

Holden Research and Consulting

20pnewmanstrawberry01 Carbon Penetrant/PNGreen for Soil Amendment and Production Improvements for Coastal Strawberry

Trial ID: 20pnewmanstrawberry01	Location: Ventura, CA	Trial Year: 2020
Protocol ID: 20pnewmanstrawberry01	Investigator: David Holden	
Project ID:	Study Director: Matt Nicoletti	
	Sponsor Contact:	

Trt No.	Treatment Name	Other Rate	Other Rate Unit	Appl Code	Appl Description	Comment
1	Grower Standard	1	tbd			
2	Grower Standard Carbon Penetrant/PNGreen 1-3-3	1 2	tbd gal/ac	AB	A=4 weeks post transplant B=A+4 weeks	Drip tape applied

Replications: 6, Untreated treatments: 1, Design: Completely Random (Fully Randomized), Treatment units: Treated 'Plot' experimental unit size, Dry Form. Unit: %, Treated 'Plot' experimental unit size Width: 5.333 feet, Treated 'Plot' experimental unit size Length: 295 feet, Application volume: 200 L/ha, Mix size: 2 liters, Format definitions: G-All7.def, G-All7.frm

Product quantities required for listed treatments and applications of trials included in this table:

Amount*	Unit	Treatment Name	Form Conc	Form Type	Lot Code
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* 'Per area' calculations based on spray volume= 200 L/ha, mix size= 2 liters (mix size basis).
 * Adjusted for multiple applications in treatment list.

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General Trial Information

Study Director: Matt Nicoletti
Investigator: David Holden

Trial Status: F one-year/final **Trial Reliability:** GOOD
Initiation Date: Jul-22-2020 **Planned Completion Date:** Jan-31-2021
Completion Date: Dec-3-2020

Trial Location

City: Oxnard **Country:** USA United States
State/Prov.: California

Conducted Under GLP: No
Conducted Under GEP: No

Objectives:

To test a Penny Newman program in addition to a grower standard fertilizer program and compare to that grower standard fertilizer program for strawberry production in California

Conclusions:

Methods and Materials:

The variety of strawberry (cv. Portola) utilized for this trial was grown in a growers field in Ventura county, California. This trial was set up as a completely randomized block trial of two treatments (See included treatment table) with completely randomized data collection of six replicates maintained during the growing season. All treatments received in season applications of nutrients at various rates, along with seasonally necessitated foliar pest control. All rates and timing of test materials applied can be found in the tables associated with this report. No problems with phytotoxicity were noted through the use of any of these materials.

Results and Discussion:

All data for this trial will be found in this report, with production data also represented in the included Charts 1-8, along with soils and leaf reports from A&L Western Agricultural Laboratories.

Growth parameter ratings, along with the percentage of canopy coverage, will be found in data columns 1-3. Vigor and SPAD ratings were taken during this trial. Early season vigor ratings on a scale of 0-5, with 5 being the best looking plants, can be found in column 2. No significant differences in vigor were noted. SPAD (SPAD meters give a relative chlorophyll value with the higher the number indicating higher chlorophyll readings) readings at the same time as the first vigor reading (column 1) did not show any significant differences between treatments for this reading date. Canopy ground cover percentage (column 3) did not show any differences in leaf growth on the September reading date. This was measured using the Canopeo app from Oklahoma State University which allows for a quantifiable reading of canopy coverage by giving a percentage of how much of a plant's surface area is covered by the canopy(<https://appcenter.okstate.edu/content/canopeo>). Finally BRIX was measured several times during this trial as found in data columns 4, 5, and 6 with averages found in column 7 with no differences noted between treatments.

Charts 1-8 (and data in columns 7-30 averaged for the season in 31-38) tracks all marketable and

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unmarketable sampled fruit production for the picks commencing on October 5, 2020 and ending December 3, 2020. Charts 1 and 2 shows the marketable production in extrapolated calibrated trays per acre for all treatments for each pick day both on a daily and cumulative basis. As can be seen in Chart 2, treatment 2 (the Carbon Penetrant program) produced the most flats of strawberries during the trial period over the grower's standard with 1490 extrapolated flats per acre, compared to 1210 flats per acre for the grower standard program. A different perspective of how the rated production affected final grower returns is shown in Charts 3 and 4 which show the daily marketable returns based on USDA Shipping Point Market Prices found at [HTTP://\marketnews.usda.gov/portal](http://marketnews.usda.gov/portal) for each pick day. This data is represented as the net back to grower after costs of approximately \$6.00 per tray were removed that would represent picking labor, carton and tray costs, transportation to the cooler, and cooling costs associated with picking the strawberries. Based on this data, very nice cumulative returns to the farm over the grower standard was seen with a total of \$17,457 per acre for this program period for treatment 2 and over the grower standard of \$13,679. Chart 5 shows the daily market utilization for the berries picked during the season that is the percent of marketable berries to the total weight of berries picked, with both treatments averaging between 60 and 63%. Chart 6 shows the mean weight per marketable fruit during the season. In this case all treatments produced berries that were within 0.5 grams of weight on average. Chart 7 shows the net differential in returns to the farm for each pick day for the treatment programs over the grower standard, with a net gain of over \$3779 per acre found in treatments 2 over the grower standard program. Finally Chart 8 consolidates the estimated net return per flat prices per day paid back to the grower during this trial period. As can be seen in this data as the pick season progressed the return to the grower increase significantly over time and then declined at the end of this season.

Pre-treat soil report (Report 20-244-029) from A&L Labs is attached, which reported moderate rates of sodium and overall salt load (mmhos/cm), high ph, and low chlorides. Two in season soil reports are also included. Report 20-317-014, sample id's PNLN 1 and 2, representing the grower standard and Carbon Penetrant treated samples, report much lower sodium and pH, moderate salts, and very low chlorides in both treatments. Report 20-345-061, sample id's SBPN 1 and 2, representing the grower standard and Carbon Penetrant treated samples, report much higher sodium and pH, high salts, and moderate to high chlorides in both treatments. It should be noted that for the sodium, salts, and chloride ratings the Carbon Penetrant treated soils are higher in these salt ratings than the untreated soil. It should also be noted that the nitrate nitrogen, and sulfur, along with other elements are also higher in the Carbon Penetrant treated soils and that these elements would contribute to the overall saltiness of the soil at the end of the season. One last observation is on the lack of rain that has occurred during this fall.

All data rated as significant was done so utilizing the New Duncan's Multiple Test Range at a 90% confidence level.

Conclusions:

Based on the data collected for the research period very nice marketable yield increases were noted with the Carbon Penetrant program employed in this trial over the grower standard program. Based on the late soil report, one or two more applications of Carbon Penetrant may have helped lower the late season salt loads seen, particularly with the lack of rain.

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Critical Observations: It has been this researcher's observation over the past twenty years of working with hundreds of formulations and rates of "biostimulant" type products that in general for them to work, some type of abiotic or biotic stress factor needs to be present (as an aside I have recently coined the term Agricultural Stress Mitigators - ASM's for these products). This helps to explain much of the confusion over these products, why they work sometimes and not others, and the general skepticism with which they have been received. Plenty of stress in the form of heat and high winds significantly contributed to this falls plant stress levels.

Contacts

Study Director: Matt Nicoletti
Organization: Penny Newman

Investigator: David Holden
Organization: Holden Research and Consulting

Cooperator/Landowner

Organization: Becker Ranch

Crop Description

Crop 1: FRAVA Fragaria vesca var. americana	American strawberry
Variety: Portola	BBCH Scale: BDWE
	Planting Date: Jul-22-2020

Site and Design

Treated Plot Width: 5.333 FT	
Treated Plot Length: 295 FT	
Treated Plot Area: 1573.235 FT ²	Treatments: 2
Replications: 6	Study Design: COMRAN Completely Randomized (CRD)

Application Description

	A	B
Application Date:	Aug-26-2020	Sep-21-2020
Appl. Start Time:	0930	0945
Application Method:	IRRIGA	IRRIGA
Application Placement:	SOIL	SOIL
Applied By:	Holden	Holden
Air Temperature, Unit:	68 F	64 F
% Relative Humidity:	80	90
Wind Velocity, Unit:	1 mph	0 mph
Wind Direction:	e	w
Dew Presence (Y/N):	N no	N no
% Cloud Cover:	0	0
Next Moisture Occurred On:	Aug-26-2020	Sep-21-2020

Crop Stage At Each Application

	A	B
Crop 1 Code, BBCH Scale:	FRAVA BDWE	FRAVA BDWE

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Application Equipment

	A	B
Appl. Equipment:	Hypro Pump	Hypro Pump
Operation Pressure, Unit:	40 psi	40 psi
Carrier:	WATER	WATER
Spray Volume, Unit:	0 0	0 0
Mix Size, Unit:	2 Gallons	2 Gallons

Trt No Treatment Application Comment

1 No negative effects found from any treatments

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Pest Type	FRAAN BSTR	FRAAN BSTR	FRAAN BSTR	FRAAN BSTR
Pest Code				
Pest Scientific Name				
Pest Name				
Crop Code	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>
BBCH Scale	Garden strawbe>	Garden strawbe>	Garden strawbe>	Garden strawbe>
Crop Scientific Name				
Crop Name				
Crop Variety				
Description	Spad	Vigor	Canopeo	Brix
Part Rated				
Rating Date	Sep-17-2020	Sep-17-2020	Sep-17-2020	Oct-26-2020
Rating Type	CONDOC	VIGOR	CANOPY	SUGCON
Rating Unit	SPAD	0-5	percent	NUMBER
Sample Size, Unit		4 PLANT	4 PLANT	
Collection Basis, Unit				
Number of Subsamples	1	1	1	1
Crop Stage Majority				
Crop Stage Scale				
Crop Density, Unit				
Footnote Number				
Assessed By				
Rating Timing				
Days After First/Last Applic.	22 22	22 22	22 22	61 35
Trt-Eval Interval	22 DA-A	22 DA-A	22 DA-A	35 DA-B
Plant-Eval Interval	57 DP-1	57 DP-1	57 DP-1	96 DP-1
Days After Emergence				
ARM Action Codes				
Number of Decimals	1	1	1	1
Trt Treatment	1	2	3	4
No. Name				
1 Grower Standard	1 tbd			
	101	32.8	4.0	28.0
	201	28.6	4.0	32.0
	301	35.4	5.0	27.0
	401	31.4	4.0	33.0
	501	29.8	3.0	30.0
	601	34.5	4.0	26.0
	Mean =	32.1	4.0	29.3
2 Grower Standard	1 tbd			
Carbon Penetrant/PNGreen 1-3-3	2 gal/ac AB			
	102	34.8	4.0	35.0
	202	33.2	4.0	30.0
	302	31.7	5.0	24.0
	402	32.4	5.0	28.0
	502	32.3	4.0	25.0
	602	33.0	5.0	31.0
	Mean =	32.9	4.5	28.8

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	FRAAN BSTR	FRAAN BSTR	FRAAN BSTR	FRAAN BSTR
Pest Type				
Pest Code				
Pest Scientific Name				
Pest Name				
Crop Code				
BBCH Scale				
Crop Scientific Name	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>
Crop Name	Garden strawbe>	Garden strawbe>	Garden strawbe>	Garden strawbe>
Crop Variety			Seasonal Ave	field
Description	Brix	Brix	Brix	wt
Part Rated				BERMAR C
Rating Date	Nov-9-2020	Dec-7-2020	Dec-7-2020	Oct-5-2020
Rating Type	SUGCON	SUGCON	SUGCON	WEIFRE
Rating Unit	NUMBER	NUMBER	NUMBER	g
Sample Size, Unit				
Collection Basis, Unit				
Number of Subsamples	1	1	1	1
Crop Stage Majority				
Crop Stage Scale				
Crop Density, Unit				
Footnote Number				
Assessed By				
Rating Timing				
Days After First/Last Applic.	75 49	103 77	103 77	40 14
Trt-Eval Interval	49 DA-B	77 DA-B	77 DA-B	
Plant-Eval Interval	110 DP-1	138 DP-1	138 DP-1	75 DP-1
Days After Emergence				
ARM Action Codes			T21	
Number of Decimals	1	1	1	0
Trt Treatment	5	6	7	8
No. Name				
1 Grower Standard	1 tbd			
	101	5.0	5.4	5.1
	201	4.8	5.2	5.1
	301	5.2	6.0	5.3
	401	5.4	5.4	5.3
	501	5.4	5.0	5.2
	601	5.2	5.6	5.2
	Mean =	5.2	5.4	5.2
2 Grower Standard	1 tbd			
Carbon Penetrant/PNGreen 1-3-3	2 gal/ac AB			
	102	5.4	5.6	5.2
	202	5.2	5.8	5.3
	302	5.0	5.4	5.1
	402	5.6	5.6	5.4
	502	5.4	5.0	5.2
	602	5.0	5.2	5.0
	Mean =	5.3	5.4	5.2

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Pest Type				
Pest Code				
Pest Scientific Name				
Pest Name				
Crop Code				
BBCH Scale				
Crop Scientific Name	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>
Crop Name	Garden strawbe>	Garden strawbe>	Garden strawbe>	Garden strawbe>
Crop Variety				
Description				
Part Rated	number	wt/berry	wt	number
Rating Date	BERMAR C	BERMAR C	BERUNM C	BERUNM C
Rating Type	COUNT	WEIFRE	WEIFRE	COUNT
Rating Unit	NUMBER	g	g	NUMBER
Sample Size, Unit				
Collection Basis, Unit				
Number of Subsamples	1	1	1	1
Crop Stage Majority				
Crop Stage Scale				
Crop Density, Unit				
Footnote Number				
Assessed By				
Rating Timing				
Days After First/Last Applic.				
Trt-Eval Interval				
Plant-Eval Interval				
Days After Emergence				
ARM Action Codes		T1		
Number of Decimals	1	1	0	1
Trt Treatment	9	10	11	12
No. Name				
1 Grower Standard				
Other	1			
Rate	tbd			
Appl				
Unit				
Code				
Plot				
101	17.0	22.9	55	4.0
201	17.0	22.6	105	8.0
301	30.0	27.3	170	15.0
401	13.0	25.8	215	17.0
501	27.0	22.0	235	17.0
601	15.0	22.0	270	26.0
Mean =	19.8	23.8	175	14.5
2 Grower Standard				
Carbon Penetrant/PNGreen 1-3-3				
Other	1			
Rate	tbd			
Appl				
Unit				
Code				
Plot				
102	27.0	25.7	110	7.0
202	16.0	21.6	80	7.0
302	46.0	27.1	285	22.0
402	12.0	23.8	370	29.0
502	26.0	21.7	245	17.0
602	13.0	22.3	325	28.0
Mean =	23.3	23.7	236	18.3

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	FRAAN BSTR	FRAAN BSTR	FRAAN BSTR	FRAAN BSTR
Pest Type				
Pest Code				
Pest Scientific Name				
Pest Name				
Crop Code				
BBCH Scale				
Crop Scientific Name	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>
Crop Name	Garden strawbe>	Garden strawbe>	Garden strawbe>	Garden strawbe>
Crop Variety				field
Description				
Part Rated	wt/berry	total wt	Utilization	wt
Rating Date	BERUNM C	BERTOT c	BERMAR c	BERMAR C
Rating Type	WEIFRE	WEIFRE	PERCEN	Oct-26-2020
Rating Unit	g	g	%	WEIFRE
Sample Size, Unit				g
Collection Basis, Unit				
Number of Subsamples	1	1	1	1
Crop Stage Majority				
Crop Stage Scale				
Crop Density, Unit				
Footnote Number				
Assessed By				
Rating Timing				
Days After First/Last Applic.				61 35
Trt-Eval Interval				
Plant-Eval Interval				96 DP-1
Days After Emergence				
ARM Action Codes	T2	T3	T4	
Number of Decimals	1	0	1	0
Trt Treatment	13	14	15	16
No. Name				
1 Grower Standard	1 tbd			
	101	13.8	445	87.6
	201	13.1	490	78.6
	301	11.3	990	82.8
	401	12.6	550	60.9
	501	13.8	830	71.7
	601	10.4	600	55.0
	Mean =	12.5	651	72.8
2 Grower Standard	1 tbd			
Carbon Penetrant/PNGreen 1-3-3	2 gal/ac AB			
	102	15.7	805	86.3
	202	11.4	425	81.2
	302	13.0	1530	81.4
	402	12.8	655	43.5
	502	14.4	810	69.8
	602	11.6	615	47.2
	Mean =	13.1	807	68.2

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Pest Type	FRAAN	FRAAN	FRAAN	FRAAN
Pest Code	BSTR	BSTR	BSTR	BSTR
Pest Scientific Name	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>
Pest Name	Garden strawbe>	Garden strawbe>	Garden strawbe>	Garden strawbe>
Crop Code				
BBCH Scale				
Crop Scientific Name				
Crop Name				
Crop Variety				
Description				
Part Rated	number	wt/berry	wt	number
Rating Date	BERMAR C	BERMAR C	BERUNM C	BERUNM C
Rating Type	COUNT	WEIFRE	WEIFRE	COUNT
Rating Unit	NUMBER	g	g	NUMBER
Sample Size, Unit				
Collection Basis, Unit				
Number of Subsamples	1	1	1	1
Crop Stage Majority				
Crop Stage Scale				
Crop Density, Unit				
Footnote Number				
Assessed By				
Rating Timing				
Days After First/Last Applic.				
Trt-Eval Interval				
Plant-Eval Interval				
Days After Emergence				
ARM Action Codes		T5		
Number of Decimals	1	1	0	1
Trt Treatment	Other	Other	Appl	
No. Name	Rate	Rate	Unit Code Plot	
1 Grower Standard	1 tbd			17
			101	12.0
			201	7.0
			301	3.0
			401	3.0
			501	8.0
			601	3.0
			Mean =	6.0
2 Grower Standard	1 tbd			18
Carbon Penetrant/PNGreen 1-3-3	2 gal/ac	AB		
			102	10.0
			202	8.0
			302	10.0
			402	8.0
			502	8.0
			602	4.0
			Mean =	8.0
				19
				20
				21.3
				22.9
				18.3
				25.0
				23.1
				26.7
				22.9
				330
				210
				185
				130
				145
				110
				185
				26.0
				27.0
				26.0
				10.0
				15.0
				18.0
				20.3

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Pest Code				
Pest Scientific Name				
Pest Name				
Crop Code	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>
BBCH Scale	Garden strawbe>	Garden strawbe>	Garden strawbe>	Garden strawbe>
Crop Scientific Name				field
Crop Name				
Crop Variety				
Description				
Part Rated	wt/berry	total wt	Utilization	wt
Rating Date	BERUNM C	BERTOT c	BERMAR c	BERMAR C
Rating Type	WEIFRE	WEIFRE	PERCEN	Nov-16-2020
Rating Unit	g	g	%	WEIFRE
Sample Size, Unit				g
Collection Basis, Unit				
Number of Subsamples	1	1	1	1
Crop Stage Majority				
Crop Stage Scale				
Crop Density, Unit				
Footnote Number				
Assessed By				
Rating Timing				
Days After First/Last Applic.				82 56
Trt-Eval Interval				
Plant-Eval Interval				117 DP-1
Days After Emergence				
ARM Action Codes	T6	T7	T8	
Number of Decimals	1	0	1	0
Trt Treatment	21	22	23	24
No. Name				
1 Grower Standard	1 tbd			
	101	585	43.6	250
	201	370	43.2	145
	301	240	22.9	170
	401	205	36.6	70
	501	330	56.1	280
	601	190	42.1	215
	Mean =	320	40.8	188
2 Grower Standard	1 tbd			
Carbon Penetrant/PNGreen 1-3-3	2 gal/ac AB			
	102	590	42.4	305
	202	485	37.1	215
	302	480	44.8	170
	402	295	55.9	265
	502	350	54.3	105
	602	285	36.8	315
	Mean =	414	45.2	229

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Pest Code	BSTR	BSTR	BSTR	BSTR
Pest Scientific Name	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>
Pest Name	Garden strawbe>	Garden strawbe>	Garden strawbe>	Garden strawbe>
Crop Code				
BBCH Scale				
Crop Scientific Name				
Crop Name				
Crop Variety				
Description				
Part Rated	number	wt/berry	wt	number
Rating Date	BERMAR C	BERMAR C	BERUNM C	BERUNM C
Rating Type	COUNT	WEIFRE	WEIFRE	COUNT
Rating Unit	NUMBER	g	g	NUMBER
Sample Size, Unit				
Collection Basis, Unit				
Number of Subsamples	1	1	1	1
Crop Stage Majority				
Crop Stage Scale				
Crop Density, Unit				
Footnote Number				
Assessed By				
Rating Timing				
Days After First/Last Applic.				
Trt-Eval Interval				
Plant-Eval Interval				
Days After Emergence		T9		
ARM Action Codes				
Number of Decimals	1	1	0	1
Trt Treatment	Other	Other	Appl	
No. Name	Rate	Rate	Unit Code Plot	
1 Grower Standard	1 tbd		101	25
			201	26
			301	27
			401	28
			501	
			601	
			Mean =	
2 Grower Standard	1 tbd		102	
Carbon Penetrant/PNGreen 1-3-3	2 gal/ac	AB	202	
			302	
			402	
			502	
			602	
			Mean =	

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Pest Type	FRAAN BSTR	FRAAN BSTR	FRAAN BSTR	FRAAN BSTR
Pest Code				
Pest Scientific Name				
Pest Name				
Crop Code	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>
BBCH Scale	Garden strawbe>	Garden strawbe>	Garden strawbe>	Garden strawbe>
Crop Scientific Name				Seasonal Ave
Crop Name				
Crop Variety				
Description	wt/berry	total wt	Utilization	wt
Part Rated	BERUNM C	BERTOT c	BERMAR c	BERMAR C
Rating Date				
Rating Type	WEIFRE	WEIFRE	PERCEN	WEIFRE
Rating Unit	g	g	%	g
Sample Size, Unit				
Collection Basis, Unit				
Number of Subsamples	1	1	1	1
Crop Stage Majority				
Crop Stage Scale				
Crop Density, Unit				
Footnote Number				
Assessed By				
Rating Timing				
Days After First/Last Applic.				
Trt-Eval Interval				
Plant-Eval Interval				117 DP-1
Days After Emergence				
ARM Action Codes	T10	T11	T12	T13
Number of Decimals	1	0	1	0
Trt Treatment	Other	Other	Appl	
No. Name	Rate	Rate	Unit Code	Plot
1 Grower Standard	1 tbd			29
				30
				31
				32
				298
				230
				348
				160
				353
				208
				266
2 Grower Standard	1 tbd			417
Carbon Penetrant/PNGreen 1-3-3	2 gal/ac	AB		247
				543
				238
				287
				237
				328

Holden Research and Consulting

20pnewmanstrawberry01 Carbon Penetrant/PNGreen for Soil Amendment and Production Improvements for Coastal Strawberry

Trial ID: 20pnewmanstrawberry01	Location: Ventura, CA	Trial Year: 2020
Protocol ID: 20pnewmanstrawberry01	Investigator: David Holden	
Project ID:	Study Director: Matt Nicoletti	
	Sponsor Contact:	

Pest Type	FRAAN BSTR	FRAAN BSTR	FRAAN BSTR	FRAAN BSTR
Pest Code				
Pest Scientific Name				
Pest Name				
Crop Code				
BBCH Scale				
Crop Scientific Name	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>
Crop Name	Garden strawbe>	Garden strawbe>	Garden strawbe>	Garden strawbe>
Crop Variety	Seasonal Ave	Seasonal Ave	Seasonal Ave	Seasonal Ave
Description	number	wt/berry	wt	number
Part Rated	BERMAR C	BERMAR C	BERUNM C	BERUNM C
Rating Date				
Rating Type	COUNT	WEIFRE	WEIFRE	COUNT
Rating Unit	NUMBER	g	g	NUMBER
Sample Size, Unit				
Collection Basis, Unit				
Number of Subsamples	1	1	1	1
Crop Stage Majority				
Crop Stage Scale				
Crop Density, Unit				
Footnote Number				
Assessed By				
Rating Timing				
Days After First/Last Applic.				
Trt-Eval Interval				
Plant-Eval Interval				
Days After Emergence				
ARM Action Codes	T14	T17	T15	T16
Number of Decimals	1	1	0	1
Trt Treatment	33	34	35	36
No. Name				
1 Grower Standard	1 tbd			
	101	13.0	22.9	17.0
	201	10.3	22.3	9.0
	301	13.0	26.8	15.3
	401	6.0	26.7	11.3
	501	15.3	23.0	12.0
	601	8.7	24.0	15.7
	Mean =	11.1	24.3	13.4
2 Grower Standard	1 tbd			
Carbon Penetrant/PNGreen 1-3-3	2 gal/ac AB			
	102	16.7	25.0	16.3
	202	11.3	21.8	16.3
	302	21.0	25.9	21.7
	402	10.3	23.1	17.0
	502	12.7	22.6	15.0
	602	9.7	24.5	20.0
	Mean =	13.6	23.8	17.7

Holden Research and Consulting

20pnewmanstrawberry01 Carbon Penetrant/PNGreen for Soil Amendment and Production Improvements for Coastal Strawberry

Trial ID: 20pnewmanstrawberry01	Location: Ventura, CA	Trial Year: 2020
Protocol ID: 20pnewmanstrawberry01	Investigator: David Holden	
Project ID:	Study Director: Matt Nicoletti	
	Sponsor Contact:	

Pest Type	FRAAN BSTR	FRAAN BSTR	FRAAN BSTR
Pest Code			
Pest Scientific Name			
Pest Name			
Crop Code	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>
BBCH Scale	Garden strawbe>	Garden strawbe>	Garden strawbe>
Crop Scientific Name	Seasonal Ave	Seasonal Ave	Seasonal Ave
Crop Name	wt/berry	total wt	Utilization
Crop Variety	BERUNM C	BERTOT c	BERMAR c
Description			
Part Rated			
Rating Date			
Rating Type	WEIFRE	WEIFRE	PERCEN
Rating Unit	g	g	%
Sample Size, Unit			
Collection Basis, Unit			
Number of Subsamples	1	1	1
Crop Stage Majority			
Crop Stage Scale			
Crop Density, Unit			
Footnote Number			
Assessed By			
Rating Timing			
Days After First/Last Applic.			
Trt-Eval Interval			
Plant-Eval Interval			
Days After Emergence			
ARM Action Codes	T18	T19	T20
Number of Decimals	1	0	1
Trt Treatment	Other	Other	Appl
No. Name	Rate	Rate	Unit Code Plot
1 Grower Standard	1 tbd		101 10.2 201 12.8 301 10.8 401 11.6 501 12.4 601 10.5 Mean = 11.4
2 Grower Standard	1 tbd		102 13.1 202 11.1 302 11.8 402 12.2 502 12.1 602 11.0 Mean = 11.9
Carbon Penetrant/PNGreen 1-3-3	2 gal/ac	AB	202 11.1 302 11.8 402 12.2 502 12.1 602 11.0 Mean = 11.9
			37 38 39
			472 345 513 292 502 373 416 630 428 800 445 468 457 538 63.3 66.7 67.9 54.9 70.4 55.8 63.1 66.1 57.6 67.9 53.6 61.2 51.8 59.7

Holden Research and Consulting

20pnewmanstrawberry01 Carbon Penetrant/PNGreen for Soil Amendment and Production Improvements for Coastal Strawberry

Trial ID: 20pnewmanstrawberry01 Location: Ventura, CA Trial Year: 2020
Protocol ID: 20pnewmanstrawberry01 Investigator: David Holden
Project ID: Study Director: Matt Nicoletti
Sponsor Contact:

Crop Code

FRAAN, BSTR, Fragaria x ananassa, = US

Part Rated

BERMAR = berry - marketable
BERUNM = berry - unmarketable
BERTOT = berry - total
C = Crop is Part Rated

Rating Type

CONDUC = conductance
VIGOR = vigor
CANOPY = canopy
SUGCON = sugar content
WEIFRE = weight - fresh
COUNT = count
PERCEN = percent

Rating Unit

SPAD = spad
0-5 = 0-5 index/scale
NUMBER = number
g = gram
% = percent

PLANT = plant/plant biomass/shrub

Plant-Eval Interval

57 DP-1 = 1 FRAVA Jul-22-2020
96 DP-1 = 1 FRAVA Jul-22-2020
110 DP-1 = 1 FRAVA Jul-22-2020
138 DP-1 = 1 FRAVA Jul-22-2020
75 DP-1 = 1 FRAVA Jul-22-2020
117 DP-1 = 1 FRAVA Jul-22-2020

ARM Action Codes

T21 = $([4]+[5]+[6])/3$
T1 = $[C8]/[C9]$
T2 = $[C11]/[C12]$
T3 = $[C8]+[C11]$
T4 = $([C8]/[C14])*100$
T5 = $[C16]/[C17]$
T6 = $[C19]/[C20]$
T7 = $[C16]+[C19]$
T8 = $([C16]/[C22])*100$
T9 = $[C24]/[C25]$
T10 = $[C27]/[C28]$
T11 = $[C24]+[C27]$
T12 = $([C24]/[C30])*100$
T13 = $([C8]+[C16]+[C24])/3$
T14 = $([C9]+[C17]+[C25])/3$
T17 = $[C32]/[C33]$
T15 = $([C11]+[C19]+[C27])/3$
T16 = $([C12]+[C20]+[C28])/3$
T18 = $[C35]/[C36]$
T19 = $[C32]+[C35]$
T20 = $([C32]/[C38])*100$

Holden Research and Consulting

20pnewmanstrawberry01 Carbon Penetrant/PNGreen for Soil Amendment and Production Improvements for Coastal Strawberry

Trial ID: 20pnewmanstrawberry01	Location: Ventura, CA	Trial Year: 2020
Protocol ID: 20pnewmanstrawberry01	Investigator: David Holden	
Project ID:	Study Director: Matt Nicoletti	
	Sponsor Contact:	

	FRAAN BSTR	FRAAN BSTR	FRAAN BSTR	FRAAN BSTR
Pest Type				
Pest Code				
Pest Scientific Name				
Pest Name				
Crop Code	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>
BBCH Scale	Garden strawbe>	Garden strawbe>	Garden strawbe>	Garden strawbe>
Crop Scientific Name				
Crop Name				
Crop Variety				
Description	Spad	Vigor	Canopeo	Brix
Part Rated				
Rating Date	Sep-17-2020	Sep-17-2020	Sep-17-2020	Oct-26-2020
Rating Type	CONDUC	VIGOR	CANOPY	SUGCON
Rating Unit	SPAD	0-5	percent	NUMBER
Sample Size, Unit		4 PLANT	4 PLANT	
Collection Basis, Unit				
Number of Subsamples	1	1	1	1
Crop Stage Majority				
Crop Stage Scale				
Crop Density, Unit				
Footnote Number				
Assessed By				
Rating Timing				
Days After First/Last Applic.	22 22	22 22	22 22	61 35
Trt-Eval Interval	22 DA-A	22 DA-A	22 DA-A	35 DA-B
Plant-Eval Interval	57 DP-1	57 DP-1	57 DP-1	96 DP-1
Days After Emergence				
ARM Action Codes				
Number of Decimals	1	1	1	1
Trt Treatment No. Name	Other Rate	Other Rate	Appl Unit Code	
1 Grower Standard	1 tbd			
2 Grower Standard Carbon Penetrant/PNGreen 1-3-3	1 tbd 2 gal/ac	AB		
	1	2	3	4
	32.1 a	4.0 a	29.3 a	4.9 a
	32.9 a	4.5 a	28.8 a	4.9 a
LSD P=.10	2.12	0.62	3.66	0.24
Standard Deviation	2.02	0.59	3.50	0.23
CV	6.23	13.92	12.02	4.61
Bartlett's X2	3.458	0.098	0.646	0.098
P(Bartlett's X2)	0.063	0.754	0.422	0.754
Skewness	-0.4914	-0.1703	0.176	0.0012
Kurtosis	0.1072	-0.0913	-0.7449	-1.1527
Treatment F	0.489	2.143	0.061	0.065
Treatment Prob(F)	0.5004	0.1739	0.8093	0.8040

Means followed by same letter do not significantly differ (P=.10, Duncan's New MRT)
 Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.

Holden Research and Consulting

20pnewmanstrawberry01 Carbon Penetrant/PNGreen for Soil Amendment and Production Improvements for Coastal Strawberry

Trial ID: 20pnewmanstrawberry01	Location: Ventura, CA	Trial Year: 2020
Protocol ID: 20pnewmanstrawberry01	Investigator: David Holden	
Project ID:	Study Director: Matt Nicoletti	
	Sponsor Contact:	

Pest Type				
Pest Code				
Pest Scientific Name				
Pest Name				
Crop Code	FRAAN	FRAAN	FRAAN	FRAAN
BBCH Scale	BSTR	BSTR	BSTR	BSTR
Crop Scientific Name	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>
Crop Name	Garden strawbe>	Garden strawbe>	Garden strawbe>	Garden strawbe>
Crop Variety			Seasonal Ave	field
Description	Brix	Brix	Brix	wt
Part Rated				BERMAR C
Rating Date	Nov-9-2020	Dec-7-2020	Dec-7-2020	Oct-5-2020
Rating Type	SUGCON	SUGCON	SUGCON	WEIFRE
Rating Unit	NUMBER	NUMBER	NUMBER	g
Sample Size, Unit				
Collection Basis, Unit				
Number of Subsamples	1	1	1	1
Crop Stage Majority				
Crop Stage Scale				
Crop Density, Unit				
Footnote Number				
Assessed By				
Rating Timing				
Days After First/Last Applic.	75 49	103 77	103 77	40 14
Trt-Eval Interval	49 DA-B	77 DA-B	77 DA-B	
Plant-Eval Interval	110 DP-1	138 DP-1	138 DP-1	75 DP-1
Days After Emergence				
ARM Action Codes			T21	
Number of Decimals	1	1	1	0
Trt Treatment No. Name	5	6	7	8
Other Rate				
Other Rate				
Appl Unit Code				
1 Grower Standard	1 tbd	5.2 a	5.4 a	5.2 a
2 Grower Standard	1 tbd	5.3 a	5.4 a	5.2 a
Carbon Penetrant/PNGreen 1-3-3	2 gal/ac AB			476 a
LSD P=.10	0.25	0.34	0.12	308.7
Standard Deviation	0.24	0.32	0.11	295.1
CV	4.56	5.9	2.2	56.39
Bartlett's X2	0.006	0.117	0.675	1.832
P(Bartlett's X2)	0.939	0.732	0.411	0.176
Skewness	-0.189	0.2177	0.0219	1.668*
Kurtosis	-0.6666	-0.4163	0.1616	2.8339*
Treatment F	0.529	0.000	0.114	0.311
Treatment Prob(F)	0.4835	1.0000	0.7430	0.5894

Holden Research and Consulting

20pnewmanstrawberry01 Carbon Penetrant/PNGreen for Soil Amendment and Production Improvements for Coastal Strawberry

Trial ID: 20pnewmanstrawberry01	Location: Ventura, CA	Trial Year: 2020
Protocol ID: 20pnewmanstrawberry01	Investigator: David Holden	
Project ID:	Study Director: Matt Nicoletti	
	Sponsor Contact:	

	FRAAN BSTR	FRAAN BSTR	FRAAN BSTR	FRAAN BSTR
Pest Type				
Pest Code				
Pest Scientific Name				
Pest Name				
Crop Code				
BBCH Scale				
Crop Scientific Name	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>
Crop Name	Garden strawbe>	Garden strawbe>	Garden strawbe>	Garden strawbe>
Crop Variety				
Description				
Part Rated	number	wt/berry	wt	number
Rating Date	BERMAR C	BERMAR C	BERUNM C	BERUNM C
Rating Type	COUNT	WEIFRE	WEIFRE	COUNT
Rating Unit	NUMBER	g	g	NUMBER
Sample Size, Unit				
Collection Basis, Unit				
Number of Subsamples	1	1	1	1
Crop Stage Majority				
Crop Stage Scale				
Crop Density, Unit				
Footnote Number				
Assessed By				
Rating Timing				
Days After First/Last Applic.				
Trt-Eval Interval				
Plant-Eval Interval				
Days After Emergence				
ARM Action Codes		T1		
Number of Decimals	1	1	0	1
Trt Treatment No. Name	9	10	11	12
1 Grower Standard	19.8 a	23.8 a	175 a	14.5 a
2 Grower Standard Carbon Penetrant/PNGreen 1-3-3	23.3 a	23.7 a	236 a	18.3 a
	1 tbd		1 tbd	
	2 gal/ac	AB		
LSD P=.10	10.79	2.35	105.7	9.22
Standard Deviation	10.32	2.25	101.1	8.81
CV	47.8	9.48	49.2	53.69
Bartlett's X2	1.696	0.002	0.596	0.268
P(Bartlett's X2)	0.193	0.962	0.44	0.604
Skewness	1.3903*	0.7289	-0.0283	0.0707
Kurtosis	2.0321	-1.1809	-1.1413	-1.289
Treatment F	0.345	0.005	1.087	0.567
Treatment Prob(F)	0.5698	0.9431	0.3217	0.4686

Holden Research and Consulting

20pnewmanstrawberry01 Carbon Penetrant/PNGreen for Soil Amendment and Production Improvements for Coastal Strawberry

Trial ID: 20pnewmanstrawberry01	Location: Ventura, CA	Trial Year: 2020
Protocol ID: 20pnewmanstrawberry01	Investigator: David Holden	
Project ID:	Study Director: Matt Nicoletti	
	Sponsor Contact:	

	FRAAN BSTR	FRAAN BSTR	FRAAN BSTR	FRAAN BSTR
Pest Type				
Pest Code				
Pest Scientific Name				
Pest Name				
Crop Code	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>
BBCH Scale	Garden strawbe>	Garden strawbe>	Garden strawbe>	Garden strawbe>
Crop Scientific Name				field
Crop Name				wt
Crop Variety				BERMAR C
Description	wt/berry	total wt	Utilization	Oct-26-2020
Part Rated	BERUNM C	BERTOT c	BERMAR c	WEIFRE
Rating Date				WEIFRE
Rating Type	WEIFRE	WEIFRE	PERCEN	WEIFRE
Rating Unit	g	g	%	g
Sample Size, Unit				
Collection Basis, Unit				
Number of Subsamples	1	1	1	1
Crop Stage Majority				
Crop Stage Scale				
Crop Density, Unit				
Footnote Number				
Assessed By				
Rating Timing				
Days After First/Last Applic.				61 35
Trt-Eval Interval				
Plant-Eval Interval				96 DP-1
Days After Emergence				
ARM Action Codes	T2	T3	T4	
Number of Decimals	1	0	1	0
Trt Treatment No. Name	Other Rate	Other Rate	Appl Unit Code	
1 Grower Standard	1 tbd			13
2 Grower Standard Carbon Penetrant/PNGreen 1-3-3	1 tbd 2 gal/ac	AB		14
				15
				16
LSD P=.10	12.5 a	651 a	72.8 a	135 a
Standard Deviation	13.1 a	807 a	68.2 a	184 a
CV	1.60	323.6	16.67	68.2
Bartlett's X2	1.53	309.3	15.93	65.2
P(Bartlett's X2)	11.89	42.44	22.6	40.86
Skewness	0.153	1.523	0.658	1.009
Kurtosis	0.695	0.217	0.417	0.315
Treatment F	0.2402	1.7526*	-0.691	-0.2095
Treatment Prob(F)	-0.0836	3.8219*	-0.9433	-1.1056
	0.520	0.761	0.245	1.706
	0.4872	0.4033	0.6312	0.2208

Holden Research and Consulting

20pnewmanstrawberry01 Carbon Penetrant/PNGreen for Soil Amendment and Production Improvements for Coastal Strawberry

Trial ID: 20pnewmanstrawberry01	Location: Ventura, CA	Trial Year: 2020
Protocol ID: 20pnewmanstrawberry01	Investigator: David Holden	
Project ID:	Study Director: Matt Nicoletti	
	Sponsor Contact:	

	FRAAN BSTR	FRAAN BSTR	FRAAN BSTR	FRAAN BSTR
Pest Type				
Pest Code				
Pest Scientific Name				
Pest Name				
Crop Code				
BBCH Scale				
Crop Scientific Name	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>
Crop Name	Garden strawbe>	Garden strawbe>	Garden strawbe>	Garden strawbe>
Crop Variety				
Description				
Part Rated	number	wt/berry	wt	number
Rating Date	BERMAR C	BERMAR C	BERUNM C	BERUNM C
Rating Type	COUNT	WEIFRE	WEIFRE	COUNT
Rating Unit	NUMBER	g	g	NUMBER
Sample Size, Unit				
Collection Basis, Unit				
Number of Subsamples	1	1	1	1
Crop Stage Majority				
Crop Stage Scale				
Crop Density, Unit				
Footnote Number				
Assessed By				
Rating Timing				
Days After First/Last Applic.				
Trt-Eval Interval				
Plant-Eval Interval				
Days After Emergence				
ARM Action Codes		T5		
Number of Decimals	1	1	0	1
Trt Treatment No. Name	17	18	19	20
Other Rate				
Other Rate				
Appl Unit Code				
1 Grower Standard	1 tbd	6.0 a	22.9 a	185 a
2 Grower Standard	1 tbd	8.0 a	23.3 a	230 a
Carbon Penetrant/PNGreen 1-3-3	2 gal/ac			
AB				
LSD P=.10	3.17	2.67	86.4	7.44
Standard Deviation	3.03	2.55	82.6	7.11
CV	43.33	11.05	39.81	38.08
Bartlett's X2	1.237	0.443	0.02	0.001
P(Bartlett's X2)	0.266	0.505	0.887	0.977
Skewness	-0.1351	-0.2843	0.5971	0.3747
Kurtosis	-1.1423	-0.2407	-1.2086	-1.4416
Treatment F	1.304	0.073	0.890	0.660
Treatment Prob(F)	0.2800	0.7920	0.3677	0.4356

Holden Research and Consulting

20pnewmanstrawberry01 Carbon Penetrant/PNGreen for Soil Amendment and Production Improvements for Coastal Strawberry

Trial ID: 20pnewmanstrawberry01	Location: Ventura, CA	Trial Year: 2020
Protocol ID: 20pnewmanstrawberry01	Investigator: David Holden	
Project ID:	Study Director: Matt Nicoletti	
	Sponsor Contact:	

	FRAAN BST R	FRAAN BST R	FRAAN BST R	FRAAN BST R
Pest Type				
Pest Code				
Pest Scientific Name				
Pest Name				
Crop Code				
BBCH Scale				
Crop Scientific Name	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>
Crop Name	Garden strawbe>	Garden strawbe>	Garden strawbe>	Garden strawbe>
Crop Variety				field
Description	wt/berry	total wt	Utilization	wt
Part Rated	BERUNM C	BERTOT c	BERMAR c	BERMAR C
Rating Date				Nov-16-2020
Rating Type	WEIFRE	WEIFRE	PERCEN	WEIFRE
Rating Unit	g	g	%	g
Sample Size, Unit				
Collection Basis, Unit				
Number of Subsamples	1	1	1	1
Crop Stage Majority				
Crop Stage Scale				
Crop Density, Unit				
Footnote Number				
Assessed By				
Rating Timing				
Days After First/Last Applic.				82 56
Trt-Eval Interval				
Plant-Eval Interval				117 DP-1
Days After Emergence				
ARM Action Codes	T6	T7	T8	
Number of Decimals	1	0	1	0
Trt Treatment No. Name	21	22	23	24
Other Rate				
Other Rate				
Appl Unit Code				
1 Grower Standard	1 tbd	10.9 a	320 a	40.8 a
2 Grower Standard	1 tbd	11.4 a	414 a	45.2 a
Carbon Penetrant/PNGreen 1-3-3	2 gal/ac AB			188 a
LSD P=.10	1.48	142.1	10.07	82.8
Standard Deviation	1.42	135.9	9.63	79.2
CV	12.71	37.01	22.4	37.92
Bartlett's X2	0.022	0.165	0.344	0.023
P(Bartlett's X2)	0.881	0.685	0.557	0.878
Skewness	0.4299	0.4779	-0.3759	-0.3306
Kurtosis	-1.3129	-1.0038	0.6665	-0.8699
Treatment F	0.320	1.441	0.647	0.798
Treatment Prob(F)	0.5841	0.2577	0.4397	0.3926

Holden Research and Consulting

20pnewmanstrawberry01 Carbon Penetrant/PNGreen for Soil Amendment and Production Improvements for Coastal Strawberry

Trial ID: 20pnewmanstrawberry01	Location: Ventura, CA	Trial Year: 2020
Protocol ID: 20pnewmanstrawberry01	Investigator: David Holden	
Project ID:	Study Director: Matt Nicoletti	
	Sponsor Contact:	

Pest Type	FRAAN BSTR	FRAAN BSTR	FRAAN BSTR	FRAAN BSTR
Pest Code				
Pest Scientific Name				
Pest Name				
Crop Code	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>
BBCH Scale	Garden strawbe>	Garden strawbe>	Garden strawbe>	Garden strawbe>
Crop Scientific Name				
Crop Name				
Crop Variety				
Description				
Part Rated	number	wt/berry	wt	number
Rating Date	BERMAR C	BERMAR C	BERUNM C	BERUNM C
Rating Type	COUNT	WEIFRE	WEIFRE	COUNT
Rating Unit	NUMBER	g	g	NUMBER
Sample Size, Unit				
Collection Basis, Unit				
Number of Subsamples	1	1	1	1
Crop Stage Majority				
Crop Stage Scale				
Crop Density, Unit				
Footnote Number				
Assessed By				
Rating Timing				
Days After First/Last Applic.				
Trt-Eval Interval				
Plant-Eval Interval				
Days After Emergence				
ARM Action Codes		T9		
Number of Decimals	1	1	0	1
Trt Treatment No. Name	25	26	27	28
1 Grower Standard	7.3 a	26.9 a	89 b	8.7 b
2 Grower Standard Carbon Penetrant/PNGreen 1-3-3	9.5 a	24.3 a	164 a	14.5 a
LSD P=.10	3.45	3.74	43.6	4.06
Standard Deviation	3.30	3.58	41.7	3.88
CV	39.2	13.96	32.92	33.53
Bartlett's X2	0.015	3.882	0.338	4.243
P(Bartlett's X2)	0.902	0.049*	0.561	0.039*
Skewness	-0.5418	1.4417*	-0.2875	-0.7005
Kurtosis	-0.4672	3.5846*	-0.2943	-0.6177
Treatment F	1.294	1.574	9.703	6.768
Treatment Prob(F)	0.2818	0.2381	0.0110	0.0264

Holden Research and Consulting

20pnewmanstrawberry01 Carbon Penetrant/PNGreen for Soil Amendment and Production Improvements for Coastal Strawberry

Trial ID: 20pnewmanstrawberry01	Location: Ventura, CA	Trial Year: 2020
Protocol ID: 20pnewmanstrawberry01	Investigator: David Holden	
Project ID:	Study Director: Matt Nicoletti	
	Sponsor Contact:	

	FRAAN BSTR	FRAAN BSTR	FRAAN BSTR	FRAAN BSTR
Pest Type				
Pest Code				
Pest Scientific Name				
Pest Name				
Crop Code	FRAAN	FRAAN	FRAAN	FRAAN
BBCH Scale	BSTR	BSTR	BSTR	BSTR
Crop Scientific Name	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>
Crop Name	Garden strawbe>	Garden strawbe>	Garden strawbe>	Garden strawbe>
Crop Variety				Seasonal Ave
Description	wt/berry	total wt	Utilization	wt
Part Rated	BERUNM C	BERTOT c	BERMAR c	BERMAR C
Rating Date				
Rating Type	WEIFRE	WEIFRE	PERCEN	WEIFRE
Rating Unit	g	g	%	g
Sample Size, Unit				
Collection Basis, Unit				
Number of Subsamples	1	1	1	1
Crop Stage Majority				
Crop Stage Scale				
Crop Density, Unit				
Footnote Number				
Assessed By				
Rating Timing				
Days After First/Last Applic.				
Trt-Eval Interval				
Plant-Eval Interval				117 DP-1
Days After Emergence				
ARM Action Codes	T10	T11	T12	T13
Number of Decimals	1	0	1	0
Trt Treatment No. Name	Other Rate	Other Rate	Appl Unit Code	
1 Grower Standard	1 tbd			29
2 Grower Standard	1 tbd			30
Carbon Penetrant/PNGreen 1-3-3	2 gal/ac	AB		31
LSD P=.10	10.7 a	278 b	67.9 a	32
Standard Deviation	11.2 a	393 a	56.9 a	
CV	1.60	101.4	12.02	109.8
Bartlett's X2	1.53	96.9	11.49	105.0
P(Bartlett's X2)	14.01	28.89	18.42	35.33
Skewness	1.637	0.151	0.004	0.984
Kurtosis	0.201	0.697	0.952	0.321
Treatment F	-0.4827	-0.6408	0.0537	1.1983
Treatment Prob(F)	-0.1083	0.0822	-0.1514	1.582
	0.403	4.288	2.753	1.035
	0.5399	0.0652	0.1281	0.3330

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	Sponsor Contact:	

Pest Type	FRAAN BSTR	FRAAN BSTR	FRAAN BSTR	FRAAN BSTR
Pest Code				
Pest Scientific Name				
Pest Name				
Crop Code	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>
BBCH Scale	Garden strawbe>	Garden strawbe>	Garden strawbe>	Garden strawbe>
Crop Scientific Name	Seasonal Ave	Seasonal Ave	Seasonal Ave	Seasonal Ave
Crop Name	number	wt/berry	wt	number
Crop Variety	BERMAR C	BERMAR C	BERUNM C	BERUNM C
Description				
Part Rated				
Rating Date				
Rating Type	COUNT	WEIFRE	WEIFRE	COUNT
Rating Unit	NUMBER	g	g	NUMBER
Sample Size, Unit				
Collection Basis, Unit				
Number of Subsamples	1	1	1	1
Crop Stage Majority				
Crop Stage Scale				
Crop Density, Unit				
Footnote Number				
Assessed By				
Rating Timing				
Days After First/Last Applic.				
Trt-Eval Interval				
Plant-Eval Interval				
Days After Emergence				
ARM Action Codes	T14	T17	T15	T16
Number of Decimals	1	1	0	1
Trt Treatment No. Name	33	34	35	36
Other Rate				
Other Rate				
Appl Unit Code				
1 Grower Standard	11.1 a	24.3 a	150 b	13.4 b
2 Grower Standard Carbon Penetrant/PNGreen 1-3-3	13.6 a	23.8 a	210 a	17.7 a
	1 tbd			
	2 gal/ac			AB
LSD P=.10	4.10	1.86	26.6	2.96
Standard Deviation	3.92	1.78	25.4	2.83
CV	31.81	7.41	14.13	18.18
Bartlett's X2	0.31	0.253	0.212	0.168
P(Bartlett's X2)	0.578	0.615	0.645	0.682
Skewness	0.7322	0.4741	0.2636	-0.198
Kurtosis	0.9983	-1.1184	-0.0272	0.1942
Treatment F	1.273	0.226	16.864	7.045
Treatment Prob(F)	0.2856	0.6446	0.0021	0.0241

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	Sponsor Contact:	

Pest Type			
Pest Code			
Pest Scientific Name			
Pest Name			
Crop Code	FRAAN	FRAAN	FRAAN
BBCH Scale	BSTR	BSTR	BSTR
Crop Scientific Name	Fragaria x ana>	Fragaria x ana>	Fragaria x ana>
Crop Name	Garden strawbe>	Garden strawbe>	Garden strawbe>
Crop Variety	Seasonal Ave	Seasonal Ave	Seasonal Ave
Description	wt/berry	total wt	Utilization
Part Rated	BERUNM C	BERTOT c	BERMAR c
Rating Date			
Rating Type	WEIFRE	WEIFRE	PERCEN
Rating Unit	g	g	%
Sample Size, Unit			
Collection Basis, Unit			
Number of Subsamples	1	1	1
Crop Stage Majority			
Crop Stage Scale			
Crop Density, Unit			
Footnote Number			
Assessed By			
Rating Timing			
Days After First/Last Applic.			
Trt-Eval Interval			
Plant-Eval Interval			
Days After Emergence			
ARM Action Codes	T18	T19	T20
Number of Decimals	1	0	1
Trt Treatment No. Name	Other Rate	Other Rate	Appl Unit Code
1 Grower Standard	1 tbd	37	38
2 Grower Standard Carbon Penetrant/PNGreen 1-3-3	1 tbd 2 gal/ac AB	11.4 a	538 a
		11.9 a	63.1 a
LSD P=.10	0.96	128.8	6.83
Standard Deviation	0.91	123.1	6.52
CV	7.86	25.8	10.62
Bartlett's X2	0.486	1.037	0.001
P(Bartlett's X2)	0.486	0.308	0.979
Skewness	-0.0244	1.2538	-0.1464
Kurtosis	-1.0985	2.4281	-1.6376
Treatment F	0.930	2.945	0.833
Treatment Prob(F)	0.3577	0.1169	0.3828

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Project ID: Study Director: Matt Nicoletti
Sponsor Contact:

Crop Code

FRAAN, BSTR, Fragaria x ananassa, = US

Part Rated

BERMAR = berry - marketable
BERUNM = berry - unmarketable
BERTOT = berry - total
C = Crop is Part Rated

Rating Type

CONDUC = conductance
VIGOR = vigor
CANOPY = canopy
SUGCON = sugar content
WEIFRE = weight - fresh
COUNT = count
PERCEN = percent

Rating Unit

SPAD = spad
0-5 = 0-5 index/scale
NUMBER = number
g = gram
% = percent

PLANT = plant/plant biomass/shrub

Plant-Eval Interval

57 DP-1 = 1 FRAVA Jul-22-2020
96 DP-1 = 1 FRAVA Jul-22-2020
110 DP-1 = 1 FRAVA Jul-22-2020
138 DP-1 = 1 FRAVA Jul-22-2020
75 DP-1 = 1 FRAVA Jul-22-2020
117 DP-1 = 1 FRAVA Jul-22-2020

ARM Action Codes

T21 = $([4]+[5]+[6])/3$
T1 = $[C8]/[C9]$
T2 = $[C11]/[C12]$
T3 = $[C8]+[C11]$
T4 = $([C8]/[C14])*100$
T5 = $[C16]/[C17]$
T6 = $[C19]/[C20]$
T7 = $[C16]+[C19]$
T8 = $([C16]/[C22])*100$
T9 = $[C24]/[C25]$
T10 = $[C27]/[C28]$
T11 = $[C24]+[C27]$
T12 = $([C24]/[C30])*100$
T13 = $([C8]+[C16]+[C24])/3$
T14 = $([C9]+[C17]+[C25])/3$
T17 = $[C32]/[C33]$
T15 = $([C11]+[C19]+[C27])/3$
T16 = $([C12]+[C20]+[C28])/3$
T18 = $[C35]/[C36]$
T19 = $[C32]+[C35]$
T20 = $([C32]/[C38])*100$

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20pnewmanstrawberry01 Carbon Penetrant/PNGreen for Soil Amendment and Production Improvements for Coastal Strawberry

Protocol ID: 20pnewmanstrawberry01 Location: Ventura, CA Trial Year: 2020
Trial ID: By: David Holden
Project ID: Study Director: Matt Nicoletti
Sponsor Contact:

Trial Establishment Guidelines

Revision Date: Feb-18-2020 **Developer:** David/Dennis
Issue Date: Dec-6-2019

Number of Trials
1

Total Trials: 1

Conduct Under GLP: No
Conduct Under GEP: No

Objectives:

To test a Penny Newman program in addition to a grower standard fertilizer program and compare to that grower standard fertilizer program for strawberry production in California

Crop Description

Crop 1: FRAVA *Fragaria vesca* var. americana American strawberry
Variety: Portola?
BBCH Scale: BDWE

Application Directions:

Crop Stage At Each Application

	A
Crop 1 Code, BBCH Scale:	FRAVA BDWE

Geographic Area/Environmental Considerations:

Commercially grown strawberries in Ventura county, California. July planting for fall production

Cropping Considerations:

Strawberries

Data to Collect:

Pre-plant general soil levels of all nutrients, end of season levels of all soil nutrients close to harvest for each treatment zone. Include sodium and chloride levels

Growth ratings of plants in season over time, along with SPAD analysis of leaf chlorophyll.

Yield at harvest divided into marketable and unmarketable strawberries for 16-18 pick days in-season, replicated six times (each pick date is a replicate of 24 plants) with extrapolation to total estimated yield per acre. Picks to end in late November to early December as peak production slows down.

BRIX ratings on at least four picks.

Statistical Analysis:

LSD or DMRT as appropriate at 90%

Summarize and Submit Study By (Date): Jan-31-2021

