Metalosate®

Powered by Albion® Technology

Balchem® Plant Nutrition Research Paper

Consultora Agrícola y Comercial Santa María SPA

Evaluation of the effect of the application of Metalosate Calcium, Metalosate Boron and Metalosate Potassium on the quality of Blueberry.

Concón, Chile 2020

Summary

Due to the increase in the worldwide supply of blueberries, the quality of the fruit is a determining factor for profitable marketing, in addition to meeting the quality requirements to adequately face the journey to the final consumer of the fruit. It is for this reason that during the 2019-2020 season the following test was carried out with the aim of studying the effect of the Tattersall program (Metalosate Calcium, Boron and Potassium) on the quality of fruit and its post-harvest life. Applications were made between October and November, spaced weekly. However, the last two applications of Metalosate Potassium could not be carried out due to the ambushing of the rows of the crop, which prevented the passage of the tractor to the sector. From October onwards, sample collection work was carried out for mineral analysis of fruits, quality and 30-day post-harvest life. Our research suggests that the Tattersall treatment increases the content of bound calcium in coloring fruits compared to those of the control treatment. This can be translated into greater firmness of the fruits, which was subsequently verified in an evaluation after 30 days of conventional cold storage. Regarding the dry matter in the phenological stages of coloring and ripe, statistical differences were observed, since treated fruits had a higher percentage than the control. The titratable acidity and brix degrees of the fruit from harvest and after 30 days did not show statistically significant differences, however, the weight per fruit was on average 0.26 grams higher than the fruits of the control treatment, which translates into an increase of 2,6 tons per hectare if a production of 20 tons per hectare with an average fruit weight of 2 grams is considered.

Notably, the firmness of the fruits of the Tattersall treatment was significantly higher compared to that of the control fruits at 30 days of storage. This means that the applied treatment was effective in increasing the weight of the fruits and also their firmness, being a good tool to improve the quality and post-harvest life of the exported fruit. However, these data represent a single season, and the fields are subject to different agroclimatic variables, therefore it is recommended to reiterate the evaluations, in order to allow more conclusive statistical analyzes to be made in the future.

Introduction

Today there is a general increase in the demand and supply of blueberry as ready-to-eat fruit, therefore, it is vitally important for producers to maintain a high quality and performance product, in order to sustain successful projects in the industry. In addition, the search for more profitable markets such as Asia entails longer trips, subjecting the fruits to longer storage and transport times. Similarly, the market demands high post-harvest life fruit, which guarantees the quality and firmness of the fruits.

Since firmness is a base condition parameter to be able to export high quality fruit to these markets, it is proposed to carry out an evaluation of the effect of the Tattersall program on the quality and post-harvest life of blueberry fruits.

Hypothesis

Tattersall program applications improve the quality of blueberry fruit (Vaccinium corymbosum).

Objective

General purpose

• Evaluate the effect of the Tattersall program on the mineral content and quality of blueberry fruit (Vaccinium corymbosum) and post-harvest life.

Specific goal

• Determine the effect of the Tattersall program on the mineral content in the blueberry plant (Vaccinium corymbosum) through fruit analysis.

• Determine the effect of applications of the Tattersall program on the quality, condition and post-harvest life of the blueberry.

Materials and Methods

Variety and Trial Area

The test was carried out on the Duke variety located on a farm with good fertigation management, pruning and average production of 20 tons per hectare.

• Duke variety in Agrícola Bioberries Ltda, property located in the town of Negrete, Bíobío Region, Chile.

Test description

The research was carried out in the Miraflores orchard, belonging to the Agrícola Bioberries Ltda, in sector 5 of the Duke variety, planted in 2004, at a planting distance of 3 x 1 meters to evaluate the effect of the Tattersall program.

Two treatments indicated in Table 1 were evaluated, application dates in Table 2, 3 and 4. It is important to note that the same agronomic and nutritional management was carried out in the sector under treatment with Tattersall program treatments as in the rest of the field.

Table 1. Number of Treatments (T0 and T1), barracks, planted area and type of treatment in the Duke variety.

Treatments	Plot	Area (ha)	Application
T0	5	0,5	Control
T1	5	0,5	Metalosate Calcio, Metalosate Boro y Metalosate Potasio.

Table 2. Dates of foliar application and dose of Metalosate Calcium, Duke variety.

	Rate (lts/ha)	
Spray dates	**T0**	**T1**
12-Oct	0	1,5
18-Oct	0	1,5
25-Oct	0	1,5
1-April	0	1,5

**: It was sprayed with de 600 lts/ha of water.*

Table 3. Dates of foliar application and dose of Metalosate Boron, Duke variety.

	Dosis (lt/ha)	
Spray dates	**T0**	**T1**
12-Oct	0	1
18- Oct	0	1
25- Oct	0	1
1-April	0	1

**: It was sprayed with de 600 lts/ha of water.*

Table 4. Dates of foliar application and dose of Metalosate Potassium, Duke variety.

	Dosis (lts/ha)	
Spray dates	**T0**	**T1**
11-Nov	0	1,5

** It was sprayed with de 600 lts/ha of water.*

Materials

- Signs.
- Metalosate Ca 2,5 lts.
- Metalosate B 1.7 lts.
- Metalosate K 1,5 lts.
- Laboratory and field precision weights.

- Headband.
- Metro foot.
- Harvesting trays.
- Plastic bags for samples.
- Permanent marker down.
- Data completion forms.
- FirmPro.
- Refractometer.
- Clamshell.
- Cardboard boxes.
- Fridge.
- PCs development of reports, statistical data processing.
- Photographic camera.

Parameters to evaluate

Fruit analysis.

3 fruit analyzes were performed. One in green fruit, one second in coloring fruit, and a third in ripe. The samples collected for fruit analysis were 500 grams per treatment. The samples were sent to the Agrolab laboratory to evaluate parameters of:

- Macronutrients: Total Calcium, Soluble Calcium and Linked Calcium (mg / 100g).

- Dry material (%).

Production, quality of harvest and post-harvest.

The harvest of fruits belonging to the plants of each treatment began, 2 kilos of fruit were collected at random per treatment in harvest trays and transferred to clamshells of 250 grams (6 oz), labeled, in the direction of the closest packing. These samples were evaluated for the equatorial diameter and fruit weight, to subsequently perform statistical analysis.

In addition, fruit quality parameters were determined at harvest and stored at 0º C in conventional cold. The analyzes that were carried out are:

• Export percentage (%).

• Fruit weight (gr).

• Pulp resistance to pulp pressure or firmness (Lb / plg2).

• Rots (%).

• Brix.

• Titratable acidity.

• Average fruit size.

* For firmness and rotting, fruit quality analysis was performed at harvest and after 30 days of storage at 0º C.

Experimental design and statistical analysis.

A Completely Randomized Design with two treatments and five replicates was used for evaluations. The statistical techniques used were exploratory data analysis, which consists

of calculating averages, minimums, maximums, and standard deviations. In addition, the one-way ANOVA method of comparisons of means was used. To identify the homogeneous groups, we worked with the Tukey test, in case there were significant differences between the treatments. Finally, the information is presented using letter diagrams (different letters indicate significant differences).

Results

Next, the results of the statistical analysis for the data obtained during the visits to the field will be described.

• Parameters evaluated: mineral analysis of fruit, firmness and post-harvest life.

Table 5. Specification of treatments.

Treatment	Area (ha)	Detail
T0	0,5	Control
T1	0,5	Metalosate Boro, Calcio y Potasio.

Mineral analysis

An analysis of the fruits was carried out to identify the content of bound calcium, in the states of green fruit, in coloring fruit and ripe. The results are in Table 6.

Table 6**. Bound Calcium** by treatment and phenological state of the fruit.

Treatament	Fruit stage	Bound Calcium (mg/100 g)
T0	Green fruit	6,04 a
T1	Green fruit	6,26 a
T0	Coloring	5,40 b
T1	Coloring	6,20 a
T0	Ripe	4,74 a
T1	Ripe	4,42 a

Different letters vertically indicate statistically significant differences between means (p <0.05, Fisher's LSD).

In green and ripe fruit, no treatment effect was verified, the results being very similar to each other. In the case of the fruits in coloring stage, there was a positive response of T1, showing a statistically higher amount of bound calcium in relation to the control.

Total Calcium

An analysis of the fruits was carried out to identify the content of Total Calcium, in the states of green fruit, in coloring and ripe. The results are in Table 7.

Table 7. Total calcium by phenological status and treatment.

Treatment	Phenological stage	Total Calcium
T0	Fruto verde	20,5 a
T1		20,6 a
T0	Fruto pinta	12,4 a
T1		14,2 a
T0	Fruto maduro	8,9 a
T1		9,7 a

Different letters vertically indicate statistically significant differences between means (p <0.05, Fisher's LSD).

Statistical analysis did not show statistically significant differences. In each state, the treatments had the same effect.

Dry matter

An analysis was carried out to evaluate the dry matter content of the fruits. The results are in Table 8.

Table 8. Dry matter by phenological status and treatment.

Treatment	Phenological stage	Dry matter
T0	Green fruit	11,6 a
T1		11,9 a
T0	Coloring	10,6 b
T1		12,2 a
T0	Ripe	11,6 b
T1		13,4 a

Different letters vertically indicate statistically significant differences between means (p <0.05, Fisher's LSD).

In the phenological stages of coloring and ripe, treatment 1 presented better results, differing statistically from T0.

Brix

The sugar content of the fruits was measured on two dates, the results of which are found in Table 9.

Table 9. Measurement of Brix in blueberry fruits, by date and treatment.

Treatment	Date	Phenological stages	Brix
T0	16-12-2019	Initial evaluation	13,50 a
T1	16-12-2019	Initial evaluation	13,66 a
T0	15-01-2020	Evaluation 30 days	12,86 a
T1	15-01-2020	Evaluation 30 days	13,80 a

Different letters vertically indicate statistically significant differences between means (p <0.05, Fisher's LSD).

The statistical analysis did not show statistically significant differences, therefore, the Brix degrees are the same in both treatments.

Fruit weight and titratable acidity

Table 10. Weight and titratable acidity of the fruits, by date and treatment.

Treatment	Date	Stage	Aver wheight (g)	Titratable acidity
T0	16-12-2019	Initial evaluation	2,26	0,3
T1	16-12-2019	Initial evaluation	2,52	0,4
T0	15-01-2020	Evaluation 30 days	2,21	0,4

T1	15-01-2020	Evaluation 30 days	2,45	0,4

Both parameters were calculated based on 61 fruits. It is observed that in Treatment 1 the fruits have a greater weight, on average 16 units higher than the control. In the case of titratable acidity, there were no major differences.

Firmness

The measurement of the firmness of the fruits was evaluated in FirmPro (HappyVolt). The results are in Table 11.

Table 11. Measurement of firmness in blueberry fruits, by date and treatment.

Treatment	Date	Stage	Firmness (gf/mm)
T0	16-12-2019	Initial evaluation	130,70 a
T1	16-12-2019	Initial evaluation	135,36 a
T0	15-01-2020	Evaluation 30 days	136,62 b
T1	15-01-2020	Evaluation 30 days	148,56 a

Different letters vertically indicate statistically significant differences between means (p <0.05, Fisher's LSD).

The statistical analysis did not show differences on the first evaluation date. On the other hand, at 30 days the treatments were statistically different, with Treatment 1 giving the highest value for firmness. Furthermore, it is important to mention that no rot fruit were observed in the quality evaluations and the gauge averages for both treatments did not vary.

Table 12. FirmPro Firmness Parameters.

FirmPro (gf/mm)	Firmness
0-100	Very soft
100-119	Soft
120-129	Average

130-139	Firm
140-1000	Very firm

Conclusion

This research demonstrates the existence of significant differences in the content of bound calcium in fruits in coloring from the Tattersall treatment, compared to fruits from the control treatment. Furthermore, the treated fruits were shown to have a statistically significant increase in firmness and dry matter content where the latter justifies the increase in weight of the fruits. Therefore, in this study we verified that the foliar applications of the Tattersall program were effective in increasing the content of bound calcium, dry matter, weight and firmness of the post-harvest fruits in the Duke variety, in the 2019-2020 season, in the conditions provided by the Miraflores orchard.

The conditions of the development of the trial in the Miraflores orchard were optimal, since the orchard was in very good condition and no presence of pests or weeds was observed. However, in order to analyze the effect of different agroclimatic variables over time, it is necessary to continue with these studies in order to improve the quality and post-harvest life of the fruits.

Sebastián Ochoa Münzenmayer
Ing. Agrónomo, MBA, Master en Tecnología Agrícola

Bruno Mancilla Cagliero
Ing. Agrónomo

Diego Rojas Rubio
Ing. Agrónomo

Consultora Agrícola y Comercial Santa María spa.