2023 - Mexico - Broccoli - FIRA - HH Summary

Prof. Carlos Torres Barrera

Overall Results - Broccoli Trial 2023

	Development				Result
	Broccoli Head		Leaves		Yield
	Diameter (in)	Weight (g)	Height (cm)	Diameter (cm)	(kg/5000 m2)
Control	7.4	546.6	32.3	70.7	5796
KPCB	7.4	626.6	34.3	79.2	6056
Gain	0%	**14.6%**	**6%**	**12.0%**	**4.5%**

Time:

Sowing date: 11/15/2022
Transplant: 12/11/2022
Growth: 12/30/2022
Harvest: 9/9/23 to 5/10/2023

Place:

Institute: Trust Funds for Rural Development (FIRA) of Mexico's federal government
Location: Technology Development Center Villadiego, Valle de Santiago, Gto., Mexico

Form:

Crop type: Broccoli
Variety: Super Diamante
Area per treatment: 5,000 m^2
Irrigation: Drip

Results: Development: leaves (2/21/2023) were 6.2% higher and provided 12% bigger leaf coverage for photosynthesis.
YIELD: With same 7.4" diameter of broccoli heads, average head WEIGHT was 14.64% heavier in KPCB plants (626.6 gram vs. 546.6 gram in Control plants).
YIELD: KPCB produced 14.4% more tonnage overall - 1.9 tons extra yield per hectare.

Villadiego
Centro de Desarrollo Tecnológico de FIRA

Report of validation test results

Kyminasi Plant Crop Booster™ with Brocolli

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May 2023

Trial Data

- Time:
  - Sowing date: 11/15/2022
  - Transplant: 12/11/2022
  - Growth: 12/30/2022
  - Harvest: 9/9/23 to 5/10/2023
- Location: Centro de Desarrollo Tecnológico “Villadiego” (Villadiego Technological Development Center) of FIRA, Mexico
- Crop: Broccoli
- Varieties: Super Diamante
- Area per treatment: 5,000 m^2
- Irrigation type: Drip

Validation of Kyminasi Plant Crop Booster™ in Broccoli

Results

Objective

Determine the effect of the emission of low frequency waves on the productive capacity of crops.

Treatment	Characteristics
KPCB	Sector with Crop Booster
Control	Sector without Crop Booster

- Area per treatment: 5,000 m2
- Drip irrigation
- Final trial population density: 33,000
- Phytosanitary: # applications

[1] Crop price: 2,267 dollars ($46,335) + $850 installation costs. Shelf life: 2 years (4 production cycles). $11,796.3/cycle Peso parity: $17.38/dollar

Results

Sale price: $ 9.79 / kg

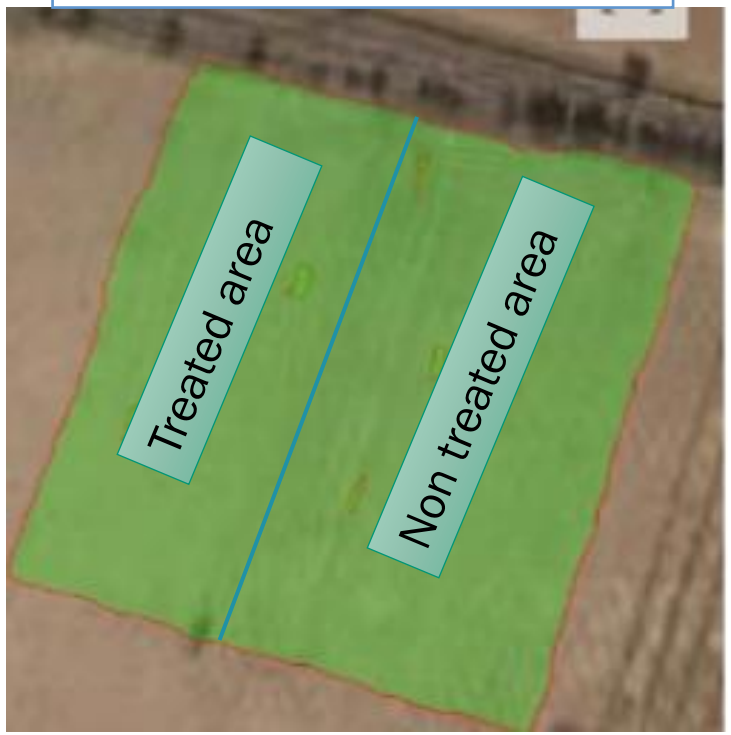
Variaty	Control	KPCB
Yield (kg/5000 m^2)	5,796	6,056
Production cost	$ 42,831	$ 48,729
Income	56,746	$ 59,300
Utility	$ 13,915	$ 10,571
Cost per kg	$ 7.39	$ 8.05
Rel B/C	1.32	1.22
Balance Point (kg)	4,375	4,977

Conclusions

- See last slide.

Phytosanitary sampling

Trial site image



Without tratamiento		
Concept	Total[1]	Average
Diamondback worm	22	2.2
Trips	27	2.7
Alternaria brassicicola	0	0
Ladybugs	0	0
Harlequin bug	0	0
Lygus bug	3	0.3
Lacewing	5	0.5
Diabrotic	0	0
Fake meter worm	0	0
Hernia	0	0
Mildew	0	0
Delia fly	0	0
Green aphid	103	10.3

With tratamiento		
Concept	Total[1]	Average
Diamondback worm	23	2.3
Trips	45	4.5
Alternaria brassicicola	0	0
Ladybugs	0	0
Harlequin bug	0	0
Lygus bug	1	0.1
Lacewing	9	0.9
Diabrotic	0	0
Fake meter worm	0	0
Hernia	0	0
Mildew	0	0
Delia fly	0	0
Green aphid	138	13.8

[1] Number of plants with findings in the existing population in 3 sampling points of 5 linear meters each.

Broccoli Plant Status

Area without treatment			
Date	**Height (cm)**	**Coverage**	**Number of Leaves**
02/21/2023	35	82.5	19
	30	61	15
	32	68.5	14
Average	**32.3**	**70.7**	**16**

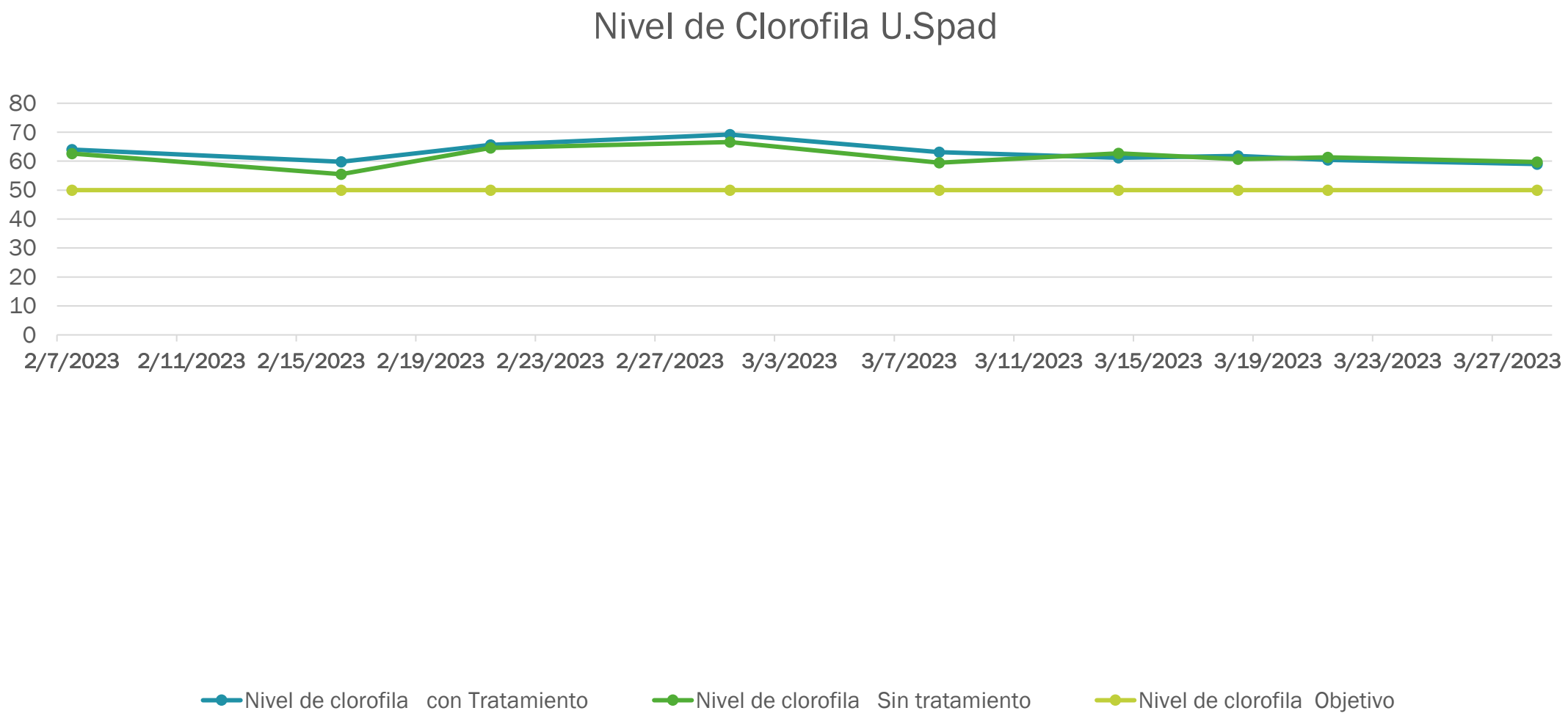
Area with treatment			
Date	**Height (cm)**	**Coverage**	**Number of Leaves**
02/21/2023	36	91	16
	37	77	17
	30	69.5	15
Average	**34.3**	**79.2**	**16**

Chlorophyll level and sap analysis in the broccoli crop

Tissue analysis in broccoli crop With treatment										
Variables	02/07/2023	02/16/2023	02/21/2023	03/01/2023	03/08/2023	03/14/2023	03/18/2023	03/21/2023	03/28/2023	Average
Nitrates (ppm)	5300	7800	6000	1700	9400	910	4000	4300	3100	4723
Potasium (ppm)	760	840	410	560	420	1900	500	890	1000	808.888889
Calcium (ppm)	480	400	840	480	700	480	660	500	700	582
Sodium (ppm)	77	77	65	56	85	58	79	79	67	71.4444444
Brix degrees	5.5	6	5	4.5	5	5	4	5	5	5
Chlorophyll (U.SPAD)	64	60	65.6	69.2	63.1	61.2	61.8	60.4	59	63

Tissue analysis in broccoli crop Without treatment										
Variables	02/07/2023	02/16/2023	02/21/2023	03/01/2023	03/08/2023	03/14/2023	03/18/2023	03/21/2023	03/28/2023	Average
Nitrates (ppm)	4800	6900	5100	4800	4000	4000	4000	3500	4000	4567
Potasium (ppm)	830	680	390	790	510	2400	890	900	690	898
Calcium (ppm)	510	580	800	500	330	530	450	540	460	522
Sodium (ppm)	120	100	65	60	71	69	56	65	76	76
Brix degrees	6.5	6	5.5	5.5	4.8	5	5	4	6	5
Chlorophyll (U.SPAD)	63	56	64.6	66.6	59.5	62.7	60.7	61.3	59.7	61

Chlorophyll measurement graph in broccoli



Broccoli Yield

With Treatment			
Number of repetitions	Total of plants[1]	Number of plants with lumps	Number of harvested plants
Row 1	236	62	174
Row 2	292	143	149
Row 3	244	60	184
Row 4	253	80	173
Row 5	330	85	245
Row 6	282	65	217
Row 7	264	102	162
Row 8	248	72	176
Row 9	254	78	176
Row 10	275	84	191
Row 11	286	91	195
Row 12	298	102	196
Row 13	305	121	184
Row 14	270	88	182
Row 15	294	67	227

20.7 Ton/ha

Without Treatment			
Number of repetitions	Total of plants[1]	Number of plants with lumps	Number of harvested plants
Row 1	175	98	77
Row 2	102	78	24
Row 3	385	223	162
Row 4	365	215	150
Row 5	343	165	178
Row 6	387	284	103
Row 7	327	170	157
Row 8	264	200	64
Row 9	390	254	136
Row 10	287	190	97
Row 11	298	178	120
Row 12	304	154	150
Row 13	286	187	99
Row 14	291	190	101
Row 15	320	234	86

18.09 Ton/ha

Inflorescence weight (g)
- With treatment: 626.6
- Without treatment: 546.6

Inflorescence diameter (in)
- With treatment: 7.4
- Without treatment: 7.4

Root length (cm)
- With treatment: 25.4
- Without treatment: 25.2

Coverage diameter (cm)
- With treatment: 79.2
- Without treatment: 70.7

[1] 33,000 plantas en 10,000 m2

Yield Data on Broccoli Crop

Number of repetitions	Weight per Head (g) (With treatment)	Weight per Head (g) (Without treatment)
1	539	498
2	740	460
3	640	300
4	720	440
5	580	680
6	500	420
7	640	600
8	520	520
9	1200	980
10	420	400
11	460	520
12	500	760
13	460	760
14	480	320
15	480	420
16	500	660
17	500	460
18	520	600
19	600	540
20	740	420
21	580	540
22	400	800
23	840	520
24	760	840
25	740	420
26	860	580
27	540	800
28	560	560
29	960	1.02
30	820	580
Average	626.6	546.6

Without treatment

With treatment

Soil moisture and EC data

Humidity comparison with equipment B. L			
Date		With treatment	Without treatment
02/24/2023	EC	2.76	2.44
	Humidity (%)	57	47
	Temp (ºF)	59.5	58.3
02/24/2023	EC	2.37	2.39
	Humidity (%)	48	56
	Temp (ºF)	59.9	60.4
02/28/2023	EC	2.54	2.71
	Humidity (%)	58	61
	Temp (ºF)	61	62.2
03/01/2023	EC	2.3	2.38
	Humidity (%)	49	46
	Temp (ºF)	60.4	61.5
03/02/2023	EC	1.95	2.09
	Humidity (%)	46	44
	Temp (ºF)	58.8	60.1
03/03/2023	EC	1.57	1.95
	Humidity (%)	48	59
	Temp (ºF)	59.4	55.9

Bluelab Pulse Meter

Conclusions

- In the first trial with broccoli, the treatment with KPCB showed greater plant development, expressed in height and degree of foliage coverage.
- The yield potential was 20.7 tons/ha, 14% higher than the control.
- The average weight of pellets (brocolli heads) in KPCB was 627 grams, 15% higher than the control.
- From the point of view of commercialized production, it was 4.5% higher and with a lower profit margin due to the investment in the Crop Booster*.

**Harvest Harmonics comment: at the time of this trial, Mexico pricing has not been established yet.*

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