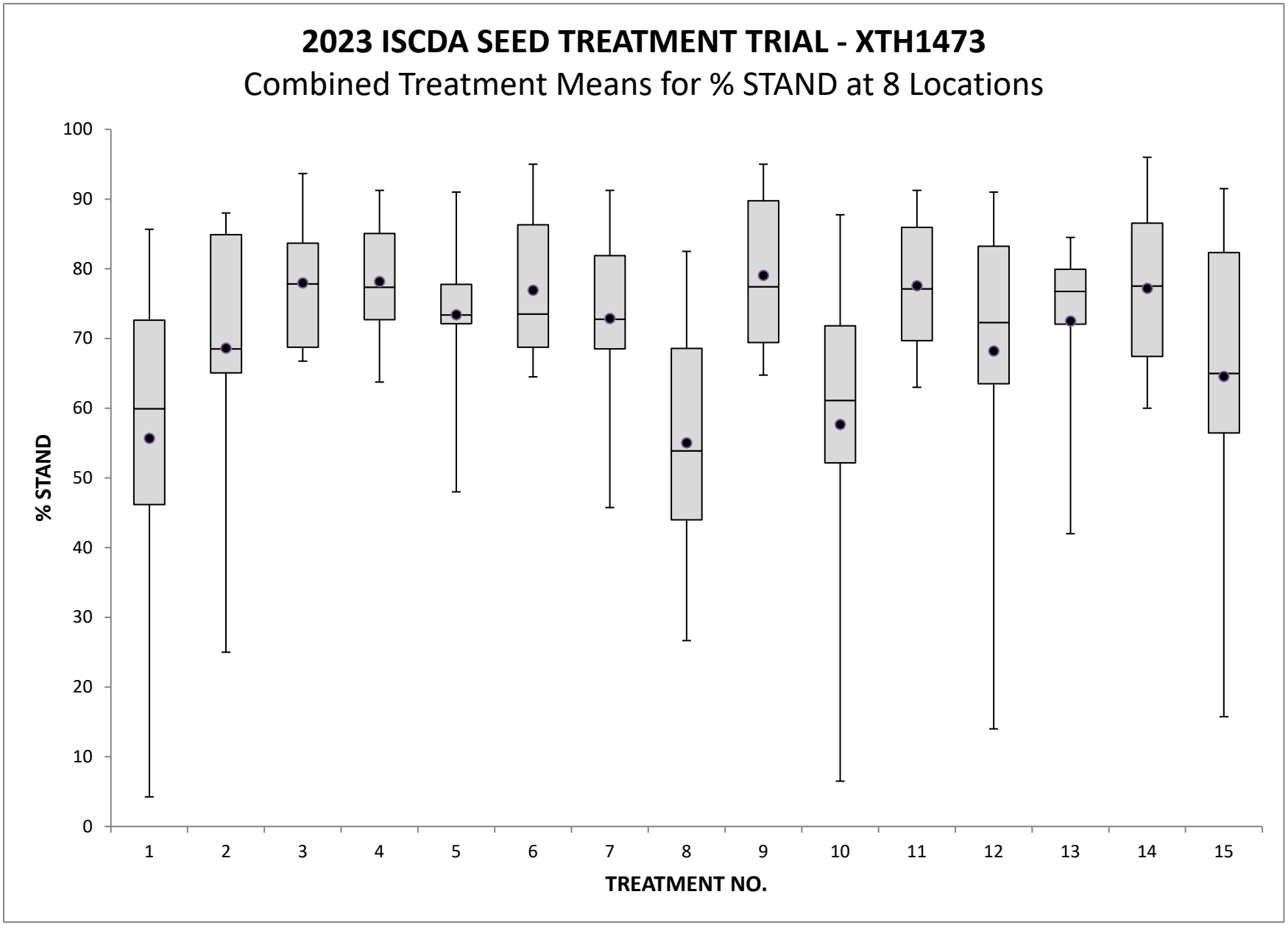


FIGURE 3. 2023 ISCDA Seed Treatment Trial – Box and whisker plot of combined treatment means for % STAND for XTH1473 at 8 locations. The mean for each treatment is indicated by •. The box indicates the interquartile range for results (divided by the median), and the whiskers span to the minimum and maximum results for each treatment.

TABLE 4a. 2023 ISCDA Seed Treatment Trial - % SLOWS – Natalie and XTH1473.

Planting date in italics. Means in columns followed by the same letter are not significantly different (P≤0.05). Results averaged across varieties are only shown when there were significant treatment effects (P≤0.05) and there was no variety x treatment interaction (P≤0.05).

TREATMENT NO.	ID-1 *May 16, 2023*				ID-2 *May 24, 2023*				IL-1 *April 13, 2023*			
	NATALIE		XTH1473		NATALIE		XTH1473		NATALIE		XTH1473	
	MEAN	**SD**	**MEAN**	**SD**	**MEAN**	**SD**	**MEAN**	**SD**	**MEAN**	**SD**	**MEAN**	**SD**
1	14.3	9.8	21.8 ab	4.0	12.3	3.3	25.5	7.1	28.0 a	5.9	38.8 ab	15.6
2	10.3	6.2	8.8 bc	8.2	6.8	2.1	14.3	4.5	8.0 bc	5.0	22.3 bc	2.6
3	7.8	4.5	17.5 abc	5.9	9.8	7.1	10.9	2.9	8.3 bc	1.9	21.3 bc	6.6
4	8.8	5.7	6.5 c	3.0	9.8	2.2	13.8	7.7	9.0 bc	1.4	19.3 bc	4.3
5	7.0	6.3	12.0 bc	3.9	10.5	1.0	14.3	3.4	6.5 c	3.1	19.0 bc	6.6
6	8.0	5.1	6.8 c	1.0	11.2	5.5	16.4	1.8	7.5 bc	1.3	24.8 bc	6.9
7	5.3	2.9	8.8 bc	2.8	13.5	4.0	16.0	7.4	10.5 bc	5.8	27.0 abc	9.6
8	16.8	3.1	27.3 a	12.7	15.8	3.0	19.0	15.4	19.3 ab	12.7	21.2 bc	10.2
9	6.5	3.4	12.5 bc	5.1	9.3	1.7	20.0	11.6	7.3 bc	2.6	18.1 b	5.1
10	12.3	5.1	21.8 ab	5.1	15.1	1.2	20.3	5.5	14.3 abc	6.3	48.5 a	4.4
11	4.5	1.7	10.5 bc	3.1	5.8	2.0	15.0	5.4	4.5 c	3.7	15.5 c	2.9
12	5.0	1.2	17.8 abc	5.7	6.5	3.8	13.3	1.5	12.5 bc	2.6	34.0 abc	11.5
13	6.0	2.4	8.3 c	4.2	11.8	3.5	17.8	14.2	7.3 bc	3.8	15.5 c	4.0
14	6.8	3.6	11.5 bc	5.8	10.3	4.9	16.5	6.8	5.8 c	1.5	14.0 c	8.3
15	7.3	3.6	15.3 abc	4.1	12.8	2.2	15.3	3.0	12.8 bc	5.4	32.5 abc	3.1
GRAND MEAN/ GRAND SD	**8.4**	**4.8**	**13.8**	**5.23**	**10.8**	**3.5**	**16.6**	**8.0**	**10.8**	**4.9**	**24.8**	**7.8**
ANOVA: TRT	0.0321		0.0001		0.0145		0.7090		0.0001		0.0001	
HSD (P=0.05)	*12.41*		*13.33*		*8.99*		*20.35*		*12.49*		*20.07*	
CV	57.95		38.29		32.46		47.97		45.31		31.99	

TABLE 4b. 2023 ISCDA Seed Treatment Trial - % SLOWS – Natalie and XTH1473.

Planting date in italics. Means in columns followed by the same letter are not significantly different (P≤0.05). Results averaged across varieties are only shown when there were significant treatment effects (P≤0.05) and there was no variety x treatment interaction (P≤0.05).

TREATMENT NO.	NY-1 *May 19, 2023*				VA-1 *April 26, 2023*				WA-1 *May 25, 2023*			
	NATALIE		XTH1473		NATALIE		XTH1473		NATALIE		XTH1473	
	MEAN	**SD**	**MEAN**	**SD**	**MEAN**	**SD**	**MEAN**	**SD**	**MEAN**	**SD**	**MEAN**	**SD**
1					28.5 ab	13.7	0.0 c	0.0	4.3	3.4	5.9	4.8
2					14.8 ab	4.8	22.5 ab	6.8	3.8	1.5	2.0	2.4
3					12.8 ab	1.9	22.3 ab	6.7	2.5	1.0	0.3	0.6
4					12.8 ab	5.0	20.5 ab	2.5	3.4	0.7	2.0	1.8
5					14.8 ab	3.8	24.5 ab	4.2	1.0	1.4	2.0	2.4
6					12.0 ab	5.1	26.8 ab	1.8	2.0	1.6	1.5	2.4
7					20.4 ab	3.8	26.8 ab	5.6	4.0	4.2	4.8	1.3
8					30.5 a	11.2	37.5 a	9.5	1.0	1.6	2.8	2.5
9					11.0 b	2.4	21.3 ab	7.5	2.8	1.9	2.3	1.5
10					29.8 a	9.8	0.0 c	0.0	3.5	1.0	5.5	5.2
11					14.0 a	4.1	21.0 ab	12.1	0.8	0.5	2.5	1.7
12					22.0 ab	6.1	11.3 bc	13.1	3.8	2.9	2.8	2.1
13					14.4 ab	2.6	18.5 abc	6.6	1.9	2.6	1.5	1.0
14					18.3 ab	4.7	24.8 ab	5.6	1.0	1.4	2.8	1.3
15					21.0 ab	13.0	12.8 bc	14.8	5.2	5.3	2.8	1.8
GRAND MEAN/ GRAND SD					**18.5**	**7.0**	**19.4**	**7.6**	**2.7**	**2.4**	**2.8**	**2.3**
ANOVA: TRT					0.0007		0.0001		0.3407		0.1843	
HSD (P=0.05)					*17.77*		*19.25*		*6.10*		*5.83*	
CV					37.66		39.40		86.04		83.90	

TABLE 4c. 2023 ISCDA Seed Treatment Trial - % SLOWS – Natalie and XTH1473.

Planting date in italics. Means in columns followed by the same letter are not significantly different (P≤0.05). Results averaged across varieties are only shown when there were significant treatment effects (P≤0.05) and there was no variety x treatment interaction (P≤0.05).

TREATMENT NO.	WI-1 *May 15, 2023*				WI-2 *May 26, 2023*					
	NATALIE		XTH1473		NATALIE		XTH1473			
	MEAN	**SD**	**MEAN**	**SD**	**MEAN**	**SD**	**MEAN**	**SD**		
1	4.5	2.7	4.4	0.6	3.8	2.2	17.3	7.9		
2	5.0	3.5	5.9	1.7	0.4	0.6	17.8	12.3		
3	10.5	8.5	8.0	6.5	4.3	4.0	20.3	9.4		
4	9.8	5.7	8.5	5.4	3.0	2.6	14.5	4.7		
5	5.0	0.8	4.8	3.3	2.5	2.4	10.8	7.6		
6	5.5	8.7	2.8	1.3	1.0	0.8	12.8	8.5		
7	11.0	11.4	4.8	4.1	0.0	0.0	11.8	9.0		
8	3.1	1.5	2.5	1.7	4.3	2.2	12.8	4.8		
9	8.8	8.3	5.5	2.3	3.5	2.1	16.0	3.4		
10	5.5	2.3	3.5	38.	2.3	1.9	23.0	8.8		
11	8.0	2.6	3.5	0.6	1.3	0.5	16.3	6.3		
12	7.8	2.1	5.8	4.3	0.4	0.6	14.9	4.6		
13	5.0	4.4	7.3	5.9	2.8	1.9	9.5	3.7		
14	8.0	3.3	3.9	2.6	1.8	1.5	7.0	2.7		
15	8.8	8.1	5.8	2.5	2.3	1.3	12.5	5.9		
GRAND MEAN/ GRAND SD	**7.1**	**5.8**	**5.1**	**3.8**	**2.2**	**1.9**	**14.5**	**7.2**		
ANOVA: TRT	0.7884		0.5784		0.0293		0.2366			
HSD (P=0.05)	*15.00*		*9.76*		*4.75*		*18.42*			
CV	80.77		74.36		81.74		50.11			

TABLE 4d. 2023 ISCDA Seed Treatment Trial – SUMMARY ACROSS 7 LOCATIONS
% SLOWS – Natalie and XTH1473. Means in columns followed by the same letter are not significantly different (P≤0.05). *Significant treatment x variety interactions indicate responses were not uniform across trials.

TREATMENT NO.	SUMMARY ACROSS LOCATIONS					
	ALL NATALIE		ALL XTH1473		BOTH VARIETIES	
	MEAN	**SD**	**MEAN**	**SD**	**MEAN**	**SD**
1	14.0 a	12.0	17.0 ab	14.8	15.5 a	13.4
2	7.1 cd	5.6	13.6 ab	9.6	10.5 c	8.6
3	8.0 bcd	5.5	14.8 ab	9.4	11.2 bc	8.2
4	8.3 bcd	4.7	12.1 ab	7.6	10.2 c	6.6
5	6.8 cd	5.3	12.5 ab	8.5	9.6 c	7.6
6	6.8 cd	5.5	12.2 ab	10.1	9.6 c	8.5
7	8.7 bcd	7.7	14.3 ab	10.6	11.5 bc	9.6
8	13.7 a	11.7	17.4 a	14.7	15.6 a	13.4
9	7.0 cd	4.4	13.8 ab	8.9	10.3 c	7.7
10	11.8 ab	10.3	16.4 ab	15.6	14.2 ab	13.3
11	5.6 d	4.9	12.0 ab	8.3	8.9 c	7.5
12	8.7 bcd	7.3	14.1 ab	11.8	11.5 bc	10.1
13	6.6 cd	4.7	11.2 b	8.5	9.0 c	7.2
14	7.4 cd	6.2	11.8 ab	8.7	9.5 c	7.8
15	10.1 abc	8.3	14.3 ab	10.6	12.2 abc	9.7
GRAND MEAN/ GRAND SD	**8.7**	**4.7**	**13.8**	**6.4**	**11.3**	**5.6**
ANOVA: TRT	0.0001		0.0023		0.0001	
HSD (P=0.05)	*4.3*		*5.8*		*3.6*	
CV	54.06		46.05		49.79	
INTERACTION	0.0001*		0.0001*		0.0001*	

TABLE 5a. 2023 ISCDA Seed Treatment Trial - ADJUSTED % STAND – Natalie and XTH1473.

Planting date in italics. Means in columns followed by the same letter are not significantly different (P≤0.05). Results averaged across varieties are only shown when there were significant treatment effects (P≤0.05) and there was no variety x treatment interaction (P≤0.05).

TREATMENT NO.	ID-1 *May 16, 2023*				ID-2 *May 24, 2023*				IL-1 *April 13, 2023*			
	NATALIE		XTH1473		NATALIE		XTH1473		NATALIE		XTH1473	
	MEAN	**SD**	**MEAN**	**SD**	**MEAN**	**SD**	**MEAN**	**SD**	**MEAN**	**SD**	**MEAN**	**SD**
1	76.8 ab	11.0	61.5 de	5.1	80.8	16.2	36.8 b	11.0	52.8 b	4.5	22.5 d	7.1
2	81.5 ab	8.3	79.8 a-d	6.7	84.8	10.8	60.8 ab	16.2	67.8 ab	2.5	51.3 abc	4.8
3	85.0 ab	4.7	66.1 b-e	5.5	72.3	18.9	72.7 a	4.7	68.5 ab	9.1	53.3 abc	5.7
4	74.5 ab	13.7	85.0 a	7.6	74.3	3.4	70.5 ab	13.3	76.3 a	9.0	58.8 ab	4.2
5	81.0 ab	10.1	80.3 abc	3.2	87.0	3.5	63.8 ab	7.0	78.5 a	8.1	58.8 ab	8.5
6	87.0 ab	6.1	88.8 a	4.3	80.4	7.8	52.7 ab	3.9	75.8 ab	9.5	52.5 abc	6.9
7	90.8 a	4.6	81.0 abc	5.0	73.8	7.1	51.8 ab	15.3	78.8 a	4.3	54.5 abc	10.0
8	71.8 b	4.3	54.3 e	11.7	66.3	5.4	45.8 ab	20.6	64.8 ab	11.8	20.7 d	0.3
9	82.8 ab	5.3	80.8 abc	6.6	77.3	8.2	66.3 ab	11.0	68.3 ab	8.3	59.0 ab	3.5
10	75.3 ag	5.8	65.8 cde	4.8	67.6	4.1	46.5 ab	13.0	69.8 ab	10.1	18.5 d	1.8
11	87.5 ag	3.3	81.8 ab	2.8	89.9	2.3	72.8 a	8.7	78.0 a	5.7	59.0 ab	5.5
12	91.3 a	3.4	73.0 a-d	2.2	88.3	7.3	55.5 ab	18.2	75.5 ab	6.0	43.0 bc	8.8
13	88.5 ab	3.7	77.5 a-d	9.9	76.6	5.4	65.8 ab	21.9	74.8 ab	7.9	67.0 a	5.5
14	85.0 ab	4.2	85.3 a	5.3	80.0	4.1	50.3 ab	16.7	73.0 ab	11.5	59.5 a	7.0
15	89.3 a	4.6	77.8 a-d	5.2	76.5	4.8	50.5 ab	14.4	73.5 ab	3.3	39.3 c	3.1
GRAND MEAN/ GRAND SD	**83.2**	**6.85**	**75.9**	**6.27**	**78.4**	**8.4**	**57.5**	**14.1**	**71.7**	**7.8**	**47.8**	**6.4**
ANOVA: TRT	0.0013		0.0001		0.0140		0.0191		0.0030		0.0001	
HSD (P=0.05)	*17.44*		*15.97*		*21.50*		*35.89*		*19.95*		*16.41*	
CV	8.24		8.24		10.75		24.49		10.90		13.20	

TABLE 5b. 2023 ISCDA Seed Treatment Trial - ADJUSTED % STAND – Natalie and XTH1473.

Planting date in italics. Means in columns followed by the same letter are not significantly different (P≤0.05). Results averaged across varieties are only shown when there were significant treatment effects (P≤0.05) and there was no variety x treatment interaction (P≤0.05).

TREATMENT NO.	NY-1 *May 19, 2023*				VA-1 *April 26, 2023*				WA-1 *May 25, 2023*			
	NATALIE		XTH1473		NATALIE		XTH1473		NATALIE		XTH1473	
	MEAN	**SD**	**MEAN**	**SD**	**MEAN**	**SD**	**MEAN**	**SD**	**MEAN**	**SD**	**MEAN**	**SD**
1					33.8 de	18.3	4.3 c	3.8	77.5 c	6.6	50.6 d	1.8
2					62.6 abc	1.5	49.5 a	14.1	86.8 abc	4.6	83.5 ab	9.7
3					68.8 ab	2.2	51.8 a	4.3	90.3 abc	3.9	93.6 a	0.6
4					66.8 ab	7.2	58.3 a	6.2	95.9 a	1.7	83.5 ab	7.0
5					68.3 ab	8.1	54.3 a	5.0	87.8 abc	6.3	79.3 ab	5.0
6					71.8 a	5.9	56.3 a	2.2	94.9 ab	4.0	84.5 ab	6.2
7					64.7 abc	4.1	52.0 a	5.2	90.0 abc	7.3	76.0 a	10.4
8					44.0 b-e	12.7	22.0 b	5.0	86.9 abc	3.5	45.8 d	10.0
9					74.0 a	3.3	54.8 a	4.6	92.8 ab	2.1	87.0 ab	2.4
10					27.0 e	8.4	6.5 bc	3.5	84.0 bc	3.9	57.5 cd	6.0
11					60.0 a-d	9.6	49.8 a	7.6	92.8 ab	2.6	85.0 ab	2.9
12					44.0 b-e	4.2	11.5 bc	8.1	90.0 abc	3.6	79.0 ab	8.2
13					71.3 a	2.8	51.8 a	8.1	92.6 ab	3.5	73.8 bc	9.9
14					60.0 a-d	4.2	46.8 a	5.9	95.3 ab	2.6	83.3 ab	4.1
15					43.0 cde	14.5	12.5 bc	8.2	88.4 abc	4.6	78.0 ab	1.6
GRAND MEAN/ GRAND SD					**57.3**	**8.9**	**38.8**	**6.6**	**89.7**	**4.6**	**76.0**	**6.9**
ANOVA: TRT					0.0001		0.0001		0.0003		0.0001	
HSD (P=0.05)					*22.70*		*16.91*		*11.82*		*17.68*	
CV					15.59		17.25		5.14		9.08	
INTERACTION					0.0001		0.0001					

TABLE 5c. 2023 ISCDA Seed Treatment Trial - ADJUSTED % STAND – Natalie and XTH1473.

Planting date in italics. Means in columns followed by the same letter are not significantly different (P≤0.05). Results averaged across varieties are only shown when there were significant treatment effects (P≤0.05) and there was no variety x treatment interaction (P≤0.05).

TREATMENT NO.	WI-1 *May 15, 2023*				WI-2 *May 26, 2023*					
	NATALIE		XTH1473		NATALIE		XTH1473			
	MEAN	**SD**	**MEAN**	**SD**	**MEAN**	**SD**	**MEAN**	**SD**		
1	91.0	4.2	82.1	3.4	80.0	4.1	54.5 ab	12.1		
2	83.5	4.6	78.8	4.6	80.6	0.6	54.3 ab	9.9		
3	74.5	21.1	81.8	10.4	78.0	5.5	55.5 ab	11.9		
4	76.8	2.1	78.3	15.3	79.3	2.9	62.0 ab	7.4		
5	78.5	13.0	73.0	15.8	83.0	3.9	64.8 ab	7.6		
6	84.6	5.3	85.3	1.3	83.5	1.3	64.0 ab	9.5		
7	71.3	21.3	87.0	2.2	82.5	0.6	63.0 ab	11.7		
8	87.4	1.3	80.0	16.3	77.8	5.0	58.0 ab	6.1		
9	72.5	18.4	89.7	4.5	77.0	2.9	55.5 ab	4.5		
10	88.4	4.9	84.3	1.0	81.5	8.2	47.3 b	7.1		
11	82.5	6.4	80.5	11.2	82.3	6.3	58.3 ab	8.1		
12	78.5	1.3	85.8	6.2	87.6	1.5	67.0 ab	4.2		
13	77.3	17.7	75.8	16.3	81.5	6.5	68.3 a	6.2		
14	68.0	8.9	84.4	2.6	77.0	2.9	74.0 a	2.9		
15	74.8	19.1	85.3	8.2	81.3	1.9	61.5 ab	7.9		
GRAND MEAN/ GRAND SD	**79.3**	**12.3**	**82.1**	**10.2**	**80.9**	**4.2**	**60.5**	**8.2**		
ANOVA: TRT	0.4109		0.7343		0.0972		0.0065			
HSD (P=0.05)	*31.66*		*26.04*		*10.64*		*20.86*			
CV	15.68		12.38		5.16		13.54			
INTERACTION										

TABLE 5d. 2023 ISCDA Seed Treatment Trial – SUMMARY ACROSS 7 LOCATIONS ADJUSTED % STAND – Natalie and XTH1473. Means in columns followed by the same letter are not significantly different (P≤0.05). *Significant treatment x variety interactions indicate responses were not uniform across trials.

TREATMENT NO.	SUMMARY ACROSS LOCATIONS					
	ALL NATALIE		ALL XTH1473		BOTH VARIETIES	
	MEAN	**SD**	**MEAN**	**SD**	**MEAN**	**SD**
1	69.5 d	20.9	42.9 d	24.9	56.5 d	26.4
2	79.2 ab	10.2	65.0 abc	16.8	71.7 ab	15.7
3	76.8 a-d	12.9	66.6 ab	16.2	72.0 ab	15.3
4	77.0 abc	10.0	70.9 a	13.7	73.9 ab	12.3
5	80.6 ab	9.5	67.7 a	12.0	74.1 a	12.5
6	82.2 a	8.9	70.4 a	16.1	76.2 a	14.2
7	79.4 ab	12.1	66.5 ab	16.2	72.8 ab	15.7
8	70.2 cd	15.7	47.6 d	22.0	58.7 d	22.1
9	77.8 ab	10.7	70.1 a	15.1	74.1 ab	13.4
10	69.8 cd	20.9	47.6 d	25.8	58.5 d	25.9
11	81.4 ab	11.4	69.6 a	14.5	75.4 a	14.3
12	78.5 ab	16.5	59.1 bc	25.8	68.6 bc	23.7
13	80.3 ab	10.3	68.5 a	13.7	74.1 a	13.5
14	76.9 abc	12.2	68.6 a	17.3	72.8 ab	15.4
15	74.7 bcd	17.1	57.0 c	25.5	65.9 c	23.3
GRAND MEAN/ GRAND SD	**77.0**	**8.0**	**62.5**	**8.8**	**69.7**	**8.4**
ANOVA: TRT	0.0001		0.0001		0.0001	
HSD (P=0.05)	*7.3*		*8.0*		*5.4*	
CV	10.30		14.0		12.0	
INTERACTION	0.0001*		0.0001*		0.0001*	

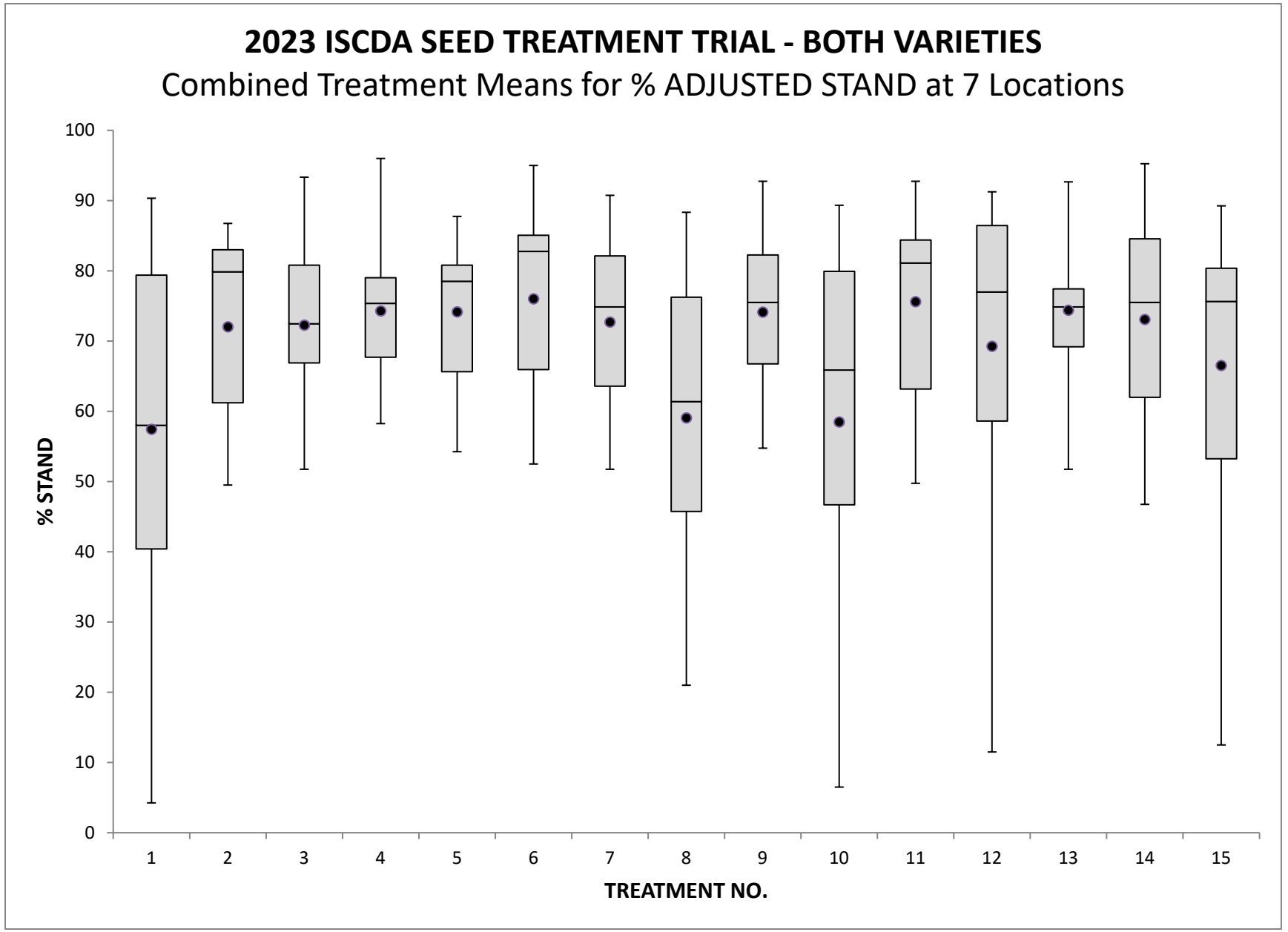


FIGURE 4. 2023 ISCDA Seed Treatment Trial – Box and whisker plot of combined treatment means for ADJUSTED % STAND for BOTH VARIETIES at 7 locations. The mean for each treatment is indicated by •. The box indicates the interquartile range for results (divided by the median), and the whiskers span to the minimum and maximum results for each treatment.

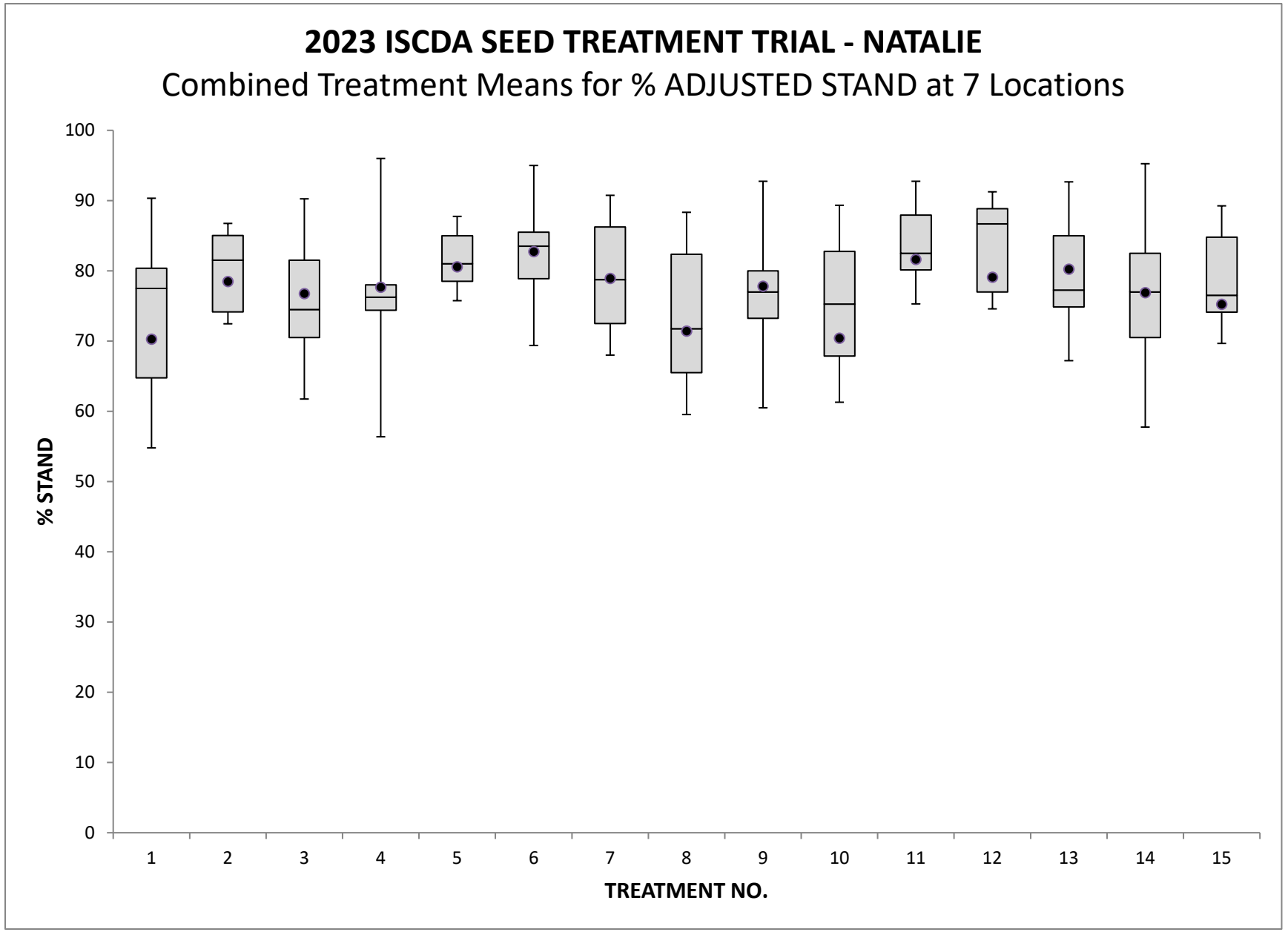


FIGURE 5. 2023 ISCDA Seed Treatment Trial – Box and whisker plot of combined treatment means for ADJUSTED % STAND for NATALIE at 7 locations. The mean for each treatment is indicated by •. The box indicates the interquartile range for results (divided by the median), and the whiskers span to the minimum and maximum results for each treatment.

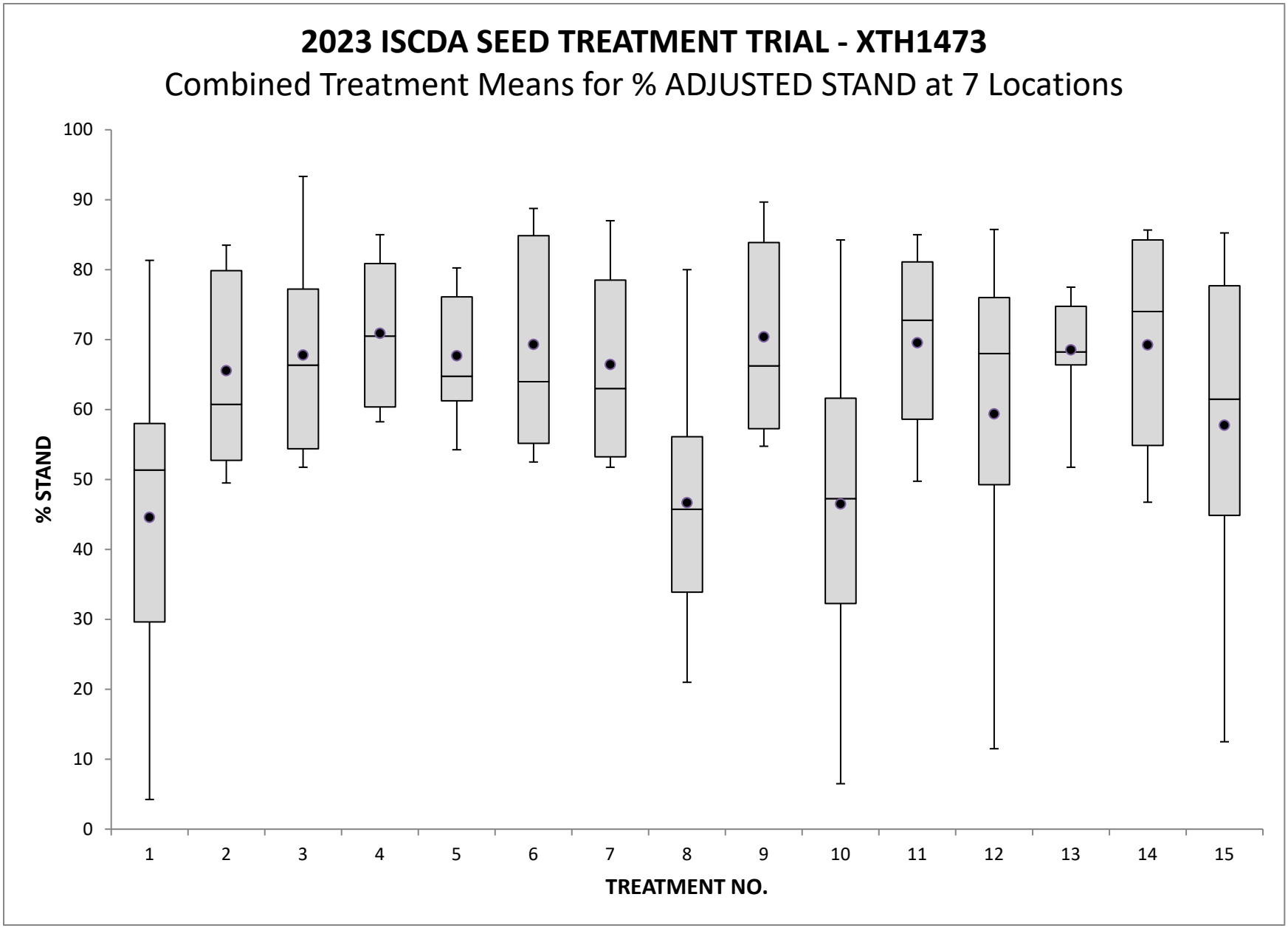
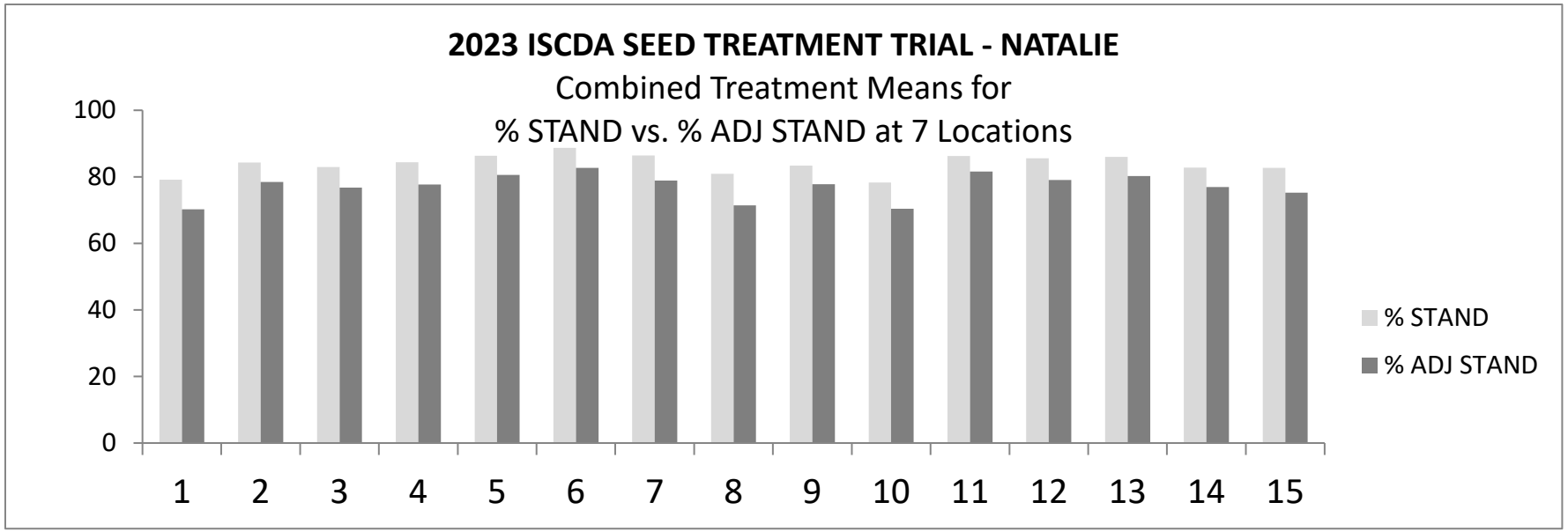


FIGURE 6. 2023 ISCDA Seed Treatment Trial – Box and whisker plot of combined treatment means for ADJUSTED % STAND for XTH1473 at 7 locations. The mean for each treatment is indicated by •. The box indicates the interquartile range for results (divided by the median), and the whiskers span to the minimum and maximum results for each treatment.



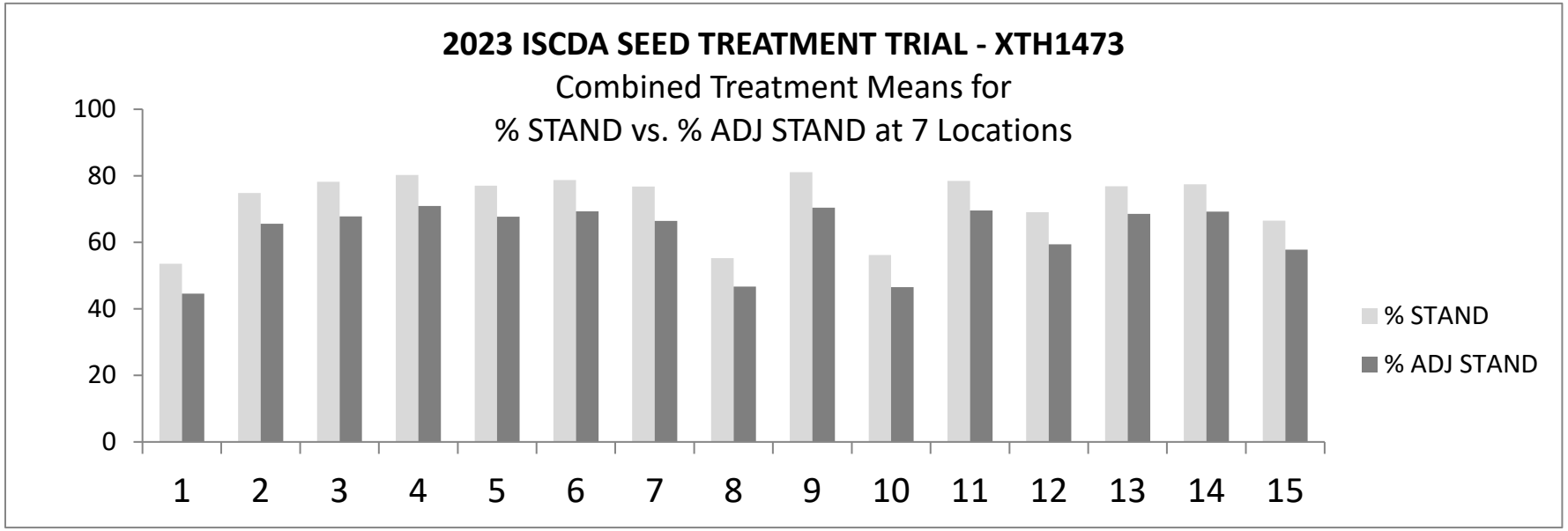


FIGURE 7. 2023 ISCDA Seed Treatment Trial – Combined treatment means for % STAND VERSUS ADJUSTED % STAND for NATALIE and XTH1473 at 7 locations.

TABLE 6a. 2023 ISCDA Seed Treatment Trial - VIGOR – Natalie and XTH1473.

Planting date in italics. Means in columns followed by the same letter are not significantly different (P≤0.05). Results averaged across varieties are only shown when there were significant treatment effects (P≤0.05) and there was no variety x treatment interaction (P≤0.05).

TREATMENT NO.	ID-1 *May 16, 2023*				ID-2 *May 24, 2023*				IL-1 *April 13, 2023*			
	NATALIE		XTH1473		NATALIE		XTH1473		NATALIE		XTH1473	
	MEAN	**SD**	**MEAN**	**SD**	**MEAN**	**SD**	**MEAN**	**SD**	**MEAN**	**SD**	**MEAN**	**SD**
1					2.88	0.75	1.13	0.25	4.00 ab	0.0	1.50 d	0.6
2					3.81	0.59	1.56	0.32	4.31 ab	0.6	3.00 abc	0.0
3					3.25	1.04	2.18	0.29	4.00 ab	0.0	3.50 ab	0.6
4					4.00	0.74	2.13	0.63	4.50 ab	0.6	3.75 a	0.5
5					3.81	0.92	1.88	0.32	4.50 ab	0.6	3.50 ab	0.6
6					3.20	0.60	1.85	0.16	5.00 a	0.0	3.25 ab	0.5
7					3.00	1.08	1.56	0.24	4.50 ab	0.6	3.25 ab	0.5
8					3.56	0.47	1.56	0.66	3.75 b	0.5	1.99 bcd	1.0
9					3.56	0.66	2.56	0.43	4.25 ab	0.5	3.31 ab	0.6
10					3.10	0.50	2.25	0.89	4.00 ab	0.0	1.65 cd	0.6
11					3.77	0.74	1.94	0.77	4.50 ab	0.6	3.75 a	0.5
12					4.18	0.36	1.81	0.75	4.25 ab	0.5	3.00 abc	0.0
13					3.18	0.50	2.13	0.78	4.75 ab	0.5	3.50 ab	0.6
14					4.06	0.66	1.75	0.54	5.00 a	0.0	3.75 a	0.5
15					3.31	0.63	1.69	0.47	4.00 ab	0.0	2.75 a-d	0.5
GRAND MEAN/ GRAND SD					**3.5**	**0.52**	**1.9**	**0.56**	**4.4**	**0.4**	**3.0**	**0.5**
ANOVA: TRT					0.0202		0.1409		0.0023		0.0001	
HSD (P=0.05)					*1.34*		*1.44*		*1.08*		*1.37*	
CV					15.11		30.29		9.75		17.49	

TABLE 6b. 2023 ISCDA Seed Treatment Trial - VIGOR – Natalie and XTH1473.

Planting date in italics. Means in columns followed by the same letter are not significantly different (P≤0.05). Results averaged across varieties are only shown when there were significant treatment effects (P≤0.05) and there was no variety x treatment interaction (P≤0.05).

TREATMENT NO.	NY-1 *May 19, 2023*				VA-1 *April 26, 2023*				WA-1 *May 25, 2023*			
	NATALIE		XTH1473		NATALIE		XTH1473		NATALIE		XTH1473	
	MEAN	**SD**	**MEAN**	**SD**	**MEAN**	**SD**	**MEAN**	**SD**	**MEAN**	**SD**	**MEAN**	**SD**
1					1.63 b	1.0	1.00 c	0.0	3.75	1.0	3.75 b	1.2
2					2.98 a	0.0	2.50 ab	1.0	4.50	0.6	4.75 ab	0.5
3					3.25 a	0.5	3.00 a	0.0	4.50	0.6	4.67 ab	0.6
4					3.25 a	0.5	3.00 a	0.0	4.67	0.6	4.75 ab	0.5
5					3.00 a	0.0	3.00 a	0.0	4.00	0.8	4.75 ab	0.5
6					3.00 a	0.0	3.03 a	0.0	4.67	0.6	5.00 a	0.0
7					2.96 a	0.1	3.00 a	0.0	3.75	1.0	4.50 ab	1.0
8					2.25 ab	0.5	1.75 bc	0.5	4.67	0.6	3.75 b	0.5
9					3.00 a	0.0	2.75 a	0.5	3.75	1.0	4.75 ab	0.5
10					1.50 b	0.6	1.00 c	0.0	4.50	0.6	4.00 ab	0.0
11					3.00 a	0.0	2.50 ab	0.6	4.00	0.5	4.75 ab	0.5
12					2.50 ab	0.6	1.00 c	0.0	4.25	0.5	5.00 a	0.0
13					2.96 a	0.1	2.75 a	0.5	3.98	1.0	4.50 ab	0.6
14					3.00 a	0.0	2.50 ab	0.6	4.00	0.8	5.00 a	0.0
15					2.25 ab	0.5	1.00 c	0.0	3.74	0.6	4.53 ab	0.6
GRAND MEAN/ GRAND SD					**2.7**	**0.4**	**2.3**	**0.4**	**4.2**	**0.8**	**4.6**	**0.5**
ANOVA: TRT					0.0001		0.0001		0.6206		0.0038	
HSD (P=0.05)					*1.08*		*1.00*		*1.96*		*1.22*	
CV					15.73		17.46		18.31		10.41	

TABLE 6c. 2023 ISCDA Seed Treatment Trial - VIGOR – Natalie and XTH1473.
Planting date in italics. Means in columns followed by the same letter are not significantly different (P≤0.05). Results averaged across varieties are only shown when there were significant treatment effects (P≤0.05) and there was no variety x treatment interaction (P≤0.05).

TREATMENT NO.	WI-1 *May 15, 2023*				WI-2 *May 26, 2023*					
	NATALIE		XTH1473		NATALIE		XTH1473			
	MEAN	**SD**	**MEAN**	**SD**	**MEAN**	**SD**	**MEAN**	**SD**		
1	3.63	1.5	4.32	0.6	4.3	0.5	2.3 ab	0.5		
2	3.46	1.5	4.64	0.6	4.3	0.6	2.3 ab	0.5		
3	2.75	1.7	3.50	1.9	4.3	1.0	2.3 ab	0.5		
4	3.50	1.0	3.50	1.7	4.5	0.6	2.8 ab	0.5		
5	2.75	1.7	4.00	0.8	4.3	0.5	2.8 ab	1.0		
6	2.96	1.0	5.00	0.0	4.5	0.6	2.8 ab	0.5		
7	3.00	1.4	4.50	0.6	4.8	0.5	2.8 ab	0.5		
8	4.31	1.2	4.50	1.0	4.0	0.0	2.3 ab	0.5		
9	3.50	1.7	4.76	0.6	3.5	0.6	2.3 ab	0.5		
10	3.64	1.2	3.50	1.7	4.3	0.5	1.5 b	0.6		
11	4.50	0.6	3.25	1.5	4.3	0.5	2.8 ab	0.5		
12	3.25	1.0	3.75	1.0	5.0	0.0	2.3 ab	0.6		
13	3.50	1.7	3.00	1.8	4.0	0.8	2.8 ab	0.5		
14	2.25	1.3	4.31	0.6	4.5	0.6	3.0 a	0.0		
15	3.00	1.4	3.50	1.7	4.5	0.6	2.8 ab	0.5		
GRAND MEAN/ GRAND SD	**3.3**	**1.3**	**4.0**	**1.3**	**4.3**	**0.6**	**2.5**	**0.5**		
ANOVA: TRT	0.6613		0.6362		0.2435		0.0378			
HSD (P=0.05)	*3.29*		*3.34*		*1.49*		*1.35*			
CV	38.51		32.94		13.53		21.31			

TABLE 6e. 2023 ISCDA Seed Treatment Trial – SUMMARY ACROSS 6 LOCATIONS
VIGOR – Natalie and XTH1473. Means in columns followed by the same letter are not significantly different (P≤0.05). *Significant treatment x variety interactions indicate responses were not uniform across locations.

TREATMENT NO.	SUMMARY ACROSS LOCATIONS					
	ALL NATALIE		ALL XTH1473		BOTH VARIETIES	
	MEAN	**SD**	**MEAN**	**SD**	**MEAN**	**SD**
1	3.35	1.2	2.16 d	1.3	2.77 e	1.4
2	3.96	0.8	3.05 abc	1.3	3.48 abc	1.2
3	3.67	1.1	3.16 abc	1.1	3.42 abc	1.1
4	4.04	0.8	3.31 abc	1.1	3.67 a	1.0
5	3.72	1.0	3.31 abc	1.1	3.52 abc	1.1
6	3.95	1.0	3.58 a	1.2	3.76 a	1.1
7	3.70	1.1	3.26 abc	1.2	3.47 abc	1.1
8	3.69	0.9	2.66 bcd	1.3	3.17 b-e	1.2
9	3.59	0.8	3.33 abc	1.1	3.47 abc	1.0
10	3.48	1.2	2.35 d	1.4	2.90 de	1.4
11	3.98	0.8	3.16 abc	1.2	3.56 ab	1.1
12	3.81	1.0	2.84 bcd	1.4	3.31 a-d	1.3
13	3.75	1.1	3.10 abc	1.1	3.41 abc	1.1
14	3.80	1.1	3.35 ab	1.2	3.58 ab	1.2
15	3.45	1.0	2.64 cd	1.4	3.04 cde	1.3
GRAND MEAN/ GRAND SD	**3.7**	**0.7**	**3.0**	**0.7**	**3.4**	**0.7**
ANOVA: TRT	0.0367		0.0001		0.0001	
HSD (P=0.05)	*0.70*		*0.7*		*0.50*	
CV	19.33		22.96		20.96	
INTERACTION	0.0292*		0.0002*		0.0001*	

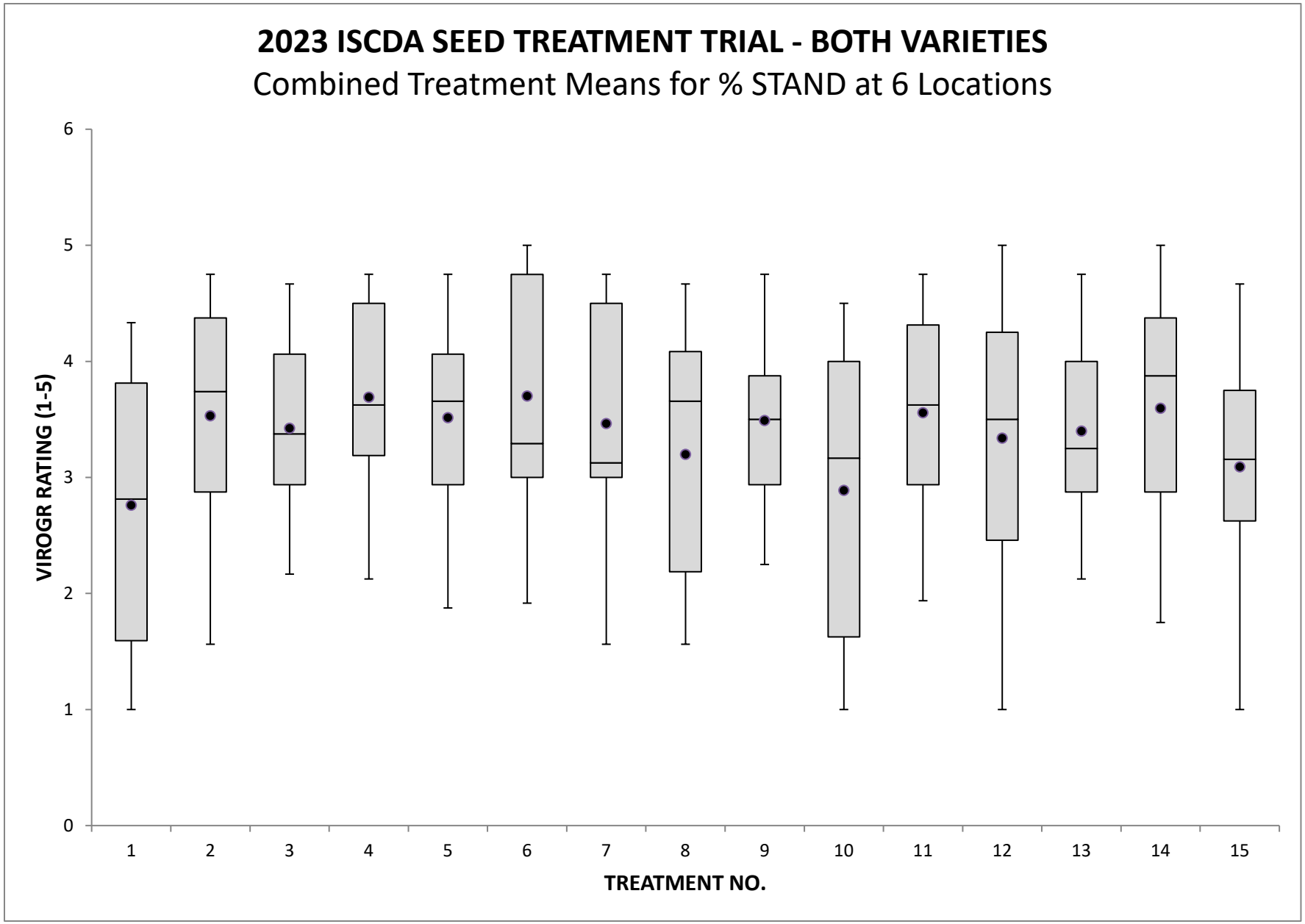


FIGURE 8. 2023 ISCDA Seed Treatment Trial – Box and whisker plot of combined treatment means for VIGOR for BOTH VARIETIES at 6 locations. The mean for each treatment is indicated by •. The box indicates the interquartile range for results (divided by the median), and the whiskers span to the minimum and maximum results for each treatment.

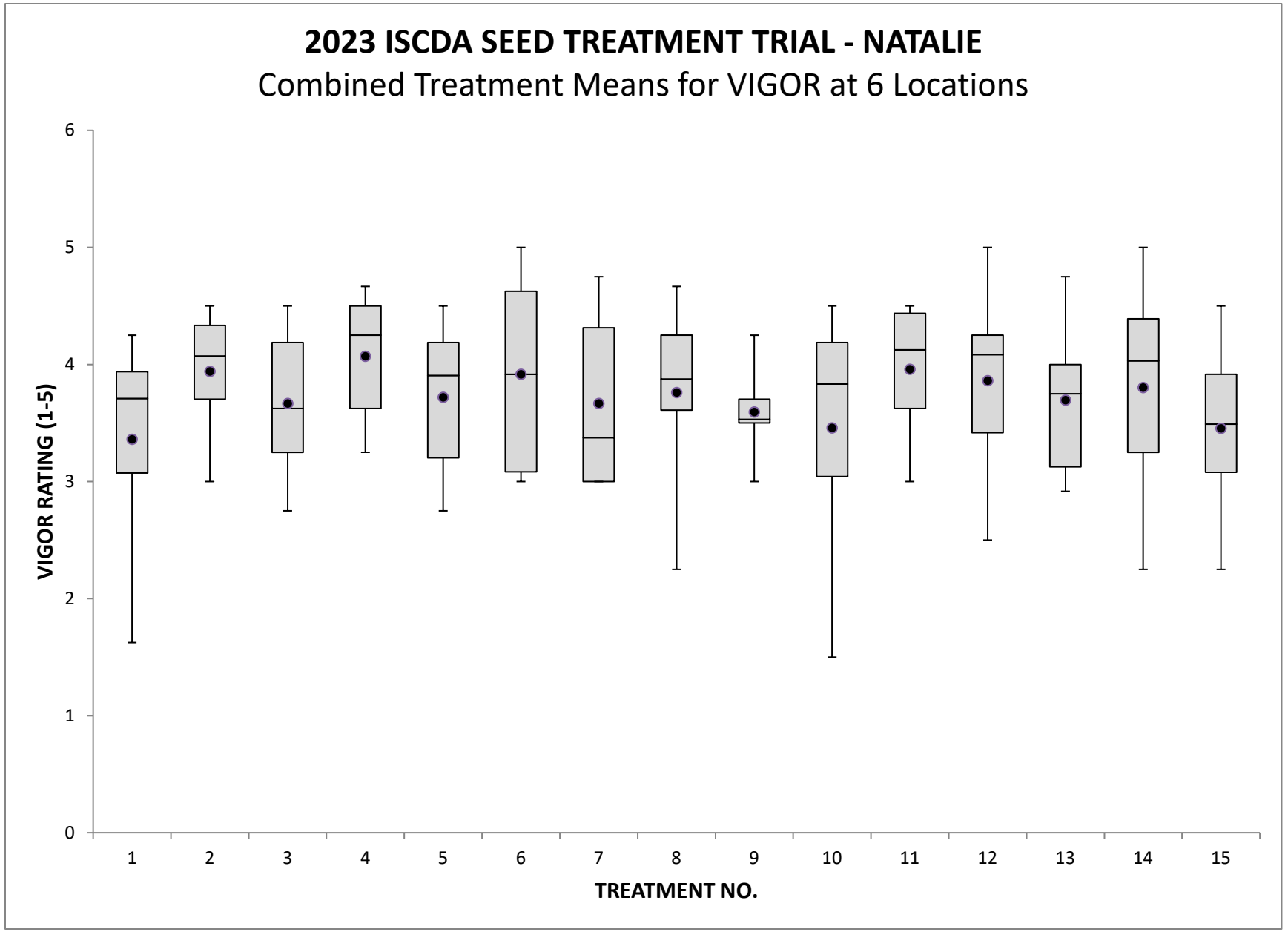


FIGURE 9. 2023 ISCDA Seed Treatment Trial – Box and whisker plot of combined treatment means for VIGOR for NATALIE at 6 locations. The mean for each treatment is indicated by •. The box indicates the interquartile range for results (divided by the median), and the whiskers span to the minimum and maximum results for each treatment.

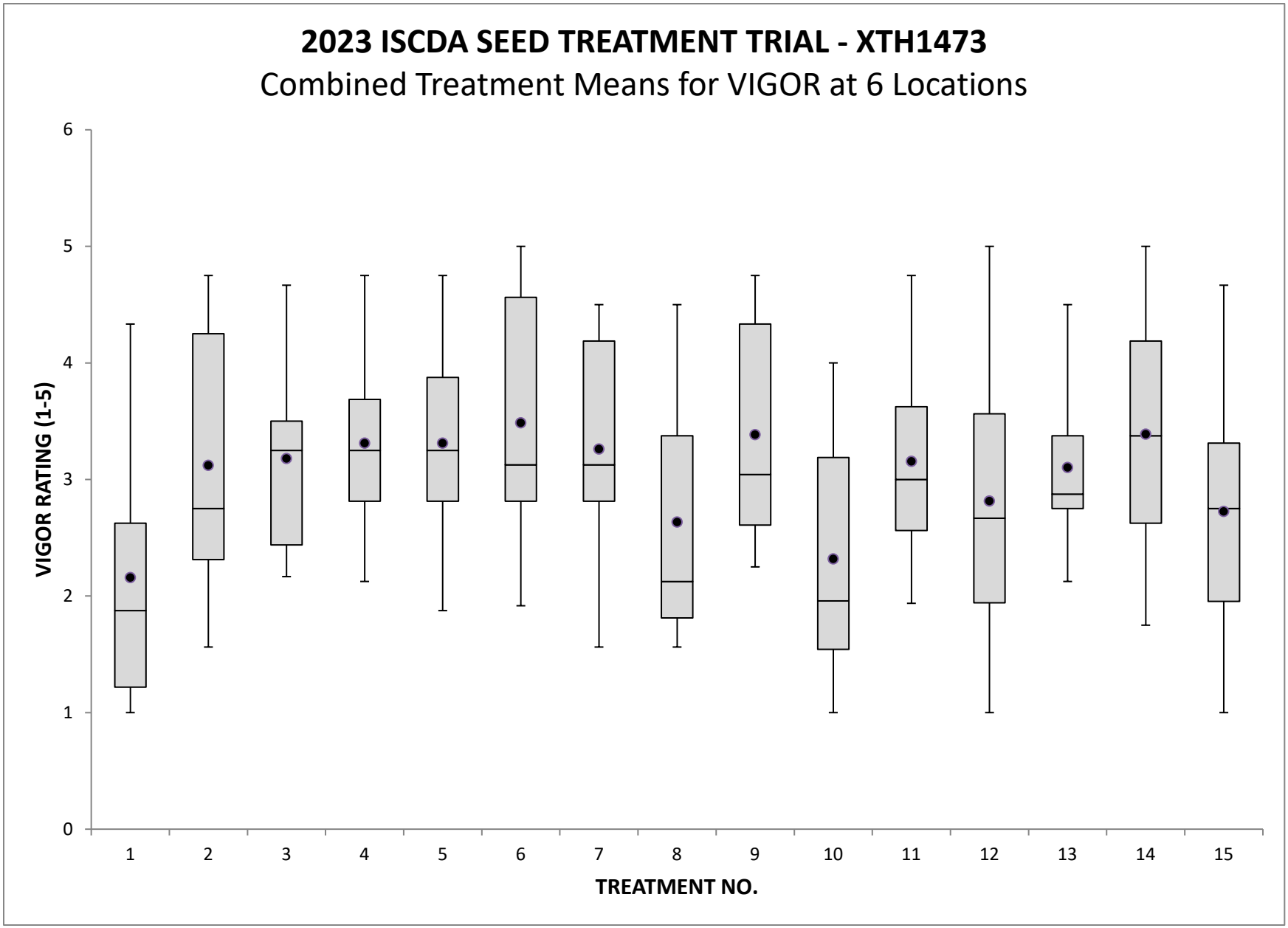


FIGURE 10. 2023 ISCDA Seed Treatment Trial – Box and whisker plot of combined treatment means for VIGOR for XTH1473 at 6 locations. The mean for each treatment is indicated by •. The box indicates the interquartile range for results (divided by the median), and the whiskers span to the minimum and maximum results for each treatment.