

## 2010 Columbia Basin Sweet Corn Seed Treatments Trial

**Introduction:** The Seed Treatment Committee of the International Sweet Corn Development Association (ISCD) selects treatments and develops plans for a multi-location seed treatment trial every year. Researchers from across the country evaluate the selected treatments for their effectiveness against seed-borne and soil-borne diseases that affect sweet corn stand and vigor. This multi-location trial helps sweet corn stakeholders identify the best performing seed treatments for optimum stand establishment under different growing conditions. WSU Extension and the local sweet corn industry in the Columbia Basin of Washington have participated in this trial for many years.

**Methods:** A trial was located in a center pivot irrigated field in the Columbia Basin near Mattawa, WA to evaluate 27 seed treatments on sweet corn (var. Super Sweet Jubilee (*sh2*)). Treatments included conventional fungicides, experimental fungicides, and a biological organic fungicide. Many of the treatments also included seed enhancements and insecticides. Treatments were applied to seeds in water-based slurries using commercial seed treaters. The ground was prepared by strip-tilling planting rows into a cover crop of buckwheat. Seeds for the trial were planted by hand on 5 April, 2010 at a depth of 1-in. One-hundred seeds were planted in each plot. Plots consisted of one 30-ft long row with a between-row spacing of 30-in.



Treatments were replicated four times in a randomized complete block design. The trial was evaluated on 19 May (44 DAP) when the majority of emerged seedlings were at the 4-leaf stage. Each plot was evaluated by taking a stand count and rating vigor. Stand was expressed as a percentage of the number of seeds planted. Vigor was rated using a subjective visual rating scale of 1-5 (1=extremely weak, 2=weak, 3=fair, 4=vigorous, and 5=very vigorous). Treatment differences were compared using ANOVA and protected least significant differences at the 5% probability level, LSD (0.05).

**Results:** The five weeks after planting were characterized by cooler than normal temperatures and above-normal precipitation for the Columbia Basin. These less than ideal growing conditions delayed germination and almost certainly increased disease pressure. The result was reduced stands and poor seedling vigor in the trial. Table 1 shows mean stand and mean vigor for each of the treatments. The average stand for all treatments was only 24%, but treatment means for stand ranged from 1% to 72%. Ten of the twenty-seven treatments had significantly higher stand compared to the non-treated check. Seed treatment mixtures that included the active ingredients captan (Captan 4 Flowable, Captan 400 C), thiram (Thiram 42-S, Signet), or carboxin (Vitavax-34, Vitavax-200) consistently resulted in higher stands compared to the non-treated check. Captan and thiram are broad-spectrum, protectant fungicides for control of seed decay, damping-off, and seedling blights. They are standard seed treatments that are commonly used in combination. Carboxin is a systemic fungicide with activity against seed-borne head smut and *Rhizoctonia solani*, and is another commonly used seed treatment on sweet corn. Standard conventional seed treatments for sweet corn usually include one or more Pythium-active products, but the seed treatment mixtures with these products (Acquire, Allegiance FL, Apron XL LS, Dividend Extreme, Sebring 2.65 ST) in this trial did not always increase stand counts compared to the non-treated check; i.e. they were not always significantly different. The two seed treatments with Captan 4 Flowable + Thiram 42-S + Dividend Extreme + Apron XL LS + Vitavax-34 +/- WECO 1090 (Treatments 3 & 28) resulted in the highest stand counts in this trial. The Agricoat Organic (10 oz/cwt) seed treatment (Treatment 5) resulted in the lowest stand count, but it was not significantly different from the non-treated check. The three lowest ranking treatments for stand were the treatments with Agricoat Organic (Treatments 4, 5 & 6), but the stands in these plots were not significantly different from the stands in the non-treated plots.

Treatment means for plant vigor ranged from 1 (extremely weak) to 3 (fair). The average vigor rating for all treatments was only 2.5. None of the treatments produced seedlings that were statistically more or less vigorous than the non-treated check. The Agricoat Organic (10 oz/cwt) (Treatment 5) treatment resulted in the lowest vigor rating, which was significantly less than some of the treatments, but not significantly different from the non-treated seed. The seed treatments resulting in the highest stand counts tended to have the highest vigor ratings.



Photos were taken on 9 June, 2010 (65 DAP).

Many comparisons can be made between seed treatments that substituted, added, or eliminated products in the mixtures. The seed treatment mixture with Vortex FL + Allegiance FL + Captan 400 C + Thiram 42-S (Treatment 10) resulted in a significantly higher stand compared to similar mixtures substituting Trilex Flowable (Treatment 11) or Tops Flowable (Treatment 12) for the Captan 400 C + Thiram 42-S. Similarly, a seed treatment mixture substituting Maxim 4 FS (Treatment 27) for Captan 4 Flowable + Thiram 42-S (Treatment 28) resulted in a lower stand. The seed treatment with BAS 580 02F (Treatment 9) performed a little better than a similar mixture substituting Stamina (Treatment 7), but the differences in stand and vigor were not significant at the  $P=0.05$  level. BAS 580 02F and Stamina both contain pyraclostobin, but BAS 580 02F includes thiophanate-methyl. BAS 580 02F is not labeled for use on sweet corn. The seed treatments with Senator 600 FS + Sebring 2.65 ST + Signet 2.5 +/- Maize Coat + Polymer (Treatments 21 & 22) resulted in significantly lower stands compared to a similar treatment that added Sativa 309 FS (a.i. tebuconazole) to the mixture (Treatment 23). The seed treatments that included the seed enhancement WECO 1090 (Treatments 6, 27 & 28) resulted in similar stand and vigor ratings compared to the seed treatment mixtures without it (Treatments 4, 2 & 3 respectively). The seed treatment mixture with Maize Coat ZN + Polymer (Treatment 22) resulted in a slightly higher stand compared to the same mixture without it (Treatment 21), but the difference was not significant at the  $P=0.05$  level. Insecticide seed treatments included in the mixtures did not appear to significantly impact stand counts in this trial. For instance, seed treatments with Poncho 600 (Treatments 17, 18 & 20) did not perform any better than similar treatments without it (Treatments 13, 14 & 16 respectively). Many more observations can be made from the data in this trial. A close inspection of the results by treatment should reveal more information that could be useful to seed treatment formulators and sweet corn industry personnel.

**Summary:** In this trial the non-treated check resulted in only 3% stand. Most of the seed treatments ranked higher than the non-treated check for percent stand, and many of these (10 of 27) resulted in significantly higher stands at the  $P=0.05$  level. Seed treatments that included the active ingredients: captan, thiram, or carboxin tended to result in the highest stands in this trial. The three organic treatments did not perform any better than the non-treated check.

A summary of the results for the entire multi-location sweet corn seed treatment trial can be obtained by contacting Carrie Wohleb at (509) 754-2011 x. 413 or at [cwohle@wsu.edu](mailto:cwohle@wsu.edu).



**Table 1.** Effects of seed treatments on stand and vigor of sweet corn (mean of 4 replications).

No.	Treatment and rate of product	Stand <sup>y</sup> %	Vigor (1-5)
1	No Treatment	3 fg	2 ab
2	Dividend Extreme 2.0 <sup>z</sup> + Apron XL LS 0.38 <sup>z</sup> + Maxim 4 FS 0.08 <sup>z</sup> + Vitavax-34 3.5 <sup>z</sup>	51 b	3 a
3	Captan 4 Flowable 2.5 <sup>z</sup> + Thiram 42-S 2.5 <sup>z</sup> + Dividend Extreme 5.0 <sup>z</sup> + Apron XL LS 0.32 <sup>z</sup> + Vitavax-34 4.0 <sup>z</sup>	72 a	3 a
4	Agricoat Organic 20.0 <sup>z</sup>	4 fg	2 ab
5	Agricoat Organic 10.0 <sup>z</sup>	1 g	1 b
6	Agricoat Organic 20.0 <sup>z</sup> + WECO 1090 <sup>z</sup>	4 fg	2 ab
7	Charter HL 0.31 <sup>zw</sup> + Stamina 0.8 <sup>z</sup> + Acquire 0.75 <sup>z</sup> + Axxcess 1.1 <sup>y</sup>	8 fg	2 ab
8	Charter HL 0.62 <sup>zw</sup> + Stamina 1.6 <sup>z</sup> + Acquire 0.75 <sup>z</sup> + Axxcess 1.1 <sup>y</sup>	11 efg	3 a
9	Charter HL 0.31 <sup>zw</sup> + BAS 580 02 F 3.07 <sup>zw</sup> + Acquire 0.75 <sup>z</sup> + Axxcess 1.1 <sup>y</sup>	14 efg	3 a
10	Vortex FL 0.09 <sup>z</sup> + Allegiance FL 0.77 <sup>z</sup> + Captan 400 C 1.5 <sup>z</sup> + Thiram 42-S 1.3 <sup>z</sup>	40 c	3 a
11	Vortex FL 0.09 <sup>z</sup> + Allegiance FL 0.77 <sup>z</sup> + Trilex Flowable 0.16 <sup>z</sup>	14 efg	2 ab
12	Vortex FL 0.09 <sup>z</sup> + Allegiance FL 0.77 <sup>z</sup> + Tops 30 Flowable 5.0 <sup>zw</sup>	10 efg	2 ab
13	Bayertest(1) 2.5 <sup>xw</sup> + Vortex FL 0.09 <sup>z</sup> + Allegiance FL 0.77 <sup>z</sup> + Trilex Flowable 0.16 <sup>z</sup>	10 efg	3 a
14	Bayertest(1) 2.5 <sup>xw</sup> + Bayertest(2) 5.0 <sup>xw</sup> + Allegiance FL 0.77 <sup>z</sup>	9 efg	2 ab
15	Bayertest(1) 2.5 <sup>xw</sup> + Bayertest(2) 10.0 <sup>xw</sup> + Allegiance FL 0.77 <sup>z</sup>	15 efg	3 a
16	Bayertest(1) 2.5 <sup>xw</sup> + Trilex Flowable 0.16 <sup>z</sup> + Bayertest(2) 5.0 <sup>xw</sup> + Allegiance FL 0.77 <sup>z</sup>	12 efg	2 ab
17	Bayertest(1) 2.5 <sup>xw</sup> + Vortex FL 0.09 <sup>z</sup> + Allegiance FL 0.77 <sup>z</sup> + Trilex Flowable 0.16 <sup>z</sup> + Poncho 600 1.1 <sup>y</sup> + Precise Seed Finisher 1006 2.0 <sup>z</sup>	16 ef	3 a
18	Bayertest(1) 2.5 <sup>xw</sup> + Bayertest(2) 5.0 <sup>xw</sup> + Allegiance FL 0.77 <sup>z</sup> + Poncho 600 1.1 <sup>y</sup> + Precise Seed Finisher 1006 2.0 <sup>z</sup>	12 efg	3 a
19	Bayertest(1) 2.5 <sup>xw</sup> + Bayertest(2) 10.0 <sup>xw</sup> + Allegiance FL 0.77 <sup>z</sup> + Poncho 600 1.1 <sup>y</sup> + Precise Seed Finisher 1006 2.0 <sup>z</sup>	17 ef	2 ab
20	Bayertest(1) 2.5 <sup>xw</sup> + Trilex Flowable 0.16 <sup>z</sup> + Bayertest(2) 5.0 <sup>xw</sup> + Allegiance FL 0.77 <sup>z</sup> + Poncho 600 1.1 <sup>y</sup> + Precise Seed Finisher 1006 2.0 <sup>z</sup>	13 efg	2 ab
21	Senator 600 FS 2.7 <sup>y</sup> + Sebring 2.65 ST 0.75 <sup>z</sup> + Signet 2.5 <sup>z</sup>	31 cd	2 ab
22	Senator 600 FS 2.7 <sup>y</sup> + Sebring 2.65 ST 0.75 <sup>z</sup> + Signet 2.5 <sup>z</sup> + Maize Coat ZN + Polymer 4.0 <sup>z</sup>	39 c	2 ab
23	Senator 600 FS 2.7 <sup>y</sup> + Sebring 2.65 ST 0.75 <sup>z</sup> + Signet 2.5 <sup>z</sup> + Sativa 309 FS 1.2 <sup>z</sup> + Maize Coat ZN + Polymer 4.0 <sup>z</sup>	52 b	2 ab
24	Dividend Extreme 2.0 <sup>z</sup> + Sebring 2.65 ST 0.75 <sup>z</sup> + Maxim 4 FS 0.08 <sup>z</sup> + Vitavax-200 3.5 <sup>z</sup> + Cruiser 5FS 1.1 <sup>y</sup> + Maize Coat ZN + Polymer 4.0 <sup>z</sup>	57 b	3 a
25	Apron XL LS 0.19 <sup>z</sup> + Dynasty 0.83 FS 0.15 <sup>z</sup> + Maxim 4 FS 0.08 <sup>z</sup> + Cruiser 5FS 1.1 <sup>y</sup> + Dividend Extreme 2.0 <sup>z</sup>	23 de	3 a
26	Apron XL LS 0.11 <sup>z</sup> + A16148B 5.0 <sup>xw</sup> + Maxim 4 FS 0.08 <sup>z</sup> + Cruiser 5FS 1.1 <sup>y</sup> + Dividend Extreme 2.0 <sup>z</sup>	12 efg	2 ab
27	Dividend Extreme 2.0 <sup>z</sup> + Apron XL LS 0.38 <sup>z</sup> + Maxim 4 FS 0.08 <sup>z</sup> + Vitavax-34 3.5 <sup>z</sup> + WECO 1090 1.6 <sup>z</sup>	52 b	3 a
28	Captan 4 Flowable 2.5 <sup>z</sup> + Thiram 42-S 2.5 <sup>z</sup> + Dividend Extreme 5.0 <sup>z</sup> + Apron XL LS 0.32 <sup>z</sup> + Vitavax-34 4.0 <sup>z</sup> + WECO 1090 1.6 <sup>z</sup>	72 a	3 a
		24.0	2.5

<sup>z</sup>Rate applied in oz /cwt.

<sup>y</sup>Rate applied in oz/80,000 kernels.

<sup>x</sup>Rate applied in g a.i./100 kg seed.

<sup>w</sup>Product not labeled for use on sweet corn as of 4/1/2010.

<sup>v</sup>Column numbers followed by the same letter are not significantly different, based on Student-Newman-Keuls least significant difference (LSD) at P=0.05.

**Disclaimers:** Application of a pesticide to a crop or site that is not on the label is a violation of pesticide law and may subject the applicator to civil penalties up to \$7,500. In addition, such an application may also result in illegal residues that could subject the crop to seizure or embargo action by WSDA and/or the U.S. Food and Drug Administration. It is your responsibility to check the label before using the product to ensure lawful use and obtain all necessary permits in advance. WSU Extension programs and employment are available to all without discrimination. Evidence of noncompliance may be reported through your local Extension office.

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