



Final Report on Brooks Cherry Cracking Study with Bluestim

(May 21st, 2006)

TITLE OF PROJECT: Effects of Bluestim for the control of fruit cracking in Brooks Cherries

TRIAL NUMBER: Beem-M005-1C

PROJECT OBJECTIVE: Determine the efficacy of the Bluestim, in commercial "Brooks" cherry orchard for fruit cracking disorder control.

RESEARCHER (S): Lance William Beem, Beem Consulting, 8717 Bronson Drive, Granite Bay, CA

TARGET: Fruit Cracking Disorder caused by excessive water on fruit during ripening process.

CROP: Sweet Cherry **AGE:** 10 years old **VARIETY:** Brooks

LOCATION OF TRIAL: Tevelde Cherry Orchard, 13100 Ave 272, Visalia, California

PLOT DESIGN Random Complete Block Design, 7 Replicates per Treatment or Untreated Check,

PLOT (Rep) SIZE: 3 Trees = (18 Feet) Wide x (42 feet) Long = 0.01736 Acre

BLOCKED AREA: The 3 Tree replicated plots were buffered with 1-4 trees down a row on each side of the plot area to avoid spray drift from backpack sprayer. Blocked area used to set plots within was 44 trees long by 7 rows wide.

TREATMENT LIST:

1. Untreated Check
2. Bluestim @ 4.0 lbs/Acre + Monterey 7 Surfactant @ 8 oz./100 GPA @(Fruit Stage A&B)
Applied @ Pea size green & again@ translucent green
3. Bluestim @ 4.0 lbs/Acre + Monterey 7 Surfactant @ 8 oz./100 GPA @(Fruit Stage B only)
Applied @ translucent green only
4. Bluestim @ 2.0 lbs/Acre + Monterey 7 Surfactant @ 8 oz./100 GPA @(Fruit Stage A&B)
Applied @ Pea size green & again @ translucent green

STAGES OF GROWTH:

Application timing A = April 13th, 2006 (Fruit Stage was large "Pea" size green, 6-8 mm diameter)

Application timing B = April 25th, 2006 (Fruit Stage was Translucent green)

Evaluation timing C = May 5th, 2006 (Evaluated Fruit Stages were Blush to Light Red)

(There were more green fruit on the tree than Blush or Light Red, but fruit load was uniformly light overall because of weather conditions that preceded this trial; No Dark Red fruit at time of evaluation.) Commercial Harvest occurred three days after evaluation date.

APPLICATION METHODS:

Each replicated plot of 3 trees was treated with a Stihl brand Air Assist Back Pack Sprayer calculated to treat @ 100 GPA per acre, both application dates. Each application was equivalent to a volume of 100 gallons per acre. The applications were sprayed down the rows and back for full coverage on both sides of trees. Rain occurred before and after each application within 6 hours of application. There was sufficient drying time of each application prior to rainfall.

EVALUATION METHOD: Evaluations were taken, only, from south half of each tree in a replicated plot. Each south side (half) of each of 3 trees were evaluated separately and recorded separately, as sub samples to each replicated plot. Each individual tree was recorded for total blush fruit, total light red fruit and total cracked fruit from the trees. Mostly light red fruit were cracked. Most of the cracking was on the bottom of the fruit. The contracted buyer, Greg Costa, informed me Brooks Cherry fruit when it is treated with Gibberillic Acid =GA3 often have a characteristic cracking at the bottom of the most mature fruit @ time of harvest. This is a problem. This orchard was treated with Gibberillic Acid prior to harvest and evaluation date. Gibberillic Acid is widely used on Cherries in California for shipping to Japan. The application of Plant Growth Regulator's that have Gibberillic Acid all causes rapid cell elongation of the Cherry fruit following the applications. Typically fruit is treated @ translucent green stage, similar to second application date for this trial with Bluestim.

PHYTOTOXICITY: There was no notable phytotoxicity as a result of any treatment. There was not surfactant residue ring, sometimes associated with surfactant applications on red cherry fruit.

WEATHER: CIMIS Station Weather Station (Visalia) see attached spreadsheet (March/April/May)

IRRIGATION METHOD: Sprinkler irrigation, however no irrigations were used due to sufficient rainfall.

ABNORMAL CONDITIONS WHICH MIGHT AFFECT TRIAL: Excessive rainfall (compared to normal average) in the Spring months (during trial period). Temperatures were cooler than normal, as a result of this wet period.

STATISTICAL ANALYSIS: Agricultural Research Manager Program incorporating statistical package with the Student-Newman-Keuls analyzed @ LSD (P=.05), Standard Deviation, CV, Grand Mean, Bartlett's X2,P(Bartlett's X2) Replicate F, Replicate Prob F, Treatment F & Treatment Prob F See Gylling's ARM program for further information on Statistical Programs used in this trial.

RESULTS: See Tables I & II and Graphs I

DATA TABLE I AOV Analysis (LSD P=0.05) of Fruit Cracking Incidence in Brooks Cherries

Character Rated	Fruit	Fruit	Fruit	Fruit	Fruit	
Rating Date	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006	
Rating Data Type	Blush Fruit	LitRedFruit	%LitRed Frt	Cracked Frt	% Cracked Fruit	
Rating Unit	NUMBER	NUMBER	Percent	NUMBER	Percent	
Assessed By	LBeem	LBeem	LBeem	LBeem	LBeem	
Trt-Eval Interval	10DaysAfter	10DaysAfter	10DaysAfter	10DaysAfter	10DaysAfter	
ARM Action Codes			T2		T1	
Number of Subsamples	3	3	3	3	3	
Number of Decimals	2	2	4	2	4	
Trt	Treatment					
No.	Name	1	2	5	3	4
1	Untreated Check	45.52 a	3.29 a	5.8531 a	1.76 a	3.6016 a
2	Bluestem 4 + 4 + M7	36.57 a	4.38 a	9.0722 a	0.38 b	0.9168 b
3	Bluestem 0 + 4 + M7	32.81 a	3.67 a	8.5541 a	0.43 b	1.179 b
4	Bluestem 2 + 2 + M7	36.24 a	3.43 a	7.3164 a	0.71 b	1.4751 b
LSD (P=.05)		16.645	2.869	4.52965	0.862	1.38454
Standard Deviation		14.821	2.555	4.03341	0.767	1.23285
CV		39.22	69.22	52.39	93.4	68.76
Grand Mean		37.79	3.69	7.7	0.82	1.79
Bartlett's X2		1.817	1.438	0.491	14.324	3.376
P(Bartlett's X2)		0.611	0.697	0.921	0.002*	0.337
Replicate F		4.24	1.73	0.652	3.373	4.134
Replicate Prob(F)		0.0078	0.1712	0.6886	0.0208	0.0088
Treatment F		0.94	0.254	0.885	4.933	6.934
Treatment Prob(F)		0.4419	0.8576	0.4675	0.0113	0.0027

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)

Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.

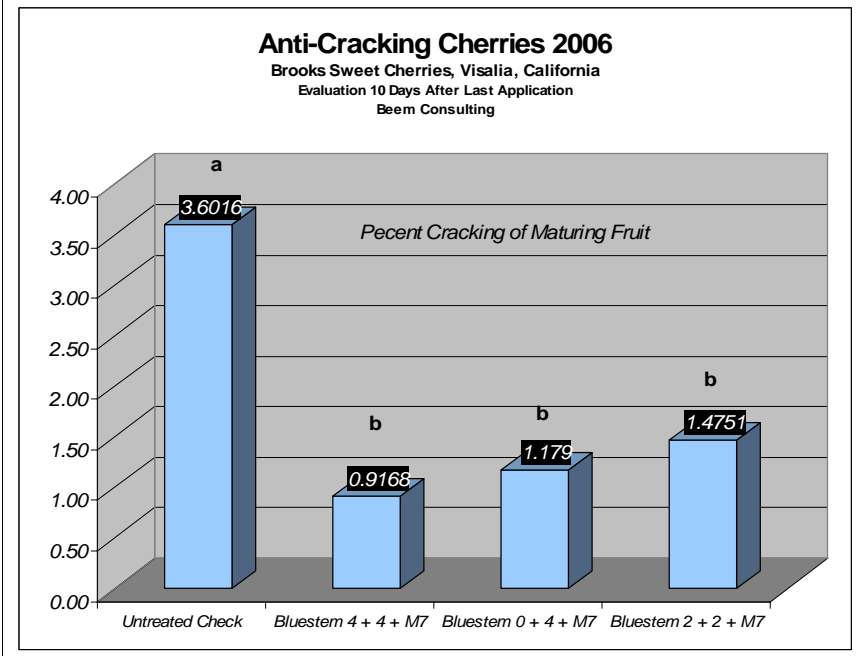
Column 4: T1 = ((C3)/(C1)) *100

DATA TABLE II Raw Data for Fruit Cracking Incidence in Brooks

Trial ID: CherryAntiCracking06
 Protocol ID: CherryAntiCracking06
 Location: Visalia

Study Director: Jay Irvine
 Investigator: Lance Beem

Character Rated	Fruit	Fruit	Fruit	Fruit	Fruit		
Rating Date	5/5/2006	5/5/2006	5/5/2006	5/5/2006	5/5/2006		
Rating Data Type	Blush Fruit	LitRedFruit	%Lit Red Frt	Cracked Frt	% Cracked Fruit		
Rating Unit	NUMBER	NUMBER	Percent	NUMBER	Percent		
Assessed By	LBeem	LBeem	LBeem	LBeem	LBeem		
Trt-Eval Interval	10DaysAfter	10DaysAfter	10DaysAfter	10DaysAfter	10DaysAfter		
ARM Action Codes			T2		T1		
Number of Subsamples	3	3	3	3	3		
Number of Decimals	2	2	4	2	4		
Trt	Treatment						
No.	Name	Plot	1	2	5	3	4
1	Untreated Check	101	62.67	7.67	9.7342	5	7.3854
		202	20.33	1.67	6.2678	1.33	5.9028
		301	54.33	0.67	1.626	2.67	4.0573
		404	51.33	1.67	2.1645	0.67	1.1166
		502	28	1.67	4.4897	1	3.1587
		601	69.67	5.33	6.9137	0.67	1.2094
		703	32.33	4.33	9.7756	1	2.381
		Mean =	45.52	3.29	5.8531	1.76	3.6016
2	Bluestem 4 + 4 + M7	102	80.33	8	9.0059	1	1.4886
		204	27	4.33	14.648	1	3.4685
		302	38	6.67	14.5455	0.33	0.6667
		401	21.67	3.67	8.6275	0	0
		503	12.33	0.33	2.0833	0	0
		602	45	4	6.7323	0	0
		704	31.67	3.67	7.8631	0.33	0.7937
		Mean =	36.57	4.38	9.0722	0.38	0.9168
3	Bluestem 0 + 4 + M7	103	36.67	4.67	9.9408	1	3.4328
		201	14.67	0.33	1.5873	0	0
		303	41.33	3.67	9.2375	0.67	0.8333
		402	53.33	7.33	12.547	0.33	0.6289
		504	19.33	1.33	5.5322	0	0
		603	39.67	5	11.5321	0.33	0.7937
		701	24.67	3.33	9.502	0.67	2.5641
		Mean =	32.81	3.67	8.5541	0.43	1.179
4	Bluestem 2 + 2 + M7	104	51.67	3.33	6.2979	1	2.1059
		203	27	1.67	5.9685	0.67	2.5397
		304	82.67	11	11.2935	2.67	2.6375
		403	13.67	0.33	1.5873	0	0
		501	18	2	9.3795	0	0
		604	31.33	1.33	4.4261	0	0
		702	29.33	4.33	12.2619	0.67	3.0423
		Mean =	36.24	3.43	7.3164	0.71	1.4751
		Column 4: T1 = ((C3)/(C1)) *100					
		Column 5: T2 = ((C2)/((C1)+(C2))) *100					



Means followed by same letter do not significantly differ (P=0.05, Student-Newman-Keuls)
Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.

DISCUSSION OF RESULTS:

The trial was statistically significant (@ LSD P=0.05) at reducing this disorder on Brooks variety of sweet cherry for bottom end and side cracking with Bluestim @ single or repeat applications, in California. All three treatments were statistically significant. There was a numeric trend for the higher rate (4 lbs product/Acre) of Bluestim applied twice to be better than the lower rate (2 lbs product/Acre) of Bluestim applied twice. However, based on these replicates and limited amount of cracking, there still was a statistically significant difference in all the treatments applied once or twice in this trial, to be different than the Untreated Check replicates. There was no observed phytotoxicity (chlorosis or necrosis) of any of the leaves, stems, fruit or overall vigor of the tree, based on visual observations during the course of this trial, from frequent visits to the site by myself (Lance Beem).

RECOMMENDATION(S):

Although, started as a wet year, as the trial finished there was much less rainfall. The crop was also relatively light this year. But this light crop variety "Brooks" turned out to be a locations for a cracking study on sweet cherries. There was sufficient amount of moisture and rapid sizing of fruit during the course of this study enough to have an onset of typical bottom end splitting (cracking = bottom end blow out) of this particularly sensitive variety of sweet cherries. As the grower and broker both indicated, this is a real problem regardless of wet year on Brooks's sweet cherry. Particularly when the fruit is treated with Gibberillic Acid (GA3) materials to size the fruit as the cherry fruit turns color.

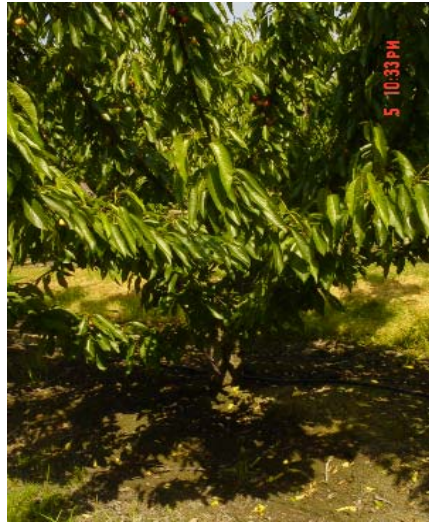
I would be my suggestion to test Bluestim (@ 3& 4 lbs/Acre) in a tank mix with GA3 materials at the standard timing of translucent green with and without a surfactant, next year. Depending on the spray conditions a surfactant is not always the most desired treatment with GA3, especially in the liquid formulation (Isopropyl Alcohol). Contact Valent USA, Stoller USA, LT BioSyn or NuFarm for further information on use of GA3 on cherries and potential tank mix restrictions with Bluestim or other chemistry. (Lance Beem)

ATTACHMENTS: Data Tables and Statistics see Excel Spreadsheets

Picture of the Tevelde "Brooks" sweet cherry orchard Bluestim Test



Stage of Fruit on Typical Tree @ this test site



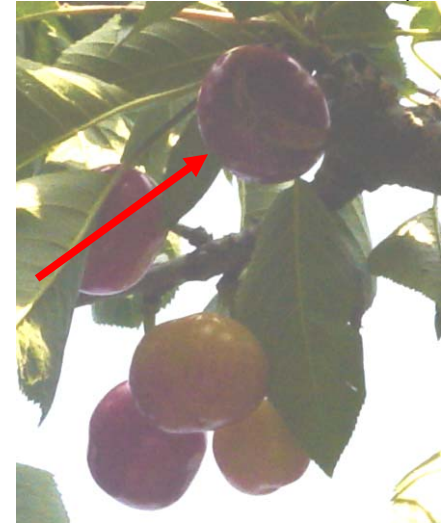
Stage of Brook's sweet cherry fruit @ time of evaluation of replicated plots



Side Split, "Crack" of Brook's Sweet Cherry Fruit



"Blow out of the Bottom of the Brook's Cherry Fruit"



(Note Correction--- Photo date of slides is actually AM time of picture on May 5th, 2006)