

**UNIVERSITY OF HORTICULTURAL SCIENCES, BAGALKOT**



**Report**

**On**

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



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DIRECTORATE OF RESEARCH**

1.	Title of the Project	<b>Effect of structured water on yield and quality of Grape (<i>Vitis vinifera L.</i>) variety Thompson Seedless</b>
2.	Name of the Research Station	<b>Division of Fruit Science, Sector No.70, University of Horticultural Sciences, Navnagar, Bagalkot – 587104, Karnataka</b>
3.	Source of Funding	<b>VWF Industries Pvt.Ltd, 90,KRS Road, Metagally, Mysore - 570016</b>
4.	Principal Investigator	<b>Mr. Sateesh Pattepur</b> Assistant Professor (Fruit Science) Orchard office, Sector 70 Udyanagiri, Bagalkot- 587103 Cell:9448188570 Email:sateeshpattepur@rediffmail.com
5.	Co-investigator	<b>Dr. D.R. Patil</b> Associate Director of Research and Extension E- Mail : <a href="mailto:adre.uhsbagalkot@gmail.com">adre.uhsbagalkot@gmail.com</a> Cell # : 9449872861 <b>Mr. Anand G. Nanjappanavar.</b> Assistant Professor (Fruit Science) E- Mail : <a href="mailto:anandnanjappanavar@yahoo.in">anandnanjappanavar@yahoo.in</a> Cell# : 9845320045 <b>Mr. Kanthesh Gandolkar</b> Assistant Professor (Agronomy) E- Mail : <a href="mailto:kanteshgn@gmail.com">kanteshgn@gmail.com</a> Cell # ; 9449872879 <b>Dr. Ambika. D. S</b> Assistant Professor ( Plant Pathology) E- Mail : <a href="mailto:ambikads.path@gmail.com">ambikads.path@gmail.com</a> Cell #: 9964877788
5	Period ( Month and Year)	01.04.2014 to 31.12.2014
6	Objectives	1. To know the effect of structured water on yield and quality of Grape.

## **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 3 replications and 5 treatments comprising of two main treatments i.e. structured water (M<sub>1</sub>) and bore well water (M<sub>2</sub>) 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 analysed and presented in the tables.

### **Treatment details**

**Design** - Split plot

#### **Main Treatments**

**M<sub>1</sub>**: Structured water

**M<sub>2</sub>**: Bore well water

#### **Sub – Treatments**

**S<sub>1</sub>**: RDF (As per package of practice and  
it is 300: 500: 1000 kg NPK/ ha.)

**S<sub>2</sub>**: 90 % of the RDF

**S<sub>3</sub>**: 80 % of the RDF

**S<sub>4</sub>**: 70 % of the RDF

**S<sub>5</sub>**: 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, CaCo<sub>3</sub>, were analysed. The results were furnished in Table 1 and 2.

**Table 1. Characteristics of structured and Bore well water**

<b>Parameters</b>	<b>Structured Water</b>	<b>Bore well water</b>
pH	6.9	7.2
EC (dSm <sup>-1</sup> )	0.83	0.86

TDS (mg/L)	511	515
Calcium (mg/L)	136	147
Conductivity mho/cm	792	786
Magnesium (mg/L)	4	10
Chloride (mg/L)	120	116
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. Month wise analysis of Structured Water and Bore Well Water for pH and EC:**

Month wise water quality parameter analyzed and presented in table 2. The results were showed that when the bore well water passed with structured water unit pH and EC of water is slightly changed, this indicates that structured water has neutral pH with lesser EC helps in easy absorption of nutrients of from soil solution, which intern 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

**Effect of structured and bore well water on number of panicles / vine (No.s)**

Type of water and RDF level and their interaction showed significant effect on number of panicles / vine. Among the type of water, structured water showed significantly higher number of panicles / vine compare to bore well water. No. of panicles / vine was significantly influenced by an levels of RDF, with 100% RDF showing higher number of panicles / vine (74.18) with respective to interaction between structured water and fertilizer level at same level of fertilizer, structured water showed significantly better effect on No. of panicles / vine compared to bore well water (74.11). Among different treatment combination, structured water with 100% RDF showing higher No. of panicles / vines.

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

Water treatment	Fertilizer level					Average
	S <sub>1</sub>	S <sub>2</sub>	S <sub>3</sub>	S <sub>4</sub>	S <sub>5</sub>	
M <sub>1</sub>	102.13	99.25	99.05	87.12	74.18	74.18
M <sub>2</sub>	99.26	99.00	96.60	86.71	74.11	74.11

<b>Mean</b>	<b>100.69</b>	<b>99.13</b>	<b>97.83</b>	<b>86.91</b>	<b>74.15</b>	
	<b>SEm±</b>	<b>CD (5%)</b>				
<b>Water treatment (A)</b>	<b>0.07</b>	<b>0.28</b>				
<b>Fertilizer level (B)</b>	<b>0.20</b>	<b>0.43</b>				
<b>Interaction (Ax B)</b>	<b>0.26</b>	<b>0.61</b>				

#### Effect of structured and bore well water on average weight of bunch (g)

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

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

<b>Water treatment</b>	<b>Fertilizer level</b>					<b>Average</b>
	<b>S<sub>1</sub></b>	<b>S<sub>2</sub></b>	<b>S<sub>3</sub></b>	<b>S<sub>4</sub></b>	<b>S<sub>5</sub></b>	
<b>M<sub>1</sub></b>	493.46	481.64	377.84	316.25	292.15	392.27
<b>M<sub>2</sub></b>	346.34	336.18	334.74	299.50	262.19	315.80
<b>Mean</b>	419.90	408.91	356.29	307.90	277.17	
	<b>SEm±</b>	<b>CD (5%)</b>				
<b>Water treatment (A)</b>	<b>0.08</b>	<b>0.33</b>				
<b>Fertilizer level (B)</b>	<b>0.35</b>	<b>0.73</b>				
<b>Interaction (Ax B)</b>	<b>0.44</b>	<b>1.04</b>				

#### Effect of structured and bore well water on average 100 berry weight (g)

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

**Table 5. Effect of structured and bore well water on average 100 berry weight (g)**

<b>Water treatment</b>	<b>Fertilizer level</b>					<b>Average</b>
	<b>S<sub>1</sub></b>	<b>S<sub>2</sub></b>	<b>S<sub>3</sub></b>	<b>S<sub>4</sub></b>	<b>S<sub>5</sub></b>	
<b>M<sub>1</sub></b>	252.05	232.15	222.01	217.28	212.1	227.13
<b>M<sub>2</sub></b>	230.96	219.26	211.26	210.33	209.18	216.26
<b>Mean</b>	241.51	225.71	216.64	213.97	210.64	
	<b>SEm±</b>	<b>CD (5%)</b>				

<b>Water treatment (A)</b>	<b>0.21</b>	<b>0.91</b>
<b>Fertilizer level (B)</b>	<b>0.20</b>	<b>0.67</b>
<b>Interaction (Ax B)</b>	<b>0.43</b>	<b>0.96</b>

### Effect of structured and bore well water on TSS ( °Brix)

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

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

Water treatment	Fertilizer level					Average
	S <sub>1</sub>	S <sub>2</sub>	S <sub>3</sub>	S <sub>4</sub>	S <sub>5</sub>	
<b>M<sub>1</sub></b>	21.31	20.24	19.6	19.53	18.99	19.93
<b>M<sub>2</sub></b>	19.53	19.49	19.34	19.25	18.7	19.26
<b>Mean</b>	20.42	19.87	19.47	19.39	18.84	
	<b>SEm±</b>	<b>CD (5%)</b>				
<b>Water treatment (A)</b>	<b>0.03</b>	<b>0.15</b>				
<b>Fertilizer level (B)</b>	<b>0.07</b>	<b>0.15</b>				
<b>Interaction (Ax B)</b>	<b>0.09</b>	<b>0.21</b>				

### Effect of structured and bore well water on acidity (%)

Acidity of berry also significantly influenced by type of water treatment, level of RDF and their interaction. Among the type of water, structured water shows significantly acidity compared to bore well water. Among RDF level 100% RDF significantly higher acidity compared to other level of RDF. Among treatment combination structured water with 100% RDF recorded significantly higher acidity.

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

Water treatment	Fertilizer level					Average
	S <sub>1</sub>	S <sub>2</sub>	S <sub>3</sub>	S <sub>4</sub>	S <sub>5</sub>	
<b>M<sub>1</sub></b>	0.22	0.26	0.29	0.25	0.29	0.26
<b>M<sub>2</sub></b>	0.27	0.25	0.24	0.23	0.22	0.24
<b>Mean</b>	0.24	0.26	0.26	0.24	0.25	
	<b>SEm±</b>	<b>CD (5%)</b>				
<b>Water treatment (A)</b>	<b>0.01</b>	<b>0.01</b>				
<b>Fertilizer level (B)</b>	<b>1.08</b>	<b>0.01</b>				
<b>Interaction (Ax B)</b>	<b>1.36</b>	<b>0.01</b>				

**Effect of structured and bore well water on yield/vine (kg) :**

Structured water (14.6) recorded higher fruit yield / vine compared to bore well water (14.01). Among the levels of RDF 100% RDF recorded significantly higher yield compared to other levels. Among different treatment combination structured water with 100% RDF recorded significantly higher fruit yield / vine compared to other treatment combination.

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

Water treatment	Fertilizer level					Average
	S <sub>1</sub>	S <sub>2</sub>	S <sub>3</sub>	S <sub>4</sub>	S <sub>5</sub>	
M <sub>1</sub>	15.61	15.24	14.56	14.43	13.45	14.6
M <sub>2</sub>	14.36	14.19	14.27	13.68	13.53	14.01
Mean	14.98	14.71	14.41	14.05	13.38	
	<b>SEm±</b>	<b>CD (5%)</b>				
Water treatment (A)	<b>0.36</b>	<b>0.07</b>				
Fertilizer level (B)	<b>0.09</b>	<b>0.17</b>				
Interaction (A x B)	<b>0.1</b>	<b>0.24</b>				

**Effect of structured and bore well water on yield/ha (t)**

Type of water and RDF level and their interaction showed significant effect on yield / ha. Among the type of water structured water (32.7) showed significantly higher yield /ha (t) as compare to bore well water (31.3). Among RDF levels 100% RDF showed significantly higher yield / ha compare to other levels of RDF with respective interaction between structured water and RDF levels, structured water with 100% RDF showed significantly better yield / ha (t) compare to other treatment combination.

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

Water treatment	Fertilizer level					Average
	S <sub>1</sub>	S <sub>2</sub>	S <sub>3</sub>	S <sub>4</sub>	S <sub>5</sub>	
M <sub>1</sub>	34.85	33.58	32.72	32.14	30.07	32.7
M <sub>2</sub>	31.80	31.61	31.56	31.38	30.12	31.3
Mean	33.33	32.6	32.14	31.76	30.09	
	<b>SEm±</b>	<b>CD (5%)</b>				
Water treatment (A)	<b>0.05</b>	<b>0.25</b>				
Fertilizer level (B)	<b>0.09</b>	<b>0.18</b>				
Interaction (A x B)	<b>0.13</b>	<b>0.26</b>				



**Principal Investigator &  
Asst. Prof. (Fruit Science)  
Division of fruit Science,  
MHREC, Sector No. 70,**

**Navanagar, UHS, Bagalkot.**