Two Season BAM-FX (7% Zn, 2% Cu) Wine Grape Trial at Guglielmo Winery (2014 and 2015)

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Field Trial and Analyses Conducted by: John L. Freeman Ph.D. (Intrinsyx Technologies Corp. NASA-Ames), George Guglielmo (Vineyard and Winery Owner), Guglielmo Winery Staff, Stephen Kidder (Guglielmo Wine-Maker), Enartis Vinquiry (Windsor, CA), Duncan Smith (CCA), Kerry White and Tyler Tomas (Field Technician).

Vines were harvested by Guglielmo Winery Staff, John L. Freeman Ph.D., Tyler Tomas, Duncan Smith, Mat Schreiber. Harvest, Weighing and Analyses were Supervised by George Guglielmo, John L. Freeman Ph.D., and Stephen Kidder

SEASON 1 FIELD TRIAL

For the season 1 trial a total of 300 mature Carignan vines were surveyed and marked off in a block having 150 vines in three separate adjacent rows marked for BAM-FX treatment and 150 marked in three separate adjacent rows as untreated controls. Additionally, 150 mature Zinfandel vines were marked off in a block with 75 marked for the BAM-FX treatment and 75 marked as control untreated vines. These vines were chosen because all vines were of similar age, health, size and spacing with a total of 907 vines per acre at a 6 ft. x 8 ft. spacing.

300 Carignan Vines 150 Zinfandel Vines

These wine grapes are normally dry farmed in the Santa Clara valley of CA, but due to the drought period, ¼ of an acre foot of water, was applied by sprinkler sets on July 15th , and this was the only water manually applied all year. Additionally, micronized wettable sulfur (Microthiol disperss) was applied as a fungicide starting in early April and three more times once each following month (May-July), following manufacturer recommendations for wine grapes.

The first foliar spray was applied to both test plots on June 28th 2014 when grape bunches or clusters were just starting to form and were small and green. The rate of this first foliar application was 50 oz. of BAM-FX stock per acre at a concentration of 0.33 oz. BAM-FX stock / 1 gallon water. The second application was

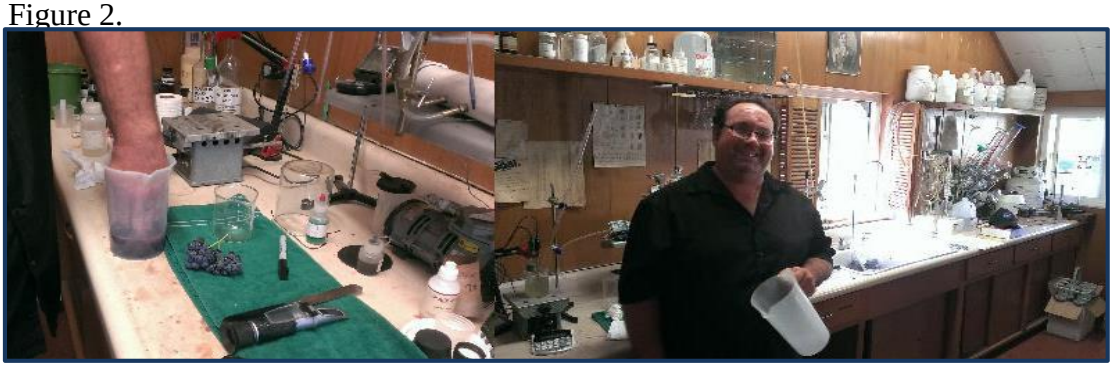
applied seven days later on July 5th at a rate of 50 oz. of BAM-FX stock per acre at a concentration of 0.50 oz. BAM-FX stock / 1 gallon water. At this time the green grapes on the BAM-FX treated seemed slightly larger than the controls and new growth was noticed with young leaves and tendrils being more pronounced on the BAM-FX treated vines. Immediately after the second application George Guglielmo, Kerry White and John Freeman walked the field trial together and agreed there was indeed a noticeable difference in growth of the BAM-FX treated vines and then photographs were taken to help support these growth observations (Figure 1).

Figure 1.

The third and final foliar spray of BAM-FX season 1 was applied on July 2014 when the vines were going into veraison, the grapes were starting to ripen and turn purple. The application rate was 50 oz. BAM-FX stock per acre at a concentration of 1 oz. BAM-FX stock/ 1 gallon water.

On September 5, 2014 immediately before fields were harvested by workers in bulk, the bunches of grapes were randomly harvested from ten vines Stephen Kidder and John Freeman from both BAM-FX treated vines, and control vines, and taken into Guglielmo's onsite analytical lab for direct comparisons (Figure 2).

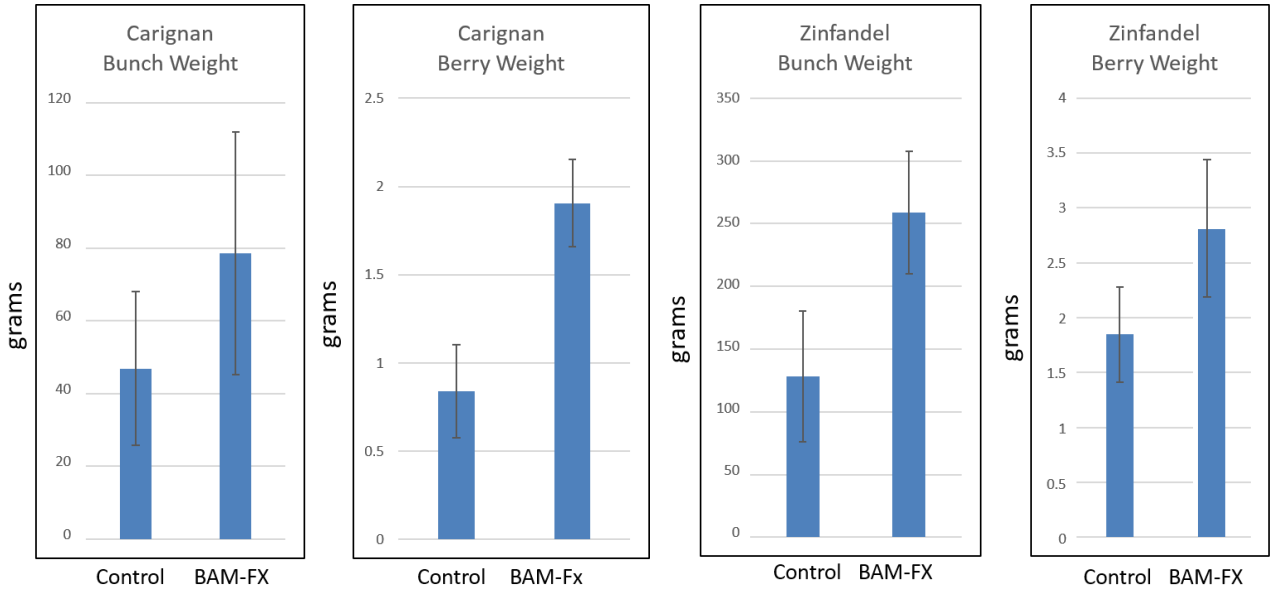
Figure 2.



Steffan Kidder, Winemaker at Guglielmo

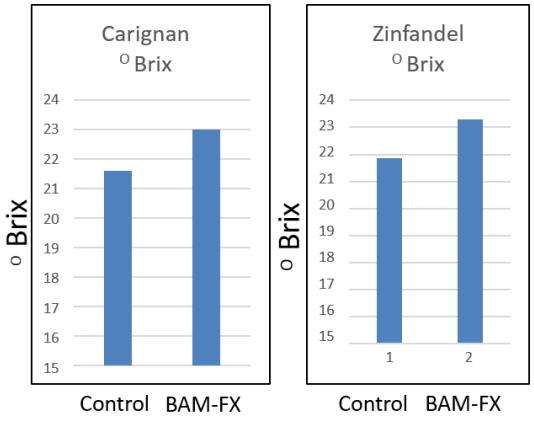
During harvest it was visually obvious that the BAM-FX treated vines had larger bunch, berry sizes and greater yields. The quantitative results obtained from the season 1 fall harvest indeed also showed that BAM-FX treated vines had an approximate 2 fold increase in both bunch and berry weights for Carignan and Zinfandel vines (Figure 3).

Figure 3.



From these bunches four crushes were then made by Stephen Kidder (Guglielmo's wine maker) and the juice obtained was analyzed for their sugar content or degrees Brix (symbol °Brix). One degree Brix is 1 gram of sucrose in 100 grams of solution and represents the strength of the solution as percentage by mass. By measuring brix content the wine maker is able to measure the potential alcohol content of a wine before it's made. Each gram of sugar that's fermented will turn into about a 1/2 gram of alcohol. In season 1, both the Carignan and Zinfandel grapes taken from vines treated with BAM-FX had increased sugar content (Figure 4).

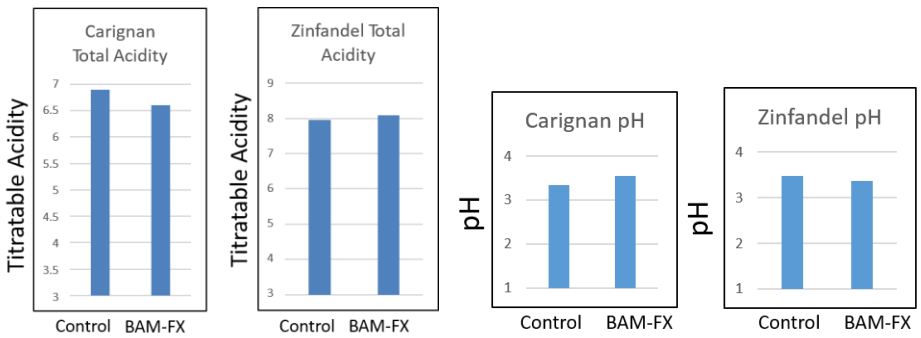
Figure 4.



In addition to sugar content, the titratable acidity or "total acidity" was then measured in juice from these crushes. The acids in wine are an important component in both winemaking and the finished product of wine. They are present in both grapes and wine, having direct influences on the color, balance and taste of the wine as well as the growth and vitality of yeast during fermentation and protecting the wine from bacteria. The

measure of the amount of acidity in wine is the total of all acids present, while strength of acidity is measured according to pH, with most wines having a pH between 2.9 and 3.9. Generally, the lower the pH, the higher the acidity in the wine. However, there is no direct connection between total acidity and pH. Three primary acids are found in wine grapes: tartaric, malic and citric acids. During the course of winemaking and in the finished wines, acids can play significant roles. In wine tasting, the term "acidity" refers to the fresh, tart and sour attributes of the wine which are evaluated in relation to how well the acidity balances out the sweetness and bitter components of the wine such as tannins. In season 1, the BAM-FX treated Carignan vines yielded grapes that had a slightly lower acid content, however the Zinfandel grapes had a slightly higher acid content (Figure 5). Conversely the Carignan grapes treated with BAM-FX had a slightly higher pH and the Zinfandel grapes treated with BAM-FX had a slightly lower pH.

Figure 5.



Conclusions from Season 1 trial

These season one results demonstrated that in addition to increasing overall wine grape production, BAM-FX can help increase the sugar content and overall quality of wine grapes. The season 1 results were especially exciting in regards to the positive effects that BAM-FX had on Zinfandel wine grapes.

SEASON 2 FIELD TRIAL

For the season 2 field trial a different area of the Guglielmo vineyard was chosen with new vines and the focus shifted to applications made only on Zinfandel Wine Grapes. After making many other field trial observations in orchard crops, and based on the season 1 trial results, a different application rate and timing was chosen and used in the season 2 trial.

In all, a total of 300 mature Zinfandel Vines were surveyed and marked off in a block having 150 vines in three separate adjacent rows for BAM-FX treatment, and 150 vines in three separate adjacent rows as untreated controls. These vines were chosen because all vines were of similar age, health, size and spacing with a total of 907 vines per acre at a 6 ft. x 8 ft. spacing. These wine grapes are normally dry farmed in the Santa Clara valley of CA, but due to the drought period, ¼ of an acre foot of water, was applied by sprinkler sets on July 4th , and this was the only water manually applied all year. Additionally, micronized wettable sulfur (Microthiol disperss) was applied as a fungicide starting in early April and three more times once each following month (May-July), following manufacturer recommendations for wine grapes.

Starting early in the season, at first sign of early bud break in March (3-1-2015), 50 oz. of BAM-FX stock per acre was applied in a spray, at a concentration of 0.75 oz. BAM-FX per / gallon water in the early morning, targeting the top woody area, new small leaves and emerging swollen buds around vine knobs and the

branch starts. Secondarily BAM-FX was also soil applied by slightly wetting the surrounding soil directly underneath vines above roots through an intentional overspray on the same pass (* Note this early spring application method could easily be replicated using a tractor equipped with adjustable spray beams).

A second evening fine mist spray was then applied as a foliar to leaves only at a concentration of 0.5 oz BAM-FX per / gallon of water at a rate of 50 oz BAM-FX stock / per acre onto leaves. This was applied strategically in May (5-15-15), during the early to mid-vegetative phase.

Finally, at the onset of véraison or grape berry ripening, a third foliar fine mist evening spray was applied at a concentration of 0.5 oz BAM-FX stock per / gallon water at a rate of 50 oz. per acre onto leaves and grape bunches using a fine mist spray on 7-3-15. (*Note, due to warm temperatures and an early spring the 2015 growing season started and ended early with an August 26th harvest date for the Zinfandel grapes).

At harvest time it was visibly apparent that the BAM-FX treated vines had a significantly greater yield. Arrangements had been made prior to harvest with the grower George Guglielmo and his staff to separately harvest each row in this trial directly into forklift bins and then weigh the subsequent harvest from each of the six rows of 50 vines, 3 rows treated with +BAM-FX and 3 un-treated control rows. The yield results from the season 2 trial showed an approximate doubling of yields obtained from the BAM-FX treated vines (Table 1.) and in general the vines appeared greener and had visibly more leaves and vine biomass.

Table 1. Wine grape yields per each of six trial rows (50 vines per row).

	Yield at Harvest Weight in Pounds (lbs)	Average Bunch weights per treatment grams (g)
Row 1 BAM-FX	240 lbs.	176.4 g
Row 2 BAM-FX	200 lbs.	193.7 g
Row 3 BAM-FX	190 lbs.	201.3 g
Average Weight pounds (lbs) per row (50 vines)	**210 lbs.**	**190.46 g**
Stdev	**26.00 lbs.**	**12.76**
Stderr	**15.01 lbs.**	**7.36**
Control 1	120 lbs.	119.5 g
Control 2	80 lbs.	111.8 g
Control 3	100 lbs.	129.6 g
Average Weight pounds (lbs) per row (50 vines)	**100 lbs.**	**120.3 g**
Stdev	**20 lbs.**	**8.92 g**
Stderr	**11.54 lbs.**	**5.14 g**

BAM-FX treated grape vine yield results not only showed a consistent doubling in total harvest yields, but the Bunch Weight averages showed an 70 gram average increase in grape bunch weights (Table 1).

In addition to collecting weights at harvest, due to the visibly apparent shoot growth differences and leaf biomass, immediately prior to harvest the vines in each row were measured for a variety of growth parameters and the summarized data is presented in table 2.

Table 2.

Zinfandel Wine Grape Bunch and Vine Growth Parameters Measured at the Time of Harvest in Fall 2015						
Control row 1	Avg. # Grape Bunches / Vine	Avg. Area of Bunches square inches	Total Bunch Area square inches	Avg. Branch Length inches	Total Vine Branch Length inches	Avg. # Branches / Vine
AVERAGE	22.45	9.32	210.50	31.41	483.23	15.27
STDEV	12.62	2.04	129.42	12.06	227.21	5.25
STDERR	2.75	0.45	28.24	2.63	49.58	1.15
Control row 2	Avg. # Grape Bunches / Vine	Avg. Area of Bunches square inches	Total Bunch Area square inches	Avg. Branch Length inches	Total Vine Branch Length inches	Avg. # Branches / Vine
AVERAGE	24.29	8.13	208.62	28.56	451.29	15.95
STDEV	15.83	2.19	142.42	10.69	217.26	3.77
STDERR	3.45	0.48	31.08	2.33	47.41	0.82
Control row 3	Avg. # Grape Bunches / Vine	Avg. Area of Bunches square inches	Total Bunch Area square inches	Avg. Branch Length inches	Total Vine Branch Length inches	Avg. # Branches / Vine
AVERAGE	24.35	8.15	216.09	25.90	410.09	16.78
STDEV	15.41	2.49	138.80	12.16	263.73	5.85
STDERR	3.36	0.54	30.29	2.65	57.55	1.28
Control Rows 1-3 combined	Avg. # Grape Bunches / Vine	Avg. Area of Bunches square inches	Total Bunch Area square inches	Avg. Branch Length inches	Total Vine Branch Length inches	Avg. # Branches / Vine
AVERAGE CONTROL	**23.70**	**8.53**	**211.74**	**28.62**	**448.20**	**16.00**
STDEV	1.08	0.68	3.88	2.76	36.67	0.76
STDERR	0.62	0.39	2.24	1.59	21.17	0.44
BAM-FX row 1	Avg. # Grape Bunches / Vine	Avg. Area of Bunches square inches	Total Bunch Area square inches	Avg. Branch Length inches	Total Vine Branch Length inches	Avg. # Branches / Vine
AVERAGE	24.57	10.94	317.95	42.99	624.81	13.57
STDEV	16.22	3.55	260.83	14.29	343.20	4.89
STDERR	3.54	0.78	56.92	3.12	74.89	1.07
Bam-FX row 2	Avg. # Grape Bunches / Vine	Avg. Area of Bunches square inches	Total Bunch Area square inches	Avg. Branch Length inches	Total Vine Branch Length inches	Avg. # Branches / Vine
AVERAGE	29.47	9.89	298.11	37.48	610.16	16.37
STDEV	10.83	1.40	125.90	12.74	280.81	4.13
STDERR	2.36	0.30	27.47	2.78	61.28	0.90
BAM-FX row 3	Avg. # Grape Bunches / Vine	Avg. Area of Bunches square inches	Total Bunch Area square inches	Avg. Branch Length inches	Total Vine Branch Length inches	Avg. # Branches / Vine
AVERAGE	29.64	9.15	271.95	35.44	594.00	18.45
STDEV	18.21	1.80	170.66	12.46	240.01	5.58
STDERR	3.97	0.39	37.24	2.72	52.38	1.22
BAM-FX Rows 1-3 combined	Avg. # Grape Bunches / Vine	Avg. Area of Bunches square inches	Total Bunch Area square inches	Avg. Branch Length inches	Total Vine Branch Length inches	Avg. # Branches / Vine
AVERAGE BAM-FX	**27.89**	**9.99**	**296.00**	**38.64**	**609.66**	**16.13**
STDEV	2.88	0.90	23.07	3.90	15.41	2.45
STDERR	1.66	0.52	13.32	2.25	8.90	1.41

The table 2. data demonstrated that the BAM-FX treated vines vs. controls; had a greater average number of grape bunches per each vine (28 BAM-FX vs. 23 control); a larger average bunch area per each vine (10 in^2 BAM-FX vs. 8.5 in^2 control); a greater total bunch area per vine (296 in^2 BAM-FX vs. 212 in^2 control); a ten inch longer average branch length (38 in BAM-FX vs. 28 in control), a longer total vine branch length (610 in BAM-FX vs. 448 in control), and the same average number of branches per each vine.

At the time of harvest in 2015, crush – juice quality parameters were again measured at Guglielmo and showed only a slight average increase for sugar content (Brix) without any statistical differences, and with little or no difference in titratable acidity or pH (Table 3).

Table 3. Zinfandel Crush - Juice Quality Parameters Measured per row at Guglielmo (Time of Harvest Fall 2015)			
	Sugar Content (° Brix)	**Titratable Acidity**	**pH**
Control row 1	28.3	8.5	3.35
Control row 2	28.2	7.9	3.37
Control row 3	27.0	7.9	3.54
AVERAGE of Control rows 1-3	**27.83**	**8.1**	**3.42**
STDEV	0.72	0.34	0.10
STDERR	0.41	0.19	0.05
BAM-FX row 1	28.0	7.8	3.37
BAM-FX row 2	27.8	7.65	3.47
BAM-FX row 3	28.4	8.4	3.52
AVERAGE of BAM-FX rows 1-3	**28.06**	**7.95**	**3.45**
STDEV	0.30	0.39	0.07
STDERR	0.17	0.22	0.04

In addition to the above onsite analyses done at the Guglielmo Winery laboratory, a Juice Quality panel including Zn and Cu analyses, and a Berry Phenolic profile was completed on samples that had been shipped overnight after the day of harvest to Enartis Vinquiry Laboratories (www.enartisvinquiry.com). These results are provided in tables 4 and 5 and the raw data from Enartis is also provided in appendix A.

The Juice Quality panel revealed some important results consistent with the findings from Guglielmo Winery laboratory. These results showed that in BAM-FX treated berries there was no difference in the sugar content (^{o}Brix) or the pH (Table 4.). There was however an apparent 15% average decrease in the titratable acidity which was different then results received at harvest at Guglielmo which showed little or no difference in titratable acidity. Interestingly there was an 8% average decrease in the Malic Acid content of Bam-FX treated vines (Table 4.). It may be possible to assume that BAM-FX helped advance the maturity of these vines compared to controls because Malic acid is known to decline in grape berries starting at veraison.

Table 4. Juice Quality Panel conducted by Enartis Vinquiry on representative crushes made from bunches harvested from each row

	Brix	pH	Titratable Acidity g/L	Malic Acid (mg/100ml)	Ammonia (mg/L)	Assimilable Amino Nitrogen (mg/L)	Copper (mg/L, ppm, µg/g)	Zinc (mg/L, ppm, µg/g)
BAM-FX row 1	26.9	3.40	6.21	291	115	165	0.150	0.922
BAM-FX row 2	26.2	3.45	8.27	434	97	169	0.110	0.705
BAM-FX row 3	28.5	3.39	7.41	298	89	147	0.160	1.150
BAM-FX Average	**27.2**	**3.41**	**7.30**	**341**	**100**	**160**	**0.140**	**0.926**
stdev	1.18	0.03	1.03	81	13	12	0.026	0.22
stderr	0.68	0.02	0.60	47	8	7	0.015	0.13
Control row 1	27.5	3.39	9.11	365	122	177	0.080	0.372
Control row 2	26.7	3.30	8.24	336	81	126	0.150	0.386
Control row 3	28.6	3.42	7.90	401	93	145	0.130	0.776
Control Average	**27.6**	**3.37**	**8.42**	**367**	**99**	**149**	**0.120**	**0.511**
stdev	0.95	0.06	0.62	33	21	26	0.036	0.23
stderr	0.55	0.04	0.36	19	12	15	0.021	0.13
Avg BAM-FX induced % change	**ND**	**ND**	**-15**	**-8**	**ND**	**7**	**15**	**45**

*ND = No Difference

The Juice panel also demonstrated no difference in ammonia content of juice from BAM-FX treated vines vs. control but did find a 7% average increase in assimilable Amino Nitrogen in juice from BAM-FX treated vines (Table 2). This is both important and interesting because specific forms of Nitrogen in grape juice (ammonia and N-containing amino acids) are necessary for the successful fermentation of grape juice into wine. Assimilable Amino Nitrogen is a measure of the concentration of individual amino acids and small peptides (one to three units) which can be utilized by wine yeast for cell growth and proliferation. Together with ammonia, Amino Nitrogen makes up the measurement of yeast assimilable nitrogen that can used by yeast for completing fermentation. Additionally other results have suggested that BAM-FX can potentially decrease the N fertilizer requirements for crops by increasing the N use efficiency of plants. A 7% average increase in amino-nitrogen maybe an indicator of this resulting from enhanced N uptake and amino acid assimilation processes stimulated perhaps by vines having adequate Zn and Cu content.

Also of interest is the 45% average higher zinc (0.140 mg Zn/L) and 14% average higher copper (0.14 mg Cu/L) content in the juice from the BAM-FX treated vines (Table 2). This demonstrates the ability of BAM-FX bioavailable ionic forms of Zn and Cu to enter vines through the shoots and at least in part be transported into berries and the resulting juice. An additional plus is that the copper values in grape juice from BAM-FX treated vines are well below the 0.3 mg/L mark where negative impacts on wine quality have been reported. These results also help confirm suggested protocols are valid and use of this product as tested does not result in any unexpected entry barriers to the wine grape production market.

Lastly the grape Berry Phenolic profile results are of major importance because the suite of phenolic compounds in grapes include several hundred molecules and their ratios are responsible for the taste, color, mouthfeel and overall quality of wine. These phenolic compounds include anthocyanins, proanthocyanidins,

tannins, or catechins, phenolic acids, stilbenoids, flavonols, and dihydroflavonols. The results from these tests demonstrated that berries harvested from BAM-FX treated vines had no average difference in their tannin content when compared to untreated controls (Table 5). However, the results in BAM-FX treated grape berries compared to controls do show an important 19% average increase in total anthocyanins and also a 5% average increase in the total phenolic content (Table 5). The results are very positive in this regard because an increase in total anthocyanins and total phenolics demonstrates a clear positive effect of BAM-FX treatments on the quality of these Zinfandel wine grape berries.

Table 5. Grape Berrie Phenolic Fingerprint Panel conducted by Enartis Vinquiry on representative grapes from each row			
	Tannin as Epicatechin equivalents (mg/g)	Total Anthocyanins (mg/g)	Total Phenolics (AU/g)
BAM-FX row 1	0.99	29.84	37.60
BAM-FX row 2	0.96	27.12	36.08
BAM-FX row 3	0.89	25.28	33.92
BAM-FX Average	**0.95**	**27.41**	**35.87**
stdev	0.05	2.29	1.85
stderr	0.03	1.32	1.07
Control row 1	1.05	27.20	37.60
Control row 2	0.82	17.36	29.04
Control row 3	1.05	21.76	35.12
Control Average	**0.97**	**22.11**	**33.92**
stdev	0.13	4.93	4.40
stderr	0.08	2.85	2.54
Avg BAM-FX induced % increase	**ND**	**19**	**5**
Tannin as Epicatechin equivalents (mg/g); Total Anthocyanins as Malvidin-3-glucoside equivalents (mg/g);			
Total Phenolics as Arbitrary Units/ gram (AU/g) ; ***ND** = No Difference			

Conclusions

In conclusion, this second season study represents a series of important tests and findings with regard to properly using BAM-FX, a balanced ionic Zinc and Copper product,, for increasing production yields and the overall quality of wine grapes. The season one results first demonstrated the ability to increase both the yields and quality sugar content/Brix in both Zinfandel and Carignan varieties, and total acids in Zinfandel. The season two results demonstrated in Zinfandel grapes the ability to increase yields, Zinc content and quality in the multiple parameters measured.

Based on these findings the grower George Guglielmo has decided to use BAM-FX in large scale applications of his vineyard acreages and will be again following the season 2 protocol described herein starting in early spring 2016 at first bud break.

Furthermore, 3rd season testing will be continued by another winery, Caldwell Winery in Napa CA, after receiving positive results (data not shown) of their own, they will also continue and expand their BAM-FX usage into larger acreages in 2016.

Based on all of these results and observations it is expected that the use of BAM-FX in the wine grape industry will likely become much more common place.

Appendix A.

Enartis VINQUIRY

Blending Innovative Technology with Unparalleled Service

Emilio Guglielmo Winery, Inc.
1480 E. Main Avenue
Morgan Hill, CA 95037

Page 1 of 2

Work Order # : W2015-08-27-024
Sample (s) Received: August 27, 2015
Report Printed: September 07, 2015

Analysis Performed at:
Enartis Vinquiry
7795 Bell Road
Windsor, CA 95492

Analysis Report

				Date Analyzed
AF84808	15 Main Zin. BAM-FX1			
	Panel 3.5	Completed		
	Brix	26.9 °Brix	Refractometer*	08/27/15
	pH	3.40	Autotitrator	08/27/15
	Titratable Acidity	0.621 g/100mL	Autotitrator	08/27/15
	Ammonia	115 mg/L	Enzymatic*	08/27/15
	Assimilable Amino Nitrogen	165 mg/L	Spectrometer	08/27/15
	Malic Acid	291 mg/100mL	Enzymatic	08/27/15
	Copper	0.15 mg/L	AA	08/27/15
	Zinc	0.922 mg/L	AA*	09/03/15
AF84809	15 Main Zin. BAM-FX2			
	Panel 3.5	Completed		
	Brix	26.2 °Brix	Refractometer*	08/27/15
	pH	3.45	Autotitrator	08/27/15
	Titratable Acidity	0.827 g/100mL	Autotitrator	08/27/15
	Ammonia	97 mg/L	Enzymatic*	08/27/15
	Assimilable Amino Nitrogen	169 mg/L	Spectrometer	08/27/15
	Malic Acid	434 mg/100mL	Enzymatic	08/27/15
	Copper	0.11 mg/L	AA	08/27/15
	Zinc	0.705 mg/L	AA*	09/03/15
AF84810	15 Main Zin. BAM-FX3			
	Panel 3.5	Completed		
	Brix	28.5 °Brix	Refractometer*	08/27/15
	pH	3.39	Autotitrator	08/27/15
	Titratable Acidity	0.741 g/100mL	Autotitrator	08/27/15
	Ammonia	89 mg/L	Enzymatic*	08/27/15
	Assimilable Amino Nitrogen	147 mg/L	Spectrometer	08/27/15
	Malic Acid	298 mg/100mL	Enzymatic	08/27/15
	Copper	0.16 mg/L	AA	08/27/15
	Zinc	1.150 mg/L	AA*	09/03/15
AF84811	15 Main Zin. Control 1			
	Panel 3.5	Completed		
	Brix	27.5 °Brix	Refractometer*	08/27/15
	pH	3.39	Autotitrator	08/27/15
	Titratable Acidity	0.911 g/100mL	Autotitrator	08/27/15

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Work Order # : **W2015-08-27-024** **Analysis Report (cont.)** Page 2 of 2

AF84811 cont.

			Date Analyzed
Ammonia	122 mg/L	Enzymatic*	08/27/15
Assimilable Amino Nitrogen	177 mg/L	Spectrometer	08/27/15
Malic Acid	365 mg/100mL	Enzymatic	08/27/15
Copper	0.08 mg/L	AA	08/27/15
Zinc	0.372 mg/L	AA*	09/03/15

AF84812 15 Main Zin. Control 2

Panel 3.5	Completed		
Brix	26.7 °Brix	Refractometer*	08/27/15
pH	3.30	Autotitrator	08/27/15
Titratable Acidity	0.824 g/100mL	Autotitrator	08/27/15
Ammonia	81 mg/L	Enzymatic*	08/27/15
Assimilable Amino Nitrogen	126 mg/L	Spectrometer	08/27/15
Malic Acid	336 mg/100mL	Enzymatic	08/27/15
Copper	0.15 mg/L	AA	08/27/15
Zinc	0.368 mg/L	AA*	09/03/15

AF84813 15 Main Zin. Control 3

Panel 3.5	Completed		
Brix	28.6 °Brix	Refractometer*	08/27/15
pH	3.42	Autotitrator	08/27/15
Titratable Acidity	0.790 g/100mL	Autotitrator	08/27/15
Ammonia	93 mg/L	Enzymatic*	08/27/15
Assimilable Amino Nitrogen	145 mg/L	Spectrometer	08/27/15
Malic Acid	401 mg/100mL	Enzymatic	08/27/15
Copper	0.13 mg/L	AA	08/27/15
Zinc	0.776 mg/L	AA*	09/03/15

for Enartis Vinquiry

TTB Certified Laboratory

ilac-MRA A2LA ACCREDITED

Test Lab Cert # 2509.01

* These test results are not currently covered by our A2LA Accreditation

www.enartisvinquiry.com

MAIN BRANCH
7795 BELL ROAD
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PASO ROBLES BRANCH
1850 RAMADA DRIVE
PASO ROBLES
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TEL: 805 591 3321
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Client Code: 01-GUGW

Emilio Guglielmo Winery, Inc.
1480 E. Main Avenue
Morgan Hill, CA 95037

Analysis Performed at:
Enartis Vinquiry
7795 Bell Road
Windsor, CA 95492

Work Order # : W2015-08-27-034
Sample (s) Received: August 27, 2015
Report Printed: September 08, 2015

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Preliminary Analysis Report

AF84828 15 Main Zin. BAM FX1
Grape Phenolic Fingerprint Panel *
Tannin: 0.99 mg/g Epicatechin Equivalents
Total Anthocyanins: 29.84 mg/g Malvidin-3-glucoside equivalents
Total Phenolics: 37.6 AU/g

AF84829 15 Main Zin. BAM FX2
Grape Phenolic Fingerprint Panel *
Tannin: 0.96 mg/g Epicatechin Equivalents
Total Anthocyanins: 27.12 mg/g Malvidin-3-glucoside equivalents
Total Phenolics: 36.08 AU/g

AF84830 15 Main Zin. BAM FX3
Grape Phenolic Fingerprint Panel *
Tannin: 0.89 mg/g Epicatechin Equivalents
Total Anthocyanins: 25.28 mg/g Malvidin-3-glucoside equivalents
Total Phenolics: 33.92 AU/g

AF84831 15 Main Zin. Control 1
Grape Phenolic Fingerprint Panel *
Tannin: 1.05 mg/g Epicatechin Equivalents
Total Anthocyanins: 27.2 mg/g Malvidin-3-glucoside equivalents
Total Phenolics: 37.6 AU/g

AF84832 15 Main Zin. Control 2
Grape Phenolic Fingerprint Panel *
Tannin: 0.82 mg/g Epicatechin Equivalents
Total Anthocyanins: 17.36 mg/g Malvidin-3-glucoside equivalents
Total Phenolics: 29.04 AU/g

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Preliminary Analysis Report (cont.)

Work Order # : **W2015-08-27-034** **Page 2 of 2**

AF84833 cont.

AF84833 15 Main Zin. Control 3

Grape Phenolic Fingerprint Panel *

Tannin: 1.05 mg/g Epicatechin Equivalents

Total Anthocyanins: 21.76 mg/g Malvidin-3-glucoside equivalents

Total Phenolics: 35.12 AU/g