

Abstract

Hair matts, produced by needle punching, are able to increase the quality of production in corn, increasing the quantity of fruits and their weight.

Furthermore hair mats are able to improve the quality of the soil, adding organic material and nitrogen

Introduction

Water scarcity in Chile represents one of the main problems for the rural population of the country, affecting the quality of life of families and the development of daily and economic activities.

Furthermore in the north of the country, farmers are not longer able to grow enough fruits and vegetable to sell, due to the drought

Human hair through the needle punching method is transformed into 60x60 cm matts with a thickness of 1.8 cm.

Seen:

other materials such as cotton or plastic polymers are able to increase production, by maintaining the moisture of the soil

The hypothesis is that the semi-permeable barrier made with human hair is able to increase the quality of production in corn, increasing the quantity of fruits and their weight. Also, due to its content of nitrogen and other nutrients is able to improve the quality of the soil

Content

Method

Two homogeneous areas of 9.7 m by 4.4 m each were delimited; defining a control area and an intervention area with Agropelo Hair Mats. An area consisting of 14 lines is delimited, finding the homogeneity required by the project.



Hair matts are installed according to the following distribution, where each matts and cutouts are numbered (P)

1	2		3	4	5	6	7		8		9	10	11		12	13	14
	2MTP																
1MT8	2MT8	23P8	3MT8	4MT8		6MT8	7MT8		8MT8		9MT8						
1MT7	2MT7	23P7	3MT7	4MT7	5MT7	6MT7	7MT7	78P7	8MT7	89P7	9MT7	10MT7	11MT7	1112P7	12MT7	13MT7	
1MT6	2MT6	23P6	3MT6	4MT6	5MT6	6MT6	7MT6	78P6	8MT6	89P6	9MT6	10MT6	11MT6	1112P6	12MT6	13MT6	14MT6
1MT5	2MT5	23P5	3MT5	4MT5	5MT5	6MT5	7MT5	78P5	8MT5	89P5	9MT5	10MT5	11MT5	1112P5	12MT5	13MT5	14MT5
1MT4	2MT4	23P4	3MT4	4MT4	5MT4	6MT4	7MT4	78P4	8MT4	89P4	9MT4	10MT4	11MT4	1112P4	12MT4	13MT4	14MT4
1MT3	2MT3	23P3	3MT3	4MT3	5MT3		7MT3	78P3	8MT3	89P3	9MT3	10MT3	11MT3	1112P3	12MT3	13MT3	14MT3
1MT2	2MT2	23P2	3MT2	4MT2	5MT2		7MT2	78P2	8MT2	89P2	9MT2	10MT2	11MT2	1112P2	12MT2	13MT2	14MT2
1MT1	2MT1	23P1	3MT1	4MT1	5MT1	6MT1	7MT1	78P1	8MT1	89P1	9MT1	10MT1	11MT1	1112P1	12MT1	13MT1	14MT1

In each of the areas, 180 individuals are enumerated. Multiple groups of similar plants were listed, providing optimal conditions for the final comparison of results.

[illegible]

[illegible]

In the upper part the individuals in the Agropelo Hair Mat zone (green) are identified and in the lower part the Control individuals (orange)

Regarding the search for data, TEROS 10 sensors were installed, at a depth of between 10 and 15 cm



Data collection for soil moisture

The following equipment is installed in the field:

- Atmospheric data collection center, including wind speed and direction, atmospheric temperature and humidity, precipitation
- Data reception center for soil moisture sensors

- 6 TEROS 10 sensors, each one with a control panel powered by a solar panel and a battery to ensure continuous operation at night. Data is displayed on a multiple access online platform and recorded every 15 minutes.

Data collection for height of the plants

40 plants are chosen randomly from the hair mat area, and 40 from the control area. Plants are measured every 15 days

Data collection for soil

4 soil samples are taken at the start of the experience. and 4 at the end of the experience, with the following protocol

- 1.- Take 200-300 gr. of soil per sample. Avoid rocks and organic matter (detritus) such as: Leaves, branches, animal remains or something recognizable.
- 2.- Mark depth, take care that it is not contaminated with upper soil, to have a better result. trustworthy.
- 3.- Use only a pencil and a paper bag to store the sample.
- 4.- Deliver in maximum two days to the lab

Samples are sent to Adolfo Figueroa Lahaye, specialist in organic agriculture: soil chromatography, substrates for agriculture and bio-inputs to apply circular chromatography

Data collection protocol for fruits

SIZE OF THE CORN

Each corn is removed from the plant, the stem is cut and the leaves are removed
Each corn is measured from the stem area (lower part) to the tip (measure 1) and from the bottom to where there are corn kernels (measure 2)

WEIGHT OF THE CORN

Each corn (without stem and without leaves), is weighed on a scale with a maximum precision of +/- 1g.

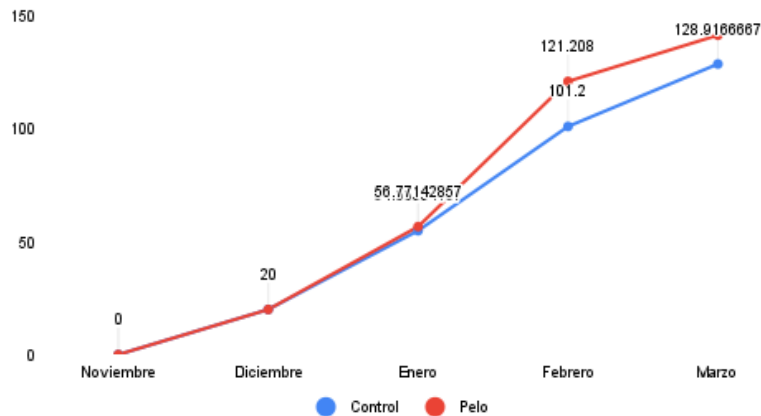
GRAIN SIZE

This measurement is taken every 5 corns, randomly: Two cuts are made to each corn, this means that a corn is left in three pieces called low, center and tip. 2 grains of corn are removed from one of the edges of the center, randomly, then 2 other grains, opposite to the first ones are removed from the other edge of the corn

Each of the grains is measured, vertically, from the tip to the bottom and horizontally (the widest part)

Results

HEIGHT



A growth of 10% more in height is registered in Hair mat zone (141.7 cm vs 128.9 cm)

PRODUCTION

A total of 92 corns (fruits) were recorded in Hair mat area and 70 in the control area

Control	Agropelo hair matt
6	16
14	24
47	52
TOTAL 70	TOTAL 92

A production of 10.43 kg is recorded in Control Area and 21.07 kg in Hair Mat Area; allowing affirm that there was a **+102% more production with the Agropelo Hair Padding**

Ripening point was reached 15 days earlier in hair zone, compared to the control zone.

FRUIT HEIGHT, WEIGHT

FRUTOS	FECHA	CONTROL					Ø GRANO		MASA		PELO					Ø GRANO		MASA
		ALTO TOTAL	ALTO GRANO	Ø BAJO	Ø ALTO	DULZOR	Ø ALTO	Ø ANCHO	GR	FECHA	ALTO TOTAL	ALTO GRANO	Ø BAJO	Ø ALTO	DULZOR	Ø ALTO	Ø ANCHO	GR
1	8/3/2022	16,50		53,00	45,00	10,3	11	5	245	8/3/2022	16,00		51	42	14,2	10	7,5	280
						16.5	9.5	6							7.8	10	6.5	

						11,8	9	5,5							6,3	10	6	
2	18/3/2022	12,53	12,50	45,00	37,00	8,00	10,00	6,00	145	8/3/2022	15,00		56	36	8,5	9	7	220
						10,20	8,00	6,00							9,9	10	6	
						5,70	8,00	5,00							10,7	11	7	
3	18/3/2022	11,00	6,50	46,00	39,00				96	18/3/2022	20,02	20,00	45,00	59,00	7,70	14,00	8,00	350
															10,70	12,00	7,00	
															10,80	11,00	7,00	
4	18/3/2022	15,50	10,00	52,00	41,00				146	18/3/2022	22,50	22,50	48,00	32,00				207
5	18/3/2022	13,00	13,00	45,00	31,00				111	18/3/2022	22,00	14,00	56,00	36,00				256
6	18/3/2022	12,04	12,00	47,00	41,00	11,00	8,00	5,00	156	18/3/2022	19,00	14,00	55,00	41,00				232
						9,20	8,00	6,00										
						9,60	8,00	6,00										
7	18/3/2022	15,00	13,00	47,00	35,00				145	18/3/2022	19,51	19,50	49,00	37,00	6,10	8,00	5,00	230
															7,70	8,00	5,00	
															8,20	8,00	6,00	
8										18/3/2022	21,50	18,00	55,00	44,00				298
9										18/3/2022	22,00	11,50	44,00	33,00				148
10										18/3/2022	18,00	18,00	51,00	36,00				205
11										18/3/2022	15,00	12,50	47,00	38,00				144
12										18/3/2022	17,52	17,50	56,00	45,00	8,30	14,00	7,00	281
															10,60	8,00	12,00	
															11,80	12,00	6,00	
13										18/3/2022	13,00	7,00	49,00	49,00				118
14										18/3/2022	19,00	14,00	59,00	45,00				263
15										18/3/2022	18,00	11,00	57,00	42,00				203
16										18/3/2022	17,00	17,00	52,00	35,00				177
17										18/3/2022	16,50	17,50	56,00	45,00	8,30	14,00	7,00	281
															10,60	8,00	12,00	
															11,80	12,00	6,00	

After registering every corn, as detailed in the method, we can affirm that corns reached:

37% more in total length in hair mat zone

7.5% more in diameter in hair mat zone

23% more in grain size in hair mat zone

54% more in weight of corn in hair mat zone

SOIL IMPROVEMENT

Samples are tested with chromatography, the conclusions are: “with respect to 1 and 2, you can notice an **improvement in the quality of the organic material and its amount.**

Nitrogen in the soil has increased and a more natural integration with the minerals of the area.”

Conclusions

It is evident that human hair matts are able to increase the quantity of production of corn, in this case, a 102% more of production is registered

Hair mats were able to increase the height of the plants by 10%

Furthermore Hair mats were able to increase the number of the fruits, as well as their quality (weight, height, grain size)

Chromatographies demonstrated that hair mats are able to improve the quality of the soil, adding organic material and nitrogen to the soil