Universidad Francisco
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PRODUCING CORN OF THE SPECIES (Zea Mays) USING THE CROP BOOSTER BIOSTIMULANT TECHNOLOGY IN THE UFPSO EXPERIMENTAL FARM.

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INTRODUCTION

Over time, Colombian fields have been deteriorating due to extensive rains, prolonged droughts and inadequate practices, causing low quality and production of green forage for animals.

The constant technological development in agriculture has been of importance in recent years, which, technologies such as the crop booster turn out to be useful in improving the agricultural production of foragers.

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PROBLEM STATEMENT

Source: *Own authorship*

Low crop yield due to soil deterioration

High production costs

OBJECTIVES

Produce maize of the species (Zea Mays) using the crop booster biostimulant technology in the UFPSO experimental farm..

Implement crop booster technology in the UFPSO experimental farm as an improvement alternative for corn crops (Zea Mays) in animal feed.

Develop procedures for the use of crop booster technology in corn crops (Zea Mays).

To determine the effect of the use of crop booster technology in the forage crop of corn (Zea Mays)

STUDY DESCRIPTION

Source: https://www.google.com.co/maps

- Growing season in %.
- Follow-up analysis.
- Comparison of the two fields.

RESULTS

FIRST OBJECTIVE. IMPLEMENT CROP BOOSTER TECHNOLOGY IN THE UFPSO EXPERIMENTAL FARM AS AN IMPROVEMENT ALTERNATIVE FOR CORN CROPS (Zea Mays) IN ANIMAL FEEDING.

- Crop Booster device.

Source: *Own authorship*

RESULTS

- Soil health.

Soil sample from the two fields

Source: *Own authorship*

RESULTS

❖ Mechanized planting.

Source: *Own authorship*

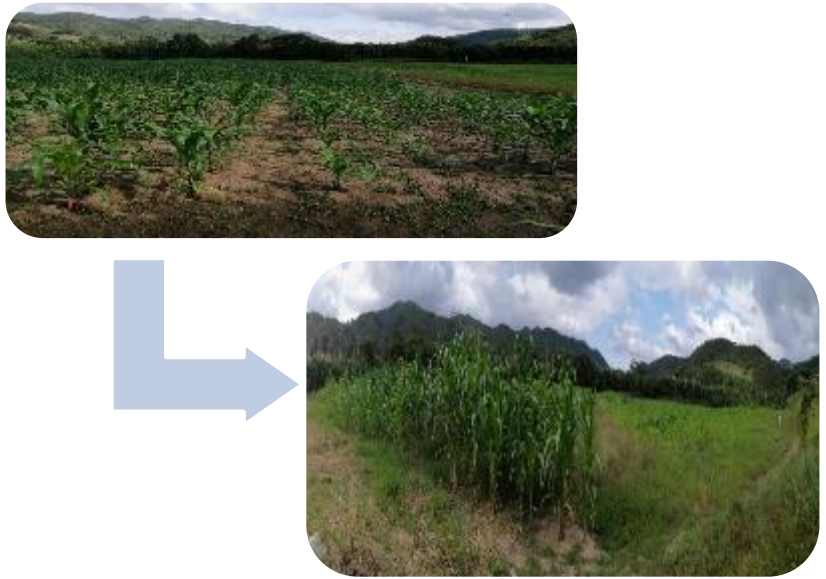
➢ Crop Booster Field
60 pounds
➢ Control Field
50 pounds

RESULTS

SECOND OBJECTIVE. DEVELOP PROCEDURES FOR THE USE OF CROP BOOSTER TECHNOLOGY IN CORN CROPS (Zea Mays).

Determine the signal intensity of the crop booster both at harvest and at planting.

Evolution at each stage



Source: *Own authorship*

RESULTS

Evaluate soil characteristics before fertilization prior to planting maize (Zea Mays) and after crop harvest.

- Analyzed by the Colombian Agricultural Research Corporation (AGROSAVIA)
- Comparison between initial and final

RESULTS

Soil analysis beginning and end of the Crop Booster

Minimum decrease in soil nutrients

		FIELDS BEGINNING		FINAL CROP BOOSTER		ANALIYIS COMPARISON
Analytical Determination	**Unit**	**Value**	**Interpretation**	**Value**	**Interpretation**	
pH	pH Units	6.26	Slightly acidic	6.62	Nearly neutral or neutral	pH Stabilization
Electrical Conductivity (EC)	dS/m	0.30	Not saline	0.16	Not saline	Decrease of (EC)
Organic Matter (OM)	g/100g	1.41	Low	1.28	Low	Decrease of (OM)
Organic Carbon (OC)	g/100g	0.82		0.74		Decrease of (OC)
Phosphorus (P) Available (Bray II)	mg/kg	27.52	Medium	34.48	Medium	Increase of (P)
Sulfur (S) available	mg/kg	11.39	Medium	8.28	Low	Decrease of (S)
Capacity Interc Cationic Effect (CICE)	cmol(+)/kg	10.30	Medium	9.23	Low	Decrease of (CICE)
Boron (B) Available	mg/kg	0.63	High	0.14	Low	Decrease of (B)
Acidity (Al+H)	cmol(+)/kg	ND	Not shown	ND	Not shown	
Interchangeable Aluminum (Al)	cmol(+)/kg	ND	Without restrictions	ND	Without restrictions	
Calcium (Ca) available	cmol(+)/kg	7.89	High	7.36	High	Decrease of (Ca)
Magnesium (Mg) Available	cmol(+)/kg	2.15	Medium	1.64	Medium	Decrease of (Mg)
Potasium (K) Available	cmol(+)/kg	0.14	Low	0.12	Low	Decrease of (K)
Sodium (Na) Available	cmol(+)/kg	<0.14	Normal	<0.14	Normal	Decrease of (Na)
Olsen Iron (Fe) Available	mg/kg	96.16	High	51.72	High	Decrease of (Fe)
Olsen Copper (Cu) Available	mg/kg	4.38	High	2.77	Medium	Decrease of (Cu)
Olsen Manganese (Mn) Available	mg/kg	5.62	Medium	5.41	Medium	Decrease of (Mn)
Olsen Zinc (Zn) Available	mg/kg	3.65	High	3.52	High	Decrease of (Zn)
Calcium saturation	%	77	High	80	High	Increased calcium saturation
Magnesium saturation	%	21	Medium	18	Medium	Increased magnesium saturation
Potassium saturation	%	1	Low	1	Low	Low amount of potassium in both fields
Sodium saturation	%	1	Normal	1	Normal	Normality of sodium saturation
Aluminum Saturation	%	0	Normal	0	Normal	Normality of Aluminum saturation

Source: *(AGROSAVIA, 2022)*

RESULTS

Soil analysis beginning and end of the control field

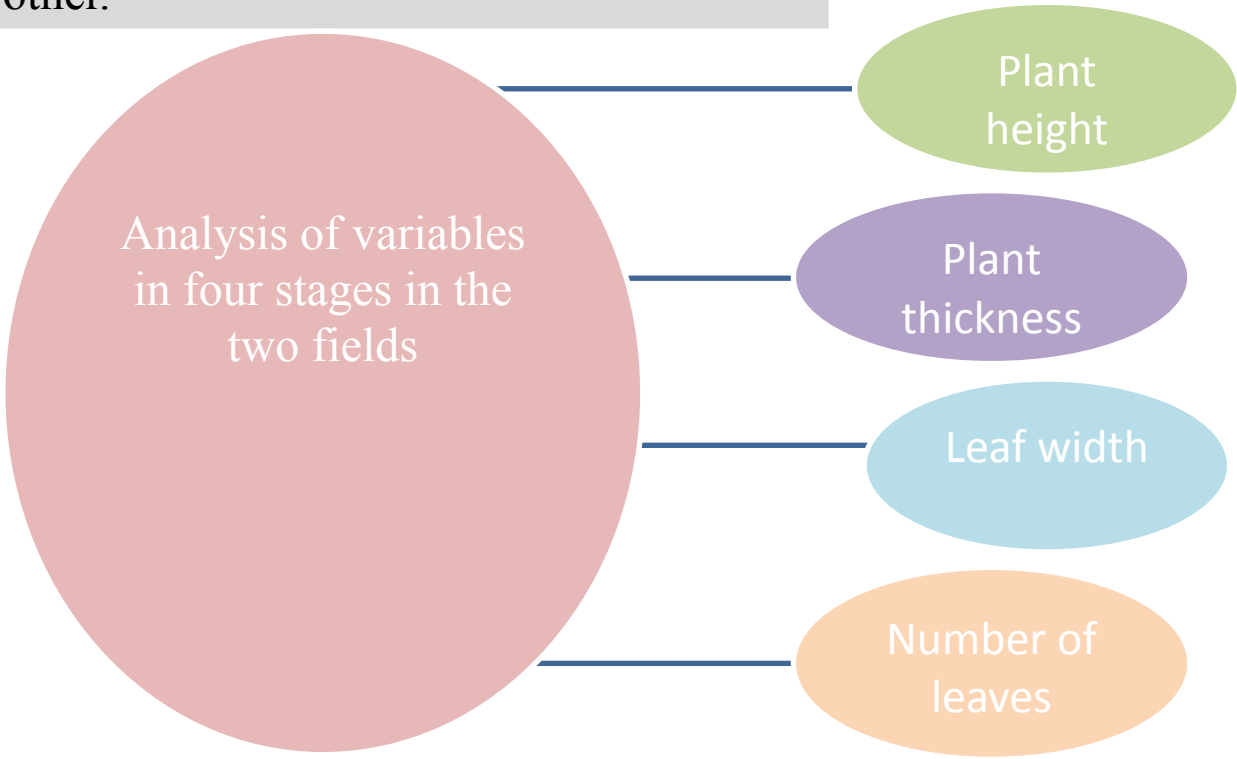
Deterioration of soil nutrients

		SOWING BEGINNING		END OF HARVEST CONTROL FIELD		COMPARISON ANALYSIS FIELDS
Analytical Determination	**Unit**	**Value**	**Interpretation**	**Value**	**Interpretation**	
pH	pH Units	6.26	Slightly Acidic	6.12	Slightly Acidic	Increased Soil Acidity
Electrical Conductivity (EC)	dS/m	0.30	Not saline	0.20	Not saline	Decrease of (EC)
Organic Matter (OM)	g/100g	1.41	Low	1.05	Low	Decrease of (OM)
Organic Carbon (OC)	g/100g	0.82		0.59		Decrease of (OC)
Phosphorus (P) Available (Bray II)	mg/kg	27.52	Medium	25.10	Medium	Decrease of (P)
Sulfur (S) available	mg/kg	11.39	Medium	7.15	Low	Decrease of (S) available
Capacity Interc Cationic Effect (CICE)	cmol(+)/kg	10.30	Medium	9.10	Low	Decrease of (CICE)
Boron (B) Available	mg/kg	0.63	High	0.10	Low	Decrease of (B) available
Acidity (Al+H)	cmol(+)/kg	ND	Not shown	ND	Not shown	
Interchangeable Aluminum (Al)	cmol(+)/kg	ND	Without restrictions	ND	Without restrictions	
Calcium (Ca) available	cmol(+)/kg	7.89	High	7.20	High	Decrease of (Ca) available
Magnesium (Mg) Available	cmol(+)/kg	2.15	Medium	1.50	Medium	Decrease of (Mg) available
Potasium (K) Available	cmol(+)/kg	0.14	Low	0.02	Low	Decrease of (K) available
Sodium (Na) Available	cmol(+)/kg	<0.14	Normal	<0.14	Normal	Decrease of (Na) available
Olsen Iron (Fe) Available	mg/kg	96.16	High	51.39	High	Decrease of (Fe) available
Olsen Copper (Cu) Available	mg/kg	4.38	High	2.44	Medium	Decrease of (Cu) available
Olsen Manganese (Mn) Available	mg/kg	5.62	Medium	5.30	Medium	Decrease of (Mn) available
Olsen Zinc (Zn) Available	mg/kg	3.65	HIgh	3.40	High	Decrease of (Zn) available
Calcium saturation	%	77	High	85	High	Increased Calcium Saturation
Magnesium saturation	%	21	Medium	22	Medium	Increased Magnesium Saturation
Potassium saturation	%	1	Low	1	Low	Normality in potassium saturation
Sodium saturation	%	1	Normal	1	Normal	Normality in sodium saturation
Aluminum Saturation	%	0	Normal	0	Normal	Normality in aluminum saturation

Source: *(AGROSAVIA, 2022)*

RESULTS

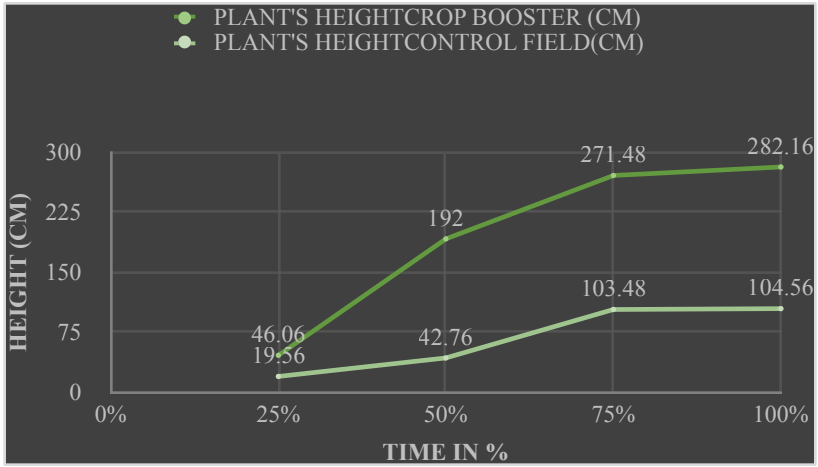
Evaluation of the vigor of corn plants (Zea Mays) in crops, with respect to each other.



RESULTS

Plant height

➢ Cultivation stages



Note: Plant height with respect to time.

Source: Own authorship.

RESULTS

Plant height comparison within each studied field

- Witness field 75% and 100%

%	Crop Booster	Control field
25	46,06 ± 10,89 [a]	19,56 ± 4,20 [a]
50	192,00 ± 12,18 [b]	42,76 ± 13,97 [b]
75	271,48 ± 6,19 [c]	103,48 ± 24,51 [c]
100	282,16 ± 3,44 [d]	104,56 ± 28,87 [c]
P - value	0,000	0,000

Source: *Own authorship*

RESULTS

Comparison of Fields over Time at Plant Height.

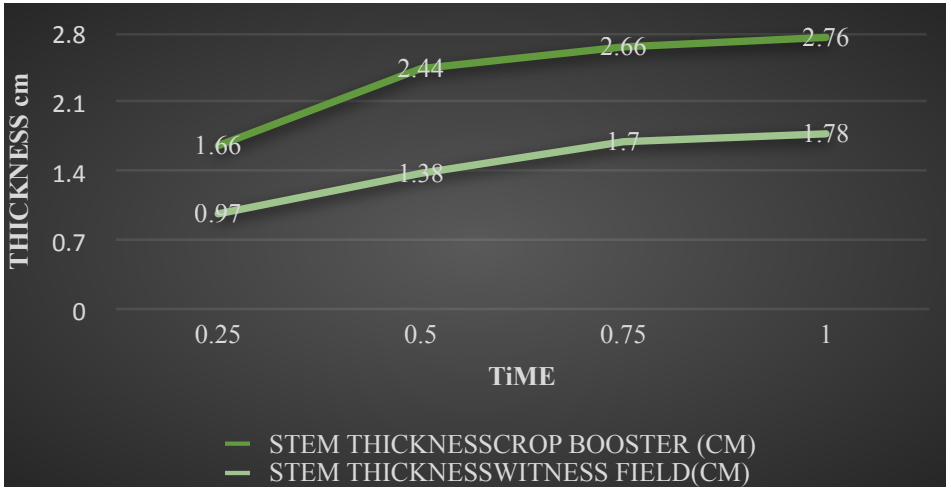
Treatment	25%	50%	75%	100%
Crop Booster	46,06 ± 10,89	192,00 ± 12,18	271,48 ± 6,19	282,16 ± 3,44
Control Field	19,56 ± 4,20	42,76 ± 13,97	103,48 ± 29,51	104,56 ± 28,87
P - value	0,000	0,000	0,000	0,000

Source: *Own authorship*

RESULTS

Plant thickness

➢ Cultivation stages



Note: Stem thickness in the time elapsed until harvest, giving a difference between the two study fields.

Source: Own authorship.

RESULTS

Plant thickness comparison within each studied field

- Crop Booster
  50%, 75% and 100%
- Control Field
  75% and 100%

%	Crop Booster	Control Field
25	1,66 ± 0,43[a]	0,97 ± 0,37[a]
50	2,44 ± 0,36[b]	1,38 ± 0,31[b]
75	2,66 ± 0,45[b]	1,70 ± 0,34[c]
100	2,76 ± 0,44[b]	1,78 ± 0,33[c]
P - value	0,000	0,000

Source: *Own authorship*

RESULTS

Comparison of Fields Over Time in Plant Thickness.

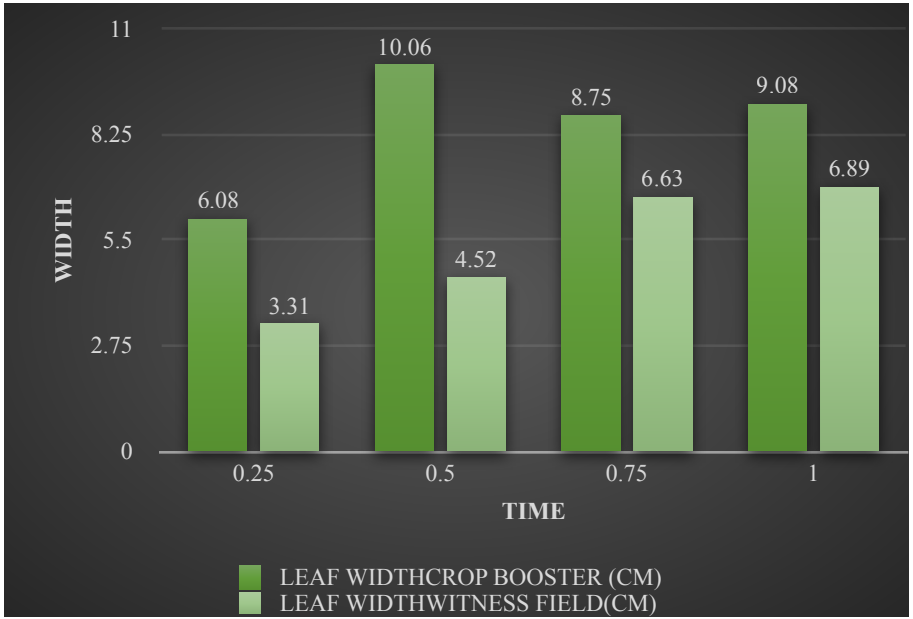
Treatment	25%	50%	75%	100%
Crop Booster	1,66 ± 0,43	2,44 ± 0,36	2,66 ± 0,45	2,76 ± 0,44
Control Field	0,97 ± 0,37	1,38 ± 0,31	1,70 ± 0,34	1,78 ± 0,33
P - value	0,000	0,000	0,000	0,000

Source: *Own authorship*

RESULTS

Leaf width

➢ Cultivation stages



Note: In this graph you can see the difference of the leaves, finding through time.

Source: Own authorship.

RESULTS

Leaf width comparison within each field studied

- Crop Booster
  75% and 100%
- Control Field
  75% and 100%

%	Crop Booster	Control Field
25	6,08 ± 1,27[a]	3,31 ± 0,74[a]
50	10,06 ± 3,00[b]	4,52 ± 1,27[b]
75	8,75 ± 0,70[c]	6,63 ± 0,96[c]
100	9,08 ± 0,70[c]	6,89 ± 1,02[c]
P - value	0,000	0,000

Source: *Own authorship*

RESULTS

Comparison of the Fields through Time in the width of the leaf.

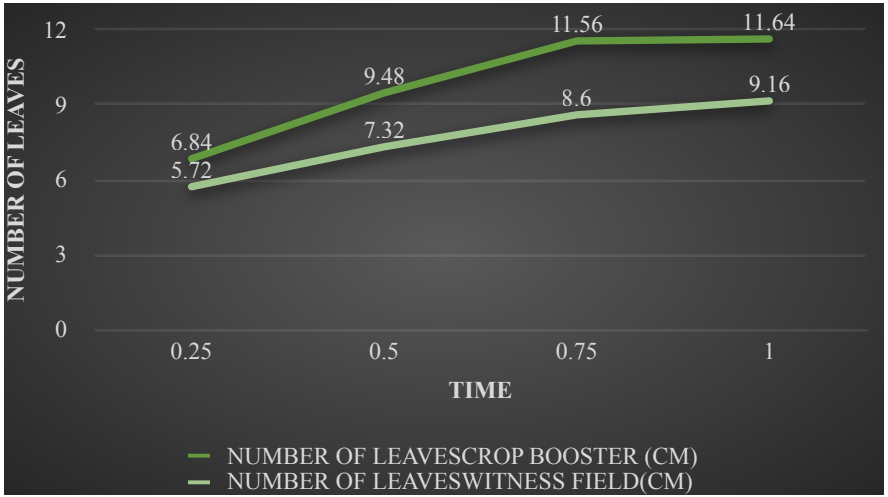
Treatment	25%	50%	75%	100%
Crop Booster	6,08 ± 1,27	10,1 ± 3,0	8,75 ± 0,69	9,1 ± 0,70
Control Field	3,31 ± 0,74	4,52 ± 1,3	6,63 ± 0,96	6,9 ± 1,01
P - value	0,000	0,000	0,000	0,000

Source: *Own authorship*

RESULTS

Number of leaves

➢ Cultivation stages



Note: This graph explains the number of sheets.

Source: Own authorship.

RESULTS

Comparison number of leaves within each field studied

- Crop Booster
  75% and 100%
- Control Field
  75% and 100%

%	Crop Booster	Control Field
25	6,84 ± 0,85[a]	5,72 ± 0,84[a]
50	9,48 ± 1,58[b]	7,32 ± 1,44[b]
75	11,56 ± 0,96[c]	8,06 ± 1,38[c]
100	11,64 ± 1,08[c]	9,16 ± 1,55[c]
P - value	0,000	0,000

Source: *Own authorship*

RESULTS

Comparison of the Fields through Time in the number of leaves.

Treatment	25%	50%	75%	100%
Crop Booster	6,84 ± 0,85	9,48 ± 1,58	11,56 ± 0,96	11,64 ± 1,08
Control Field	5,72 ± 0,84	7,32 ± 1,44	8,06 ± 1,38	9,16 ± 1,55
P – value	0,000	0,000	0,000	0,000

Source: *Own authorship*

RESULTS

Make a comparison of the spread of weeds and pests in crops, with respect to each other.

➢ Gramisom
5 liters

Source: *Own authorship*

➢ Armyworm *(Helicoverpa armigera)*

Source: *Own authorship*

RESULTS

THIRD OBJECTIVE. DETERMINE THE EFFECT OF THE USE OF THE CROP BOOSTER TECHNOLOGY IN THE FORAGE CROP OF CORN (Zea Mays).

Analysis of information obtained (harvest data).

USDA Quality Grades

Field	Category	PB (%MS)	FAD (%MS)	FND (%MS)	RFV
Crop Booster	Current	3,7	35,1	45,69	125
Witness Field	Current	1,04	38,3	47,6	115

Source: *Own authorship.*

RESULTS

Crop yield in linear meter in each field

- 1 lineal meter
- 5 points in each field

Crop Booster		Witness Field	
# Sample	**Kg**	**# Sample**	**Kg**
1	7,44	1	1,55
2	7,36	2	1,2
3	8,8	3	1,8
4	7,22	4	1,6
5	7,15	5	1,73
Average	7,59	**Average**	1,58

Source: *Own authorship*

Source: *Own authorship*

Source: *Own authorship*

RESULTS

Green forage production in both fields

Capacity= 1m lineal → Kg mts lineal
Meters row → X

X = Amount Fv x row

1 groove → Amount Fv x row
Number of crop rows → X

X = PDN FV crop

Crop Booster	Control Field
79.664 Kg	11.672 Kg

Source: *Own authorship*

Source: *Own authorship*

Source: *Own authorship*

RESULTS

Efficiency of water use in the fields.

Source: *Own authorship*

Crop Booster: Sprinkling 30 minutes per furrow
Use of 94,770 liters throughout the field

Control field: Sprinkling 1 hour per furrow
Use of 189,540 liters throughout the field

RESULTS

Brix rating b. Titratable Acidity (TA)

- Dissolved sugars
- Plant acidity

Source: *Own authorship*

Brix Degrees In The Two Harvests		Titratable Acidity Of The Two Fields	
Crop Booster	**Witness Field**	**Crop Booster**	**Witness Field**
11,60%	8,70%	2,51%	3,74%
11,40%	8,40%	2,48%	3,79%
11,70%	8,60%	2,47%	3,75%

RESULTS

Relationship between Brix degrees and titratable acidity

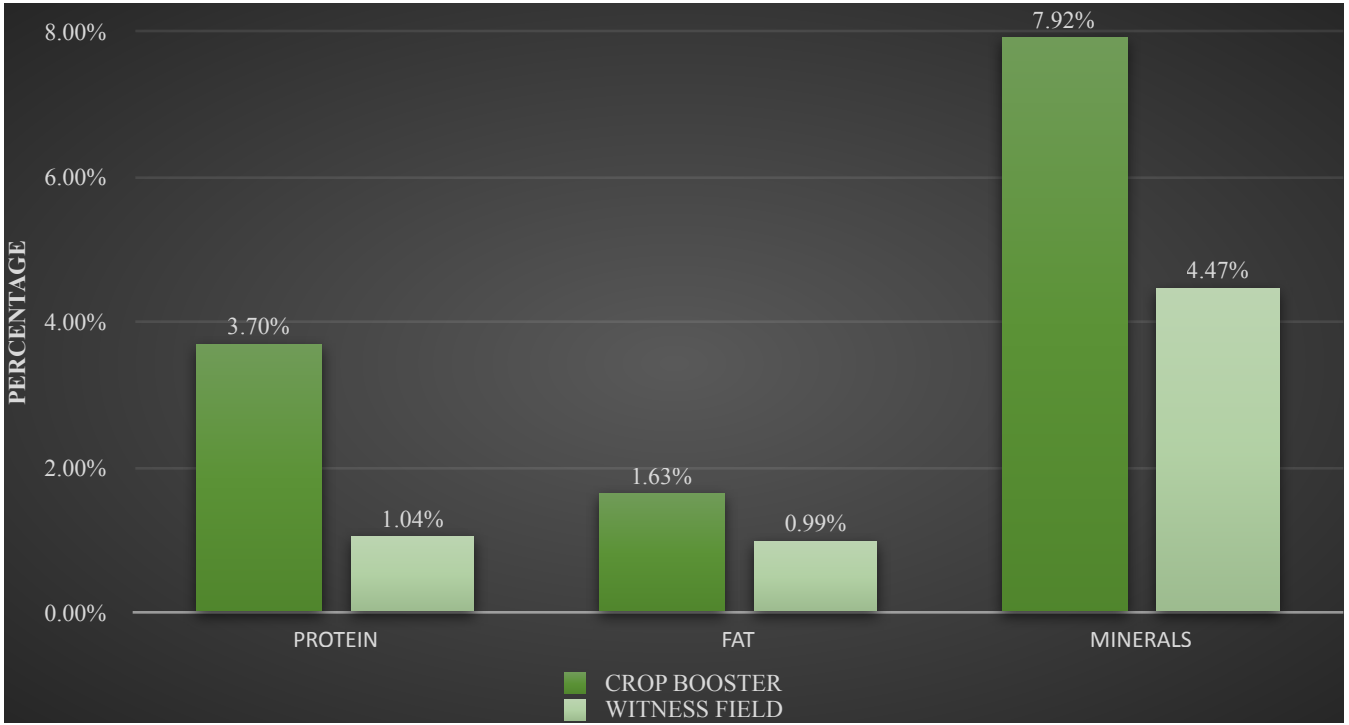
➢ The comparison of these analyzes indicate the maturity index

Crop Booster				Control Field			
Samples	**Brix Degrees (%)**	**Titratable Acidity**	**Maturity Index**	**Samples**	**Brix Degrees (%)**	**Titratable Acidity**	**Maturity Index**
1	11,60	2,51	4,62	**1**	8,70	3,74	2,3
2	11,40	2,48	4,6	**2**	8,40	3,79	2,22
3	11,70	2,52	4,64	**3**	8,60	3,75	2,29

Source: *Own authorship.*

RESULTS

Bromatological analysis in both fields.



Source: *Own authorship*

RESULTS

Number of ears in the fields.

Source: *Own authorship*

- Crop Booster: 2 ears per plant.
- Control Field: 1 ear per plant.

RESULTS

Shelf life or post-harvest time.

Crop Booster						
Days	**Temperature**	**pH**	**Smell**	**Palatability**	**Fungus Presence**	**Forage loss**
1	31°C	5,1	FRESH	90%	NONE	0%
2	55°C	6,3	FRESH	80%	PRESENCE	20% INTERMEDIATE LAYER
3	67°C	7,2	FERMENTED	50%	PRESENCE	40%
4	91°C	7,9	ACID	20%		50%

Source: *Own authorship*

RESULTS

Shelf life or post-harvest time.

Control Field						
Days	**Temperature**	**pH**	**Smell**	**Palatability**	**Fungus Presence**	**Forage loss**
1	35°C	5,5	FRESH	80%	NONE	20%
2	60°C	6,7	FERMENTED	50%	PRESENCE	60%
3	80°C	7,8	ACID	30%	PRESENCE	80%
4	98°C	8,0	ACID	0%	PRESENCE	100%

Source: *Own authorship*

FINAL DIAGNOSIS

In the second half of 2021, professional practices were carried out in the areas of forage crops for animal feed, implementing technological alternatives that are more efficient in the area, allowing a greater amount of food for animals in times of lack of water.

Source: *Own authorship*

CONCLUSIONS

Increasing production from 11,672 kg traditional crop without fertilizers to 79,664 kg with the crop booster device.

Quality improvement from 1.04% control field protein to 3.70% crop booster field protein.

Efficient in the use of water and a post-harvest life of 2 days in the control field and 3 days in the crop booster field.

RECOMENDATIONS

New investigations

Source: https://acortar.link/tWTJUt

Maximum sprinkler irrigation times.

Source: https://acortar.link/khVLcb

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THANK YOU