UNIVERSITY OF HORTICULTURAL SCIENCES, BAGALKOT

Report

On

EFFECT OF STRUCTURED WATER ON YIELD AND QUALITY OF GRAPE (*Vitis vinifera L.*) VARIETY THOMPSON SEEDLESS

Sponsored by

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No: DR/UHSB/Chem. Test/ 407 /2015-16 /729 Date: 09.06.2015

To,

G Radhakrishnan,
President
VWF Industries (P) Ltd.,
#90, K.R.S. Road, Metagalli,
Mysore – 570 016

Sir,

Sub: Submission of final report on Grape...Reg.
Ref: ADRE/MHREC/UHS/BGK/128/15-16 dated 04.06.2015

With reference to the subject cited above, Please find enclosed herewith the final report on chemical testing trail entitled **"Effect of structured water on yield and quality of Grape (*Visit vinifera L.*) Variety Thompson Seddless"** for the season 2014-15 field trial conducted at Division of Fruit Science, Sector No. 70, University of Horticultural Sciences, Navanagar, Bagalkot. This is for your kind information and needful.

Yours faithfully

Director of Research
UHS, Bagalkot

Director of Research
University of Horticulture Sciences
Navanagar, BAGALKOT-587 102

Copy to

1) Mr. Sateesh Pattepur., Asst. Prof. of Fruit Science, MHRES, UHS, Bagalkot for information
2) Office copy

Directorate of Research
OUT WARD
Date 09.06.15
No 407
File No:
UHS BAGALKOT

1.	Title of the Project	**Effect of structured water on yield and quality of Grape (*Vitis vinifera L.*) variety Thompson Seedless**
2	Name of the Research Station	**Division of Fruit Science, Sector No.70,** **University of Horticultural Sciences,** **Navnagar, Bagalkot – 587104, Karnataka**
3	Source of Funding	**VWF Industries Pvt.Ltd,** **90,KRS Road, Metagally,** **Mysore - 570016**
4.	Principal Investigator	**Mr. Sateesh Pattepur** Assistant Professor (Fruit Science) Division of fruit science, Sector 70 MHREC, Udyanagiri, Bagalkot- 587103 Cell:9448188570 Email:sateeshpattepur@rediffmail.com
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6.	Period (Month and Year)	01.04.2014 to 31.12.2014
7.	Objectives	1. To know the effect of structured water on yield and quality of Grape.

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Introduction

Structured Water units create a tuned environment where water is caused to flow in specific geometrical patterns. The flows and counter flows create an environment of dynamic shear and pressure differentials that turn water into a machine. This technology employs an innovative application and advanced understanding of the vortex phenomenon utilizing the dynamic characteristic of water itself to create a "Natural Action Unit" that works at the molecular level. This "Natural Action Unit" alters the molecular structure of the water activating and retaining the healthfull benefits of minerals and characteristics.

Specially tuned geometry creates an energy environment for water to structure itself. This gives water a lower surface tension and better hydrating properties. This geometric technology breaks up large low energy water molecule clusters into smaller high energy clusters. This innovative technology eliminates negative energy patterns (sometimes called the memory of water) and redefines the water's natural healthy energy pattern. It is reported that, by irrigating with structured water, plants grow well, fruit and nut trees mature sooner, healthy with dense foliage and well – developed trunks, significant increases in shelf life, significant increases in nutrient density, 30-50% reduction in water use, more drought resistant, heat and freeze resistant, as well as pest and disease resistant etc. Crops water with structured water have higher nutritional and sugar levels (brix levels)

Methodology

To study the **Effect of structured water on yield and quality of grape (*Vitis vinifera L.*) variety Thompson Seedless,** the experiment was conducted at Division of Fruit Science, Sector No. 70, MHREC, UHS, Navanagar, Bagalkot during 2014-15. The experiment was laid out in Split Plot Design. Four years old vines planted at a distance of 3.3m x 1.6m were selected for the study.

The experiment was laid out with three replications and five treatments comprising of two main treatments i.e. structured water (M_1) and bore well water (M_2) and sub treatments are different levels of fertilizer i.e. recommended dose of fertilizer 100% RDF (As per package of practice and it is 300: 500: 1000 kg NPK/ ha.), 90% RDF, 80% RDF, 70% RDF and 60% RDF.

For each treatment , three vines were selected. The treatments were imposed as per the plan after installation of structured water unit. Observations were recorded from the selected vines. The bunches were harvested separately as per the treatments and were used for recording yield and quality parameters. The data were analyzed and presented in the tables.

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Treatment details

Design - Split plot

Main Treatments

M_1: Structured water

M_2: Bore well water

Sub – Treatments

S_1: RDF (As per package of practice and it is 300: 500: 1000 kg NPK/ ha.)

S_2: 90 % of the RDF

S_3: 80 % of the RDF

S_4: 70 % of the RDF

S_5: 60 % of the RDF

Observation recorded

Yield Parameters

a. No. of panicles per vine (No.)

b. Average weight of bunch (g)

d. Average weight of 100 berries (g)

e. TSS (°Brix)

f. Acidity (%)

g. Yield / vine (kg)

h. Yield / ha (t)

Results

(i) Impact of structured water unit on water quality:

Irrigation water samples for the proposed study were collected before and after treatment with structured water unit. These samples were analyzed for pH, Electrical Conductivity and Total dissolved Solids (TDS), Ca, mg, Chloride, Fluoride, Nitrate, Sulfate, CaCo3, were analysed.The results were furnished in Table 1 and 2.

Table 1. Characteristics of structured and Bore well water

Parameters	Structured Water	Bore well water
pH	6.9	7.2
EC (dSm^{-1})	0.83	0.86
TDS (mg/L)	511	515
Calcium (mg/L)	136	147
Magnesium (mg/L)	4	10
Chloride (mg/L)	116	120
Fluoride (mg/L)	0.5	0.5
Nitrate (mg/L)	00	00
Sulfate (mg/L)	101	100
Alkalinity (as CaCo3) (mg/L)	340	400
Iron (mg/L)	0.1	0.1
Total hardness (mg/L)	360	364

Table 2. pH and EC of Structured Water and Bore Well Water:

Water quality parameter were analyzed and presented in table 2. The results of different months showed that, when the bore well water passed with structured water unit pH and EC of water was slightly changed and found that there as reduction in EC. This indicates that structured water has neutral pH with lesser EC helps in easy absorption of nutrients from soil solution, which inturn helps in faster growth and development of vine.

Months	pH		EC	
	SW	BW	SW	BW
April – 2014	7.32	7.41	0.95	0.98
May	7.22	7.34	0.97	0.99
June	6.85	7.00	0.84	0.86
July	7.10	7.30	0.85	0.91
August	6.90	7.00	0.96	1.00
September	7.12	7.25	0.94	1.00
October	7.00	7.30	0.92	0.95
November	7.00	7.10	0.92	0.95
December	7.01	7.20	0.91	0.95
January – 2015	6.80	7.40	0.84	0.86
February	7.00	7.30	0.90	0.96

Table 3. Effect of structured and bore well water on number of panicles per vine

Type of water and fertilizer levels and their interaction showed significant effect on number of panicles per vine. Among the type of water, structured water showed significantly higher number of panicles per vine (92.35) as compared to bore well water (91.14).

Number of panicles per vine was significantly influenced by levels of fertilizer, with 100% RDF showing higher number of panicles per vine. With respect to interaction between structured water and fertilizer level, structured water with 100% RDF showed significantly higher number of panicles per vine (102.13) as compared to other treatments.

Table 3. Effect of structured and bore well water on number of panicles / vine

Water treatment	Fertilizer level					
	S_1	S_2	S_3	S_4	S_5	Average
M_1 – Structured water	102.13	99.25	99.05	87.12	74.18	92.35
M_2 – Bore well water	99.26	99.00	96.60	86.71	74.11	91.14
Mean	**100.69**	**99.13**	**97.83**	**86.91**	**74.15**	
	SEm±	**CD (0.05)**				
Water treatment (A)	**0.07**	**0.42**				
Fertilizer level (B)	**0.20**	**0.60**				
Interaction (Ax B)	**0.26**	**0.78**				

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Table 4. Effect of structured and bore well water on weight of the bunch (g)

Weight of bunch was significantly influenced by type of water treatment, level of fertilizers and their interaction. Among the type of water, structured water shows significantly higher bunch weight (392.27g) compared to bore well water (315.80g). Among RDF levels 100% RDF recorded significantly higher bunch weight (419.90g) compare to other level of RDF. Among the treatment combination, structured water with 100% RDF showed significantly higher bunch weight (493.46g) compare to other treatments.

Table 4. Effect of structured and bore well water on average weight of bunch (g)

Water treatment	Fertilizer level					
	S_1	S_2	S_3	S_4	S_5	Average
M_1 – Structured water	493.46	481.64	377.84	316.25	292.15	392.27
M_2 – Bore well water	346.34	336.18	334.74	299.50	262.19	315.80
Mean	419.90	408.91	356.29	307.90	277.17	
	SEm±	**CD (0.05)**				
Water treatment (A)	**0.08**	**0.48**				
Fertilizer level (B)	**0.35**	**1.05**				
Interaction (Ax B)	**0.44**	**1.32**				

Table 5. Effect of structured and bore well water on hundred berry weight (g)

Hundred berry weight was significantly influenced by type of water level of fertilizer and their interaction. Among the type of water, structured water shows significantly higher hundred berry weight (227.13g) compared to bore well water (216.26g). Among the different fertilizer level 100% RDF showed significantly higher hundred berry weight (241.51g) compare to all other levels of fertilizers. Among the treatment combination, structured water with 100% RDF showed significantly higher average hundred berry weight (252.05g) compare to all other treatment combination.

Table 5. Effect of structured and bore well water on hundred berry weight (g)

Water treatment	Fertilizer level					
	S_1	S_2	S_3	S_4	S_5	Average
M_1 – Structured water	252.05	232.15	222.01	217.28	212.1	227.13
M_2 – Bore well water	230.96	219.26	211.26	210.33	209.18	216.26
Mean	241.51	225.71	216.64	213.97	210.64	
	SEm±	**CD (0.05)**				
Water treatment (A)	**0.21**	**1.21**				
Fertilizer level (B)	**0.20**	**0.60**				
Interaction (Ax B)	**0.43**	**1.29**				

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Table 6. Effect of structured and bore well water on TSS (°Brix)

TSS of berry significantly influenced by type of water treatment, level of fertilizer and their interactions. Among the type of water, structured water shows significantly higher TSS (19.93) compared to bore well water (19.26). Among fertilizer level 100% RDF showed significantly higher TSS (20.42) compare to other level of fertilizer. Among the treatment combination structured water with 100% RDF recorded significantly higher TSS (21.31) compare to other treatments.

Table 6. Effect of structured and bore well water on TSS (° Brix)

Water treatment	Fertilizer level					
	S_1	S_2	S_3	S_4	S_5	Average
M_1 – Structured water	21.31	20.24	19.6	19.53	18.99	19.93
M_2 – Bore well water	19.53	19.49	19.34	19.25	18.7	19.26
Mean	20.42	19.87	19.47	19.39	18.84	
	SEm±	**CD (0.05)**				
Water treatment (A)	**0.03**	**0.18**				
Fertilizer level (B)	**0.07**	**0.21**				
Interaction (Ax B)	**0.09**	**0.27**				

Table 7.Effect of structured and bore well water on acidity (%)

Acidity of berry was also significantly influenced by type of water treatment, level of fertilizer and their interaction. Among the type of water, structured water shows significantly lower acidity (0.23%) compared to bore well water (0.27%). Fertilizer level did not significantly influenced the fruit acidity. Among treatment combination structured water with 100% RDF recorded significantly lower acidity (0.22%) compare to other treatments except S_5.

Table 7. Effect of structured and bore well water on acidity (%)

Water treatment	Fertilizer level					
	S_1	S_2	S_3	S_4	S_5	Average
M_1 – Structured water	0.22	0.25	0.24	0.23	0.22	0.23
M_2 – Bore well water	0.27	0.26	0.29	0.25	0.29	0.27
Mean	0.24	0.26	0.26	0.24	0.25	
	SEm±	**CD (0.05)**				
Water treatment (A)	**0.01**	**NS**				
Fertilizer level (B)	**1.08**	**NS**				
Interaction (Ax B)	**1.36**	**NS**				

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Table 8.Effect of structured and bore well water on yield per vine (kg) :

Structured water recorded higher fruit yield per vine (14.68 kg) compared to bore well water (13.97kg). Among the levels of fertilizer 100% RDF recorded significantly higher yield (15.00 kg) compared to other levels. Among different treatment combination structured water with 100% RDF recorded significantly higher fruit yield per vine (15.68 kg) compared to other treatment combination.

Table 8. Effect of structured and bore well water on yield per vine (kg)

Water treatment	Fertilizer level					
	S_1	S_2	S_3	S_4	S_5	Average
M_1 – Structured water	15.68	15.23	14.57	14.45	13.45	14.68
M_2 – Bore well water	14.33	14.16	14.24	13.66	13.48	13.97
Mean	15.00	14.69	14.40	14.05	13.46	
	SEm±	CD (0.05)				
Water treatment (A)	0.03	0.18				
Fertilizer level (B)	0.04	0.12				
Interaction (Ax B)	0.06	0.17				

Table 9.Effect of structured and bore well water on yield per ha (t)

Type of water and fertilizer level and their interaction showed significant effect on yield per ha. Among the type of water, structured water showed significantly higher yield per ha (32.70t) as compared to bore well water (31.3t). Among fertilizer levels100% RDF showed significantly higher yield / ha (33.33t) compare to other levels of fertilizer. With respect to interaction between structured water and fertilizer levels, structured water with 100% RDF showed significantly better yield per ha (34.85t) compare to other treatment combination.

Table 9. Effect of structured and bore well water on yield per ha (t)

Water treatment	Fertilizer level					
	S_1	S_2	S_3	S_4	S_5	Average
M_1 – Structured water	34.85	33.58	32.72	32.14	30.07	32.7
M_2 – Bore well water	31.80	31.61	31.56	31.38	30.12	31.3
Mean	33.33	32.6	32.14	31.76	30.09	
	SEm±	CD (0.05)				
Water treatment (A)	0.05	0.30				
Fertilizer level (B)	0.09	0.27				
Interaction (Ax B)	0.13	0.39				

Conclusion:

The study indicates that use of structured water along with 100 % RDF found beneficial as compared to bore well water treatments. Use of structured water slightly improves the water quality like pH, EC and other water quality parameters, like yield and quality parameters viz. No. of panicles per vine, weight of bunch, weight of hundred berries, TSS, Yield per vine and Yield per ha shows positive response with the use of structured water as compared to bore well water.

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