



**“ REPORT OF THE
EVALUATION OF THE EFFECT
OF ECCA CARBOXY
TECHNOLOGY ON
ASPARAGUS CULTIVATION ”**

**EVALUATION RESPONSABLE
ING. JAVIER ZUZUNAGA**

**FRANCE
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GENERAL OBJECTIVE

Evaluation of variables that influence on the accumulation of reserves in the Asparagus Crop.

SPECIFIC OBJECTIVES

- ✓ Evaluate the effect of the application of Nutrisorb L & Biofit RTU on asparagus crop (°Brix; Quality, Root health and volume).
- ✓ Installation of minirhizotron tubes in Blueberry and Asparagus crops for future evaluation of root activity.

IMPORTANCE OF RESERVES ACUMULATION IN THE ASPARAGUS CROP

- ✓ The yield of an asparagus depends on the amount of soluble carbohydrates in the rhizome and in the reserve roots, since there is a remobilization of reserve sugars from the roots to the buds (Dean and Skrzeczkowska, 1996; Wooley et al., 1999). These sugars are, to a large extent, responsible for the sprouting of shoots and, therefore, for commercial production (Del Pozo, 1999).
- ✓ Sucrose is the most translocated disaccharide and the most used by the buds during sprouting (Bhowmik et al, 2002). According to the same authors (Bhowmik et al, 2001), the concentrations of soluble sugars and their distribution between the aerial and underground parts are closely related to the climate, especially to temperatures, and may differ by latitudes.



IMPORTANCE OF RESERVES ACCUMULATION IN THE ASPARAGUS CROP

- ✓ As a starting point, carbon is the raw material with which the plant builds carbohydrates. Basic structures on which other compounds are formed and other factors that promote economy, the increase in CO₂ and increase the distribution of carbohydrates to the roots (Marcelis and De Koning, 1995).
- ✓ According to CONCA (1995), the PHCA (polyhydroxycarboxylic acids) of natural origin from the ECCA Carboxy[®] technology directly affect the metabolism and translocation of photosynthates to the reserve organs in critical phenological stages that significantly modify their quality; thus guaranteeing harvested organs (shoots) of better quality and, in turn, better yields.



WHY USE ECCA CARBOXY TECHNOLOGY IN CROPS?

Trials carried out in Germany concluded that harvesting too intensively each season can cause a progressive decrease in vigor, and also lead to a decrease in crop yield in the long term, due to the wear of carbohydrates and the low production rate in the part aerial (Paschold et al., 2002). Parallel to this is the loss of biological fertility of the soil. Therefore, the maintenance of the biological fertility of the soil, and a positive annual balance between accumulation and consumption of carbohydrates (not only in the translocation) is essential for the productive efficiency of asparagus, (Martinez G 2007).

This supports the more than 60 years of research and commitment of Innovak Global, creating specific formulations of its ECCA Carboxy® Technology aimed at solving the problems that limit crop yields, taking as a fundamental basis the specific characteristics of the root, rhizosphere zone and integral soil management, where the biology of the native soil plays a fundamental role.

PRODUCTOS APLICADOS



(BIOESTIMULANT FOR NUTRIENT ASSIMILATION)

NUTRISORB® L Favors root activity and the process of active absorption of nutrients. Thanks to ECCA Carboxy® (aromatic) acids, which increase the metabolism and root activity, increasing the speed and extraction of nutrients from the soil and those provided with the fertilizer that favor the development and yield of the Asparagus crop.



(PROMOTER OF BIOLOGICAL FERTILITY)

Biofit® RTU is a formulation that restores the microbiology of depleted soils and comprehensively maintains biological fertility, since it contains a diversity of beneficial soil microorganisms that allow optimizing the nutrition and development of the crop, improving the soil structure, favoring the plant health from the root. Finally, the establishment, colonization and biochemical activity of rhizospheric microbiology is maintained for long periods of time thanks to the release of root exudates that ExuRoot® induces

CROP GENERAL INFORMATION

Country	France
Crop	Asparagus
Variety	Darlise
Planting Year	2013
Soil Type	Salty Loam
Plot	Plot 7
Treatment/ area	-Control (7 ha) - Nutrisorb L & Biofit RTU (7 ha)
Number of applications/ dose	*Nutrisorb L: 2 applications (3L/ha) *Biofit RTU: 3 applications (1 of 3 Kg/ha; 2 of 2Kg/ha)

EVALUATION

Root Quality, Health, and Volume
Asparagus culture

Lot 7

ROOT EVALUATION AMONG TREATMENTS

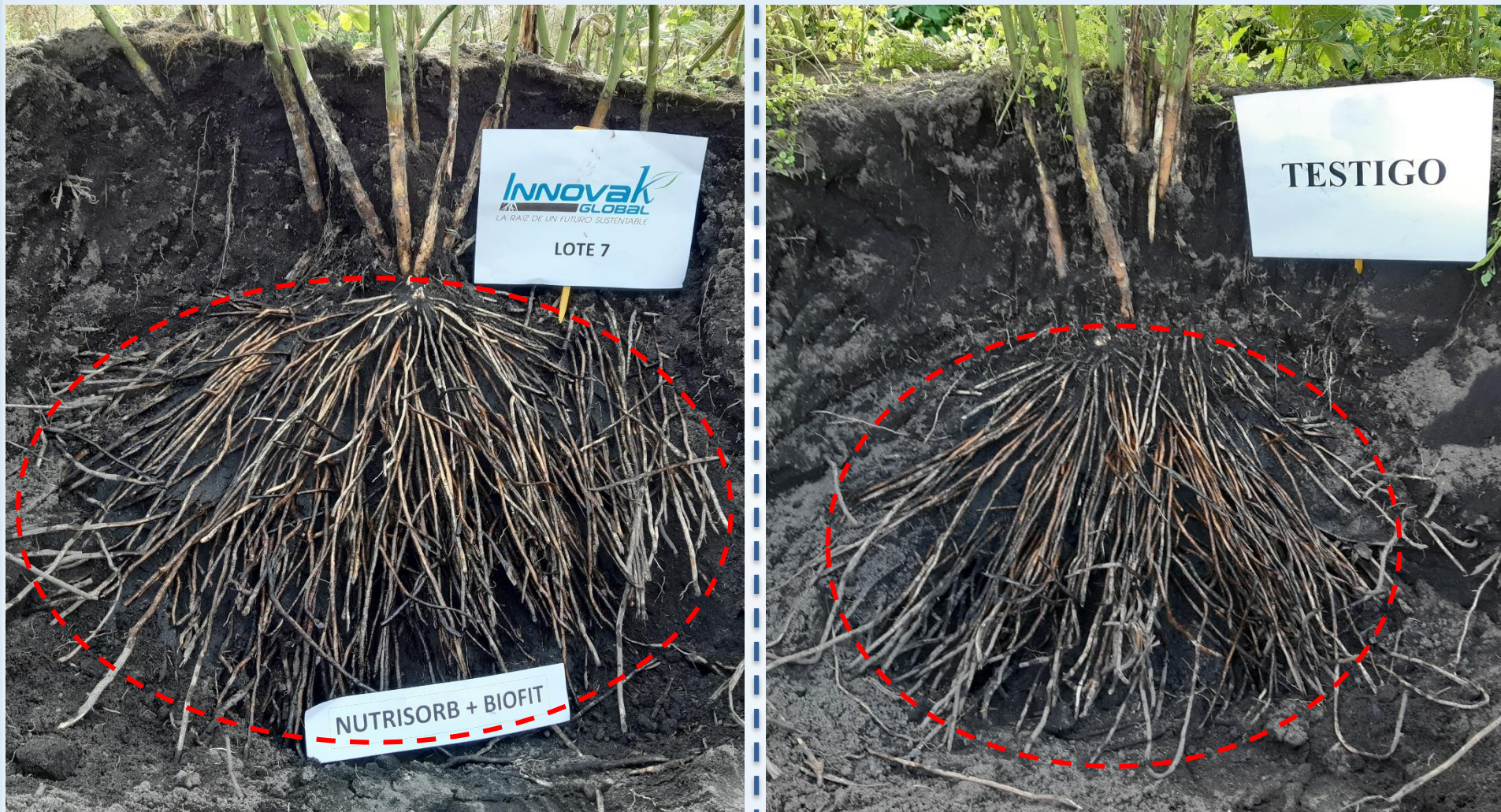


Fig.1 Asparagus culture– Innovak Global Treatment (Left), and Control (Right). LOT 7 – 12/10/2020

ROOT EVALUATION AMONG TREATMENTS



Fig.2 Asparagus culture– Innovak Global Treatment (Left), and Control (Right). PLOT 7 – 12/10/2020

COMENTS

- ✓ Root washing was performed on plants taken at random in both the Innovak Global treatment and the control. Finding a greater volume of reserve roots in the crown of the plants treated with Nutrisorb L and Biofit RTU, it was also observed that the treated plants presented a greater number of active and young roots than the control (fig. 1 and 2).
- ✓ Roots of the treated plants had a greater area of exploration, and in addition there was a lower number of oxidized roots and little root death, unlike the control plants.

RESULTS

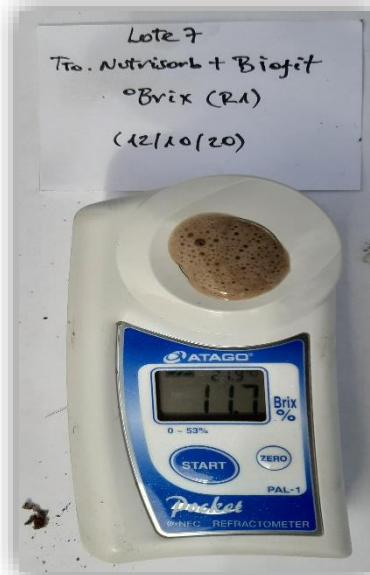
Brix in Asparagus Roots
Comparative among Treatments

Plot 7

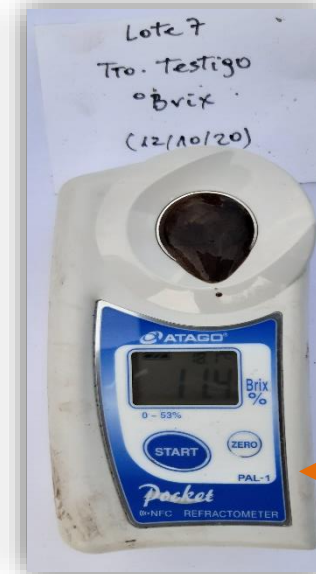
FOLLOW-UP TO EVALUATION OF BRIX

Nutrisorb L

biofit RTU



Average
12,9 BRIX



Average
9,4 BRIX

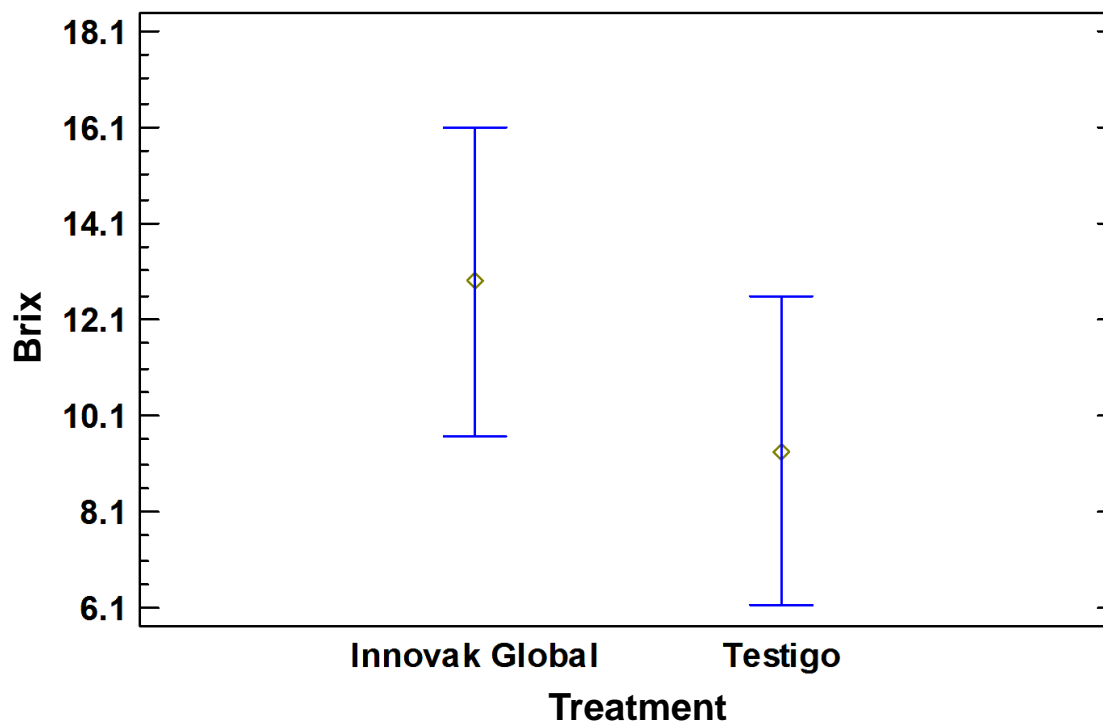
CONTROL

Fig.3. Innovak Global Treatment (Sup.), Control Treatment (Inf.). LOT 7 – 12/10/2020

ANOVA FOR BRIX BY TREATMENT

ASPARAGUS CULTURE – ROOT EVALUATION – PLOT 7 – 12/10/2020

Medias y 95.0% de Fisher LSD



Graf.1. Statistical Comparative among Treatments

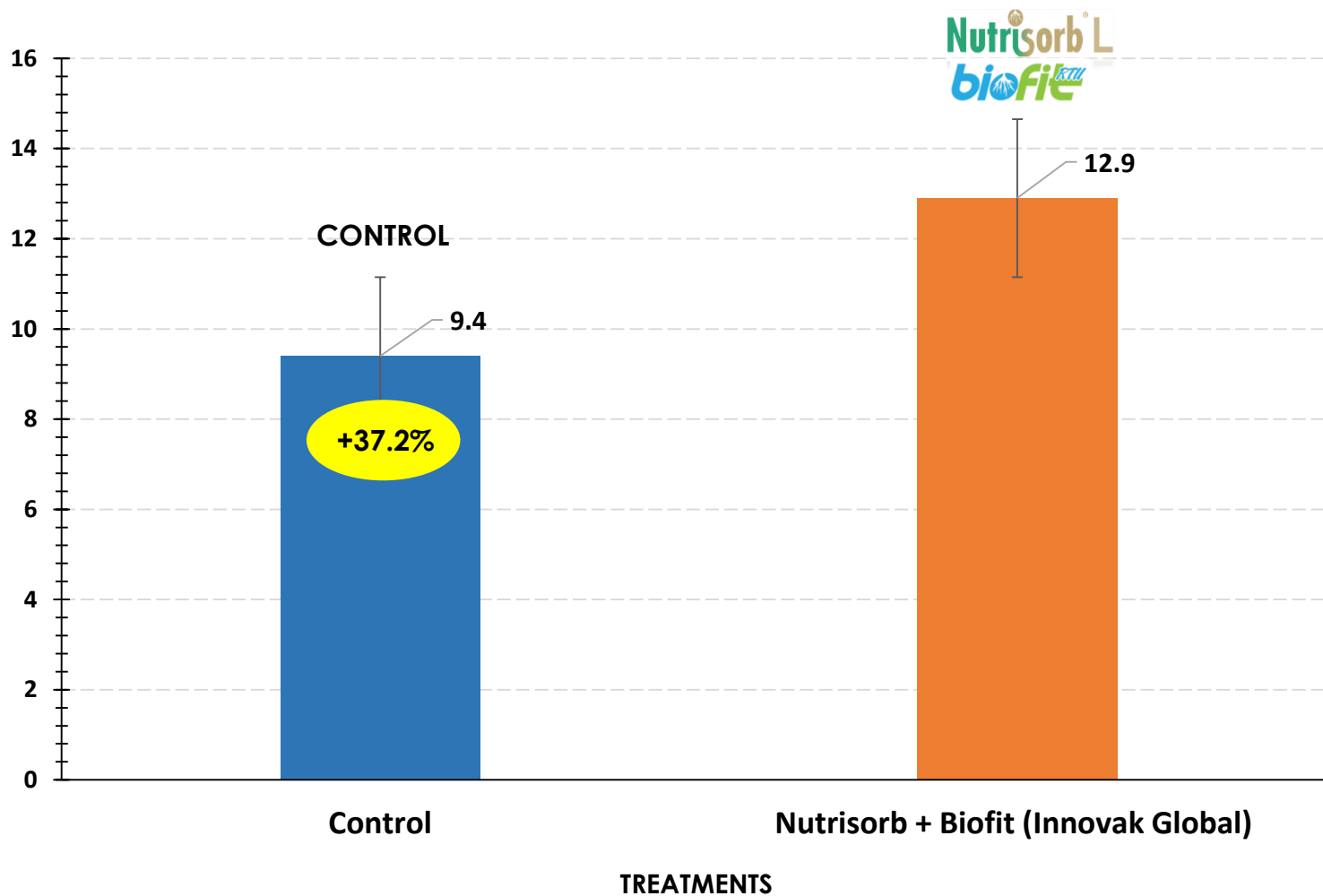
Statistical summary for Brix

<i>Treatment</i>	<i>Count</i>	<i>Average</i>	<i>Standard deviation</i>	<i>Variation Coefficient</i>	<i>Mín</i>	<i>Max</i>
Innovak Global	3	12.9	3.08058	23.8805%	10.6	16.4
Control	3	9.36667	2.55408	27.2678%	6.5	11.4
Total	6	11.1333	3.18601	28.6169%	6.5	16.4

BRIX COMPARISON AMONG TREATMENTS

ASPARAGUS CULTURE- ROOT EVALUATION – PLOT 7 – 12/10/2020

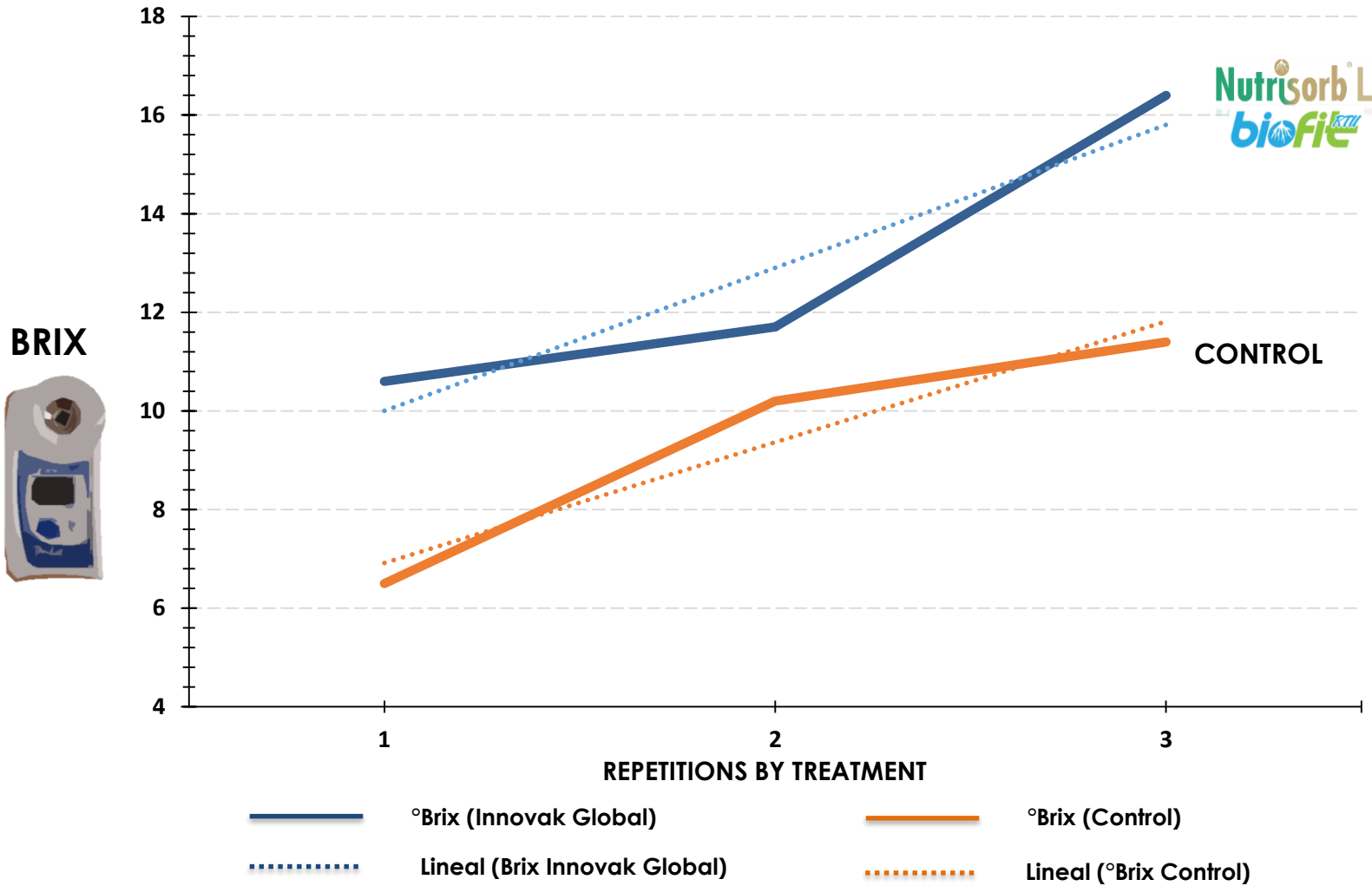
BRIX



Graf.2. Brix Comparative Among Treatments

BRIX CONTENT TENDENCIES AMONG TREATMENTS

ASPARAGUS CULTURE- ROOT EVALUATION- PLOT 7 - 12/10/2020



Graf.3. Tendencias in Brix content among treatments

COMENTS

In order to obtain more precise and reliable data, the °Brix measurement was carried out in plants of which no root washing was performed, and therefore did not remain exposed to the environment. Consequently, a hole was made in the soil next to the randomly selected plant and a sample of roots was extracted for measurement of °Brix immediately (this was done in both control and treated plants).

The comparison of Brix between treatments was carried out statistically with Anova (graph 1), it should be specified that the Innovak Global treatment presented 37.2% more average Brix content compared to the control (graph 2, fig 3). Likewise, it is important to highlight that the trend in the sugar content according to the repetitions carried out is linear ascending (it is increasing) in both treatments (graph 3); However, there is a clear difference in the accumulation of reserve in the roots in favor of the Innovak Global treatment (Nutrisorb L & Biofit RTU) compared to the control.

INSTALATION

Minirhizotron Tubes

- ✓ Blueberry Crop: lot 14
- ✓ Asparagus Crop: lot 7



INSTALATION OF 06 MINIRHIZOTRON TUBES BY TREATMENT ON BLUEBERRY (LOT 14)





ROOT CONDITION DURING MINIRHIZOTRON TUBES INSTALATION (LOT 14)





INSTALATION OF 04 MINIRHIZOTRON TUBES BY TREATMENT ON ASPARAGUS (LOT 7)



COMENTS

- ✓ The installation of Minirizotron tubes was carried out in both the blueberry culture (6 tubes in the treated and 6 in the control) as in the asparagus culture (4 tubes in the treated and 4 in the control). The study lots were 14 and 7 respectively according to culture.
- ✓ In the blueberry crop, during the installation of tubes, the state of the roots was reviewed as a precedent for the next evaluations, finding at this time little root activity due to the phenological state.
- ✓ In the cultivation of asparagus, the punch was necessary to deepen the holes where the tubes have been housed, because they have raised the ridge to control weeds and a machine will pass to re-level the soil.

CONCLUSIONS

- ❑ It is demonstrated that the application of Nutrisorb L and Biofit RTU influence the increase in the accumulation of reserves, finding a 37.2% higher concentration of sugars in the treated plants compared to the control.
- ❑ The plants treated with Nutrisorb L and Biofit RTU showed greater Brix uniformity with respect to the control.
- ❑ Regarding the evaluation of roots, the plants treated with Nutrisorb L and Biofit RTU presented better root health, a greater volume of reserve roots, as well as a greater number of active and young roots, unlike the control plants.
- ❑ The roots of the treated plants showed a greater exploration area, as well as a lower number of oxidized roots and little death of roots, unlike the control plants.



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