

Research Report

On

Effect of BCX products on growth, yield and fruit composition parameters of grape cv. Flame Seedless

Sponsored by

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Submitted by

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This trial was sponsored by PoinTec Pens and Energy Pvt. Ltd, 26-A, Attibele Industrial Area, Attibele, Bangalore – 562107 during the year 2015-16.

The experiment was carried out in the experimental vineyard of ICAR-IIHR, Bengaluru on the colour seedless grape cultivar Flame Seedless grafted on Dogridge rootstock. The vines were of 12 years old spaced at 10 ft between rows and 6 feet between vines. The vines were trained to Y trellises and irrigated through drip system.

Materials and Methods

The vines were forward pruned on 6th October 2015. The buds started sprouting about 10-12 days after pruning. Three rows of vines were selected for application of different BCX products as per the protocol provided by the company and three rows were maintained as control without application of BCX products. But in both BCX treated rows and control rows other cultural operations like irrigation, fertilizer application and plant protection sprays were carried out as per the package of practices. The details of the treatments given are as follows:

After 15 days of pruning i.e. on 19th October 2015, BCX Biochar compost was applied @ 5 kg per vine.



Fig: Soil application of BCX Biochar compost

When the shoots attained 5 leaf stage, the BCX rooting solution was drenched to soil @ 5 ml/litre at weekly intervals for 10 consecutive weeks. The dates of application are 19th October, 26th October, 5th November, 9th November, 20th November, 4th December, 10th December, 18th December, 27th December and 1st January 2016.

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Fig: Soil application of BCX rooting solution

Similarly spraying of BCX foliar solution was done for about 13 times @ of 5 ml/L at weekly intervals and stopped about 15 days before harvest. The dates of application are 28th October, 5th November, 12th November, 20th November, 2nd December, 10th December, 18th December, 26th December, 1st January, 11th January, 18th January, 25th January and 1st February 2016.



Fig: Foliar spray of BCX foliar solution

Harvesting was done from 10-12th February 2016. Yield and yield related parameters were recorded immediately after harvest. For quality parameter analysis, the representative samples were collected and fresh samples were used for analysis of all the quality parameters.

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Observations recorded:

Growth parameters:

Growth development in terms of shoot length, inter-nodal length and cane diameter was recorded at shoot maturity (about 75-90 days after pruning). Leaf area was measured using Licor leaf area meter and leaf chlorophyll content was estimated using DMSO method.

Parameters	BCX treated	Control	% increase or decrease over control
Chlorophyll content (mg/g)	0.0229	0.0192	+ 16.05
Leaf area (cm ²)	228.48	182.31	+20.20
Total shoot length (cm)	94.33	88.78	+6.25
Inter-nodal distance (cm)	8.07	7.65	+5.49
Cane diameter (mm)	7.11	6.94	+2.44



Fig. Higher leaf area in treated vines showing lesser sun flecks on the ground (left side) and lower leaf area showing higher sun flecks on the ground (right side)

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The chlorophyll content in leaves increased to the extent of 16% in treated vines over the control while the increase in leaf area was to the extent of 20% in treated vines than control. All the vegetative growth parameters measured in terms of total shoot length, internodal distance and cane diameter was higher in treated vines as shown in the table. However, the more vegetative vigour may result in denser canopy which may result in build of microclimate which may favours development of diseases. Hence, in such cases it is better to advice efficient shoot thinning to improve sunlight interception on the leaves situated in all layers of vine canopy.

Leaf scorching: There was no scorching observed on any of the leaves due to spray of BCX foliar solution to leaves right from 2nd week of pruning till 12 weeks.

Effect of BCX products on growth of berries in a bunch:

To know the effect of various BCX products on growth in the berries, berry growth in terms of individual berry weight was monitored from 8-10 mm berry stage onwards periodically at 15 days interval. About 100 berries were randomly collected per replication and weighed and average berry weight was recorded and expressed as in grams. At all the stages of observations recorded on average berry weight BCX treated vines exhibited higher berry weight to the extent of about 9% compared to that of untreated control vines.

Berry diameter (g)	BCX treated	Control	% increase or decrease over control
8-10 mm stage	5.12	4.70	+ 8.2
12-14 mm stage	11.2	10.1	+9.82
At harvest stage	19.18	17.53	+8.60

Yield Parameters:

At the time of harvest, all the yield and quality parameters were recorded. Number of bunches per vine were counted and yield per vine was recorded by weighing bunches harvested from each vine. The average bunch weight was recorded by dividing yield per vine by number of bunches per vine. About 50 berries were randomly collected in all the replications and 50 berry weight was recorded and expressed in grams. Berry diameter, berry length and berry volume was recorded as per the regular procedures. Based on the spacing

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and number of vines per acre the experimental data on yield was also expressed in terms of yield per acre (tonnes)

Parameters	BCX treated	Control	% increase or decrease over control
50 berry weight (g)	191.84	175.34	+8.60
Average bunch weight (g)	335.60	286.75	+14.55
Berry diameter (mm)	18.21	17.75	+ 2.52
Berry length (mm)	19.26	18.41	+ 4.41
Berry volume (cm ³)	3.65	3.03	+16.98
Yield per vine (kg)	10.30	9.30	+ 9.70
Yield per acre (t)	7.45	6.75	+ 9.39

There was definite increase in all the yield parameters studied in response to application different BCX products. The increase was ranged from 2.52% in case of berry diameter to the extent of 14.55% in case of average bunch weight. The berry volume was increased to the extent of 16.98% in treated vines compared to control vines. The yield per acre was increased to the extent of 9.39% in BCX treated plants compared to control vines.

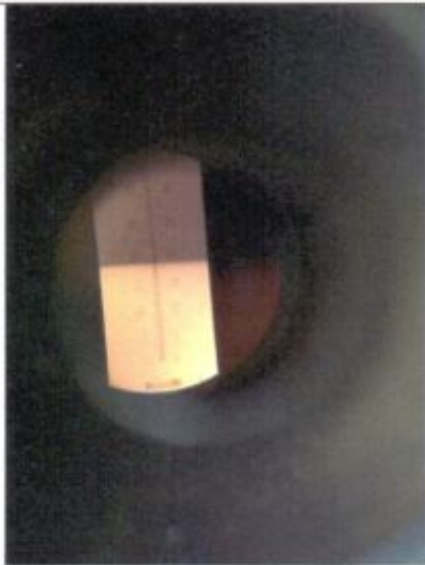
Quality Parameters

After harvesting, random samples were collected for analysis of quality parameters such as Total soluble solids (TSS) using hand held refractometer, acidity by titrating juice against 0.1 N NaOH using phenolphthalein as indicator, anthocyanin content using spectrophotometer.

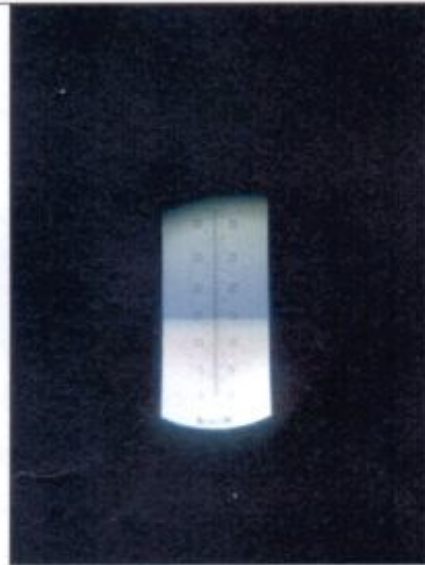
Parameters	BCX treated	Control	% increase or decrease over control
TSS (°B)	16.59	16.05	+ 3.25
Acidity (%)	0.501	0.541	-7.98
Anthocyanins (mg/g)	1.85	1.65	+10.58
Colour intensity	1.096	1.049	+4.28
Tint	1.59	1.47	+7.46

Batiana
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Among the quality parameters, there was increase in TSS to the extent of 3.25 % in BCX treated vines compared to that of control. However, the treated vines recorded lesser acidity than control vines. Anthocyanin content was increased to the extent of 10.58% on BCX treated vines.



TSS content in Treated berries (just before harvest)- 22°B (from individual berry)



TSS content in control berries (just before harvest) – 16°B (from individual berry)



BCX products treated bunches



Untreated (control) bunches

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Shelf life studies:

After harvest bunches were kept in shelf at room temperature to study the shelf measured in terms of physiological loss in weight (PLW) and number of rotten berries on 6th day in shelf.

Parameters	BCX treated	Control	% increase or decrease over control
Physiological loss in weight (PLW) %	5.53	7.72	-28.24
Percent fallen and rotten berries	19.08	24.73	-22.84

The physiological loss in weight on 6th day in shelf was to the extent of 5.53 % in BCX treated bunches while it was to the extent of 7.72% in control vines. Similarly there was about 19.08% of the berries were fallen and rotten in treated clusters on 6th day of shelf while it was about 24.72% in control vines. Hence, the BCX treated clusters recorded about 28.24 % reduction in PLW over the control. Similarly the fallen and rotten berries percent was reduced to the extent of 22.84% in BCX treated clusters compared to that of control clusters.

Incidence of Pest and Diseases:

As per the general visual observations, we could not observe any difference in the incidence of diseases or pests especially downy mildew either on foliage or on clusters between BCX treated and untreated vines.

Conclusion:

A one season trial was taken up to test the Effect of BCX products on growth, yield and fruit composition parameters of grape cv. Flame Seedless at experimental block of ICAR-IIHR, Bengaluru during 2015-16 fruiting season. The application of different products like BCX Biochar compost to soil at the time of pruning, BCX rooting solution after pruning to root zone and BCX foliar solution as indicated above in the materials and methods was compared with untreated control vines. Vines treated with BCX products increased the chlorophyll content and leaf area to the extent of 16-20% compared to control. The growth rate of the berries was higher in treated vines from fruit set till harvest. The overall yield per acre was about 9.5% higher in treated vines compared to that of control which can be attributed to increased berry weight, berry length and diameter. The berries from the treated

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vines also recorded higher anthocyanin content. The better shelf life was recorded in treated vines over control which was measured in terms of Physiological Loss in Weight. This might be attributed to less browning of pedicel and better pedicel attachment. However, no significant difference was observed for incidence of major pests and diseases in both treated and control vines. Thus, from this study it can be concluded that application of different BCX products after forward pruning could improve fruit yield and quality to the extent of 9.5% in the given soil and climatic conditions prevailed during the experimental season.

Since, the yield of grapes is determined by the fruit bud differentiation which takes place on canes after 45 days after back or April pruning, the effect of BCX products on better fruit bud differentiation should be studied by taking the trials for entire crop growth cycle from back pruning to back pruning.

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