SEP. 2023

Experimental Report of ChitosanPro

on Plant Growth Promotion

Test Done by R&D JX W
Report Organized by Marketing Dept.
Translated by Ellie Global Division

Table of Contents

Experimental materials

Detail Test Method and Materials chosen to be used

Target

In order to avoid the influence of many factors, this experiment was conducted by indoor hydroponics, in order to compare the effects of different ChitosanPro varieties and concentrations in promoting plant growth, and to screen out the optimal concentration gradient and optimal concentration of different varieties of ChitosanPro

Material Information

ChitosanPro is a kind of N-acetyl Glucosamine in free form, the molecule weight is 221DA.

Experimental Materials

ChitosanPro, High Concentration Chitosan Liquid (41.95%), Mung Bean

Material	Content Control（ppm）						
ChitosanPro	Water as Control	10	50	100	500	1000	5000
High Concentration Chitosan Liquid	Water as Control	50	250	500	2500	5000	/

Design of experiments

ChitosanPro was divided into 7 concentration gradients, High Concentration Chitosan Liquid was in 6 concentration gradients, and is cultivated by hydroponic method, planting 24 mung bean sprouts in each pot, and selecting 20 plants with moderate growth for data measurement.

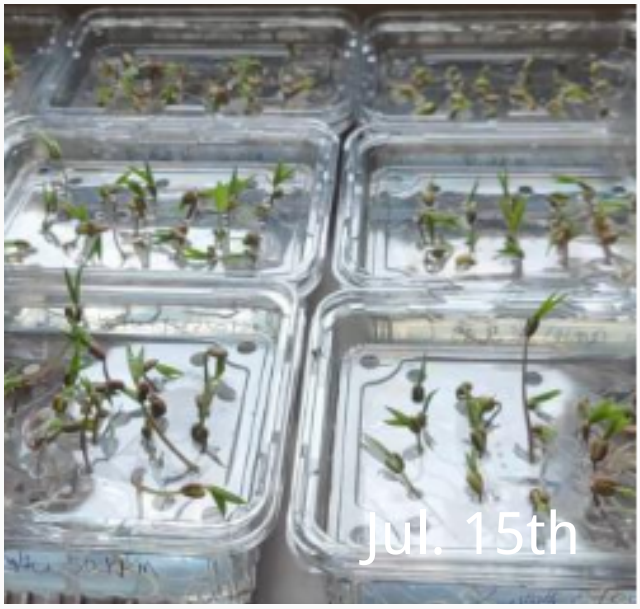
Experimental process

and data recording

Mung bean seed treatment

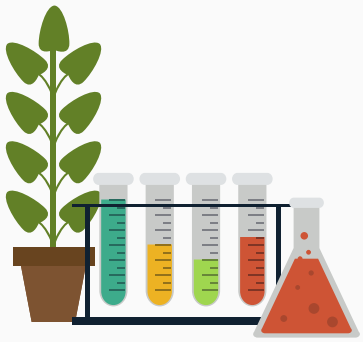
Soaking time: 12:00 on July 11, drain at room temperature after 10 hours of soaking to promote germination.

Hydroponic time: At 15:00 on July 13, select bean sprouts with a root length of about 2 cm and grow well to start hydroponics, and start observing records



Experimental process

and data recording



Mung bean seed treatment

The water control group began to wilt leaves

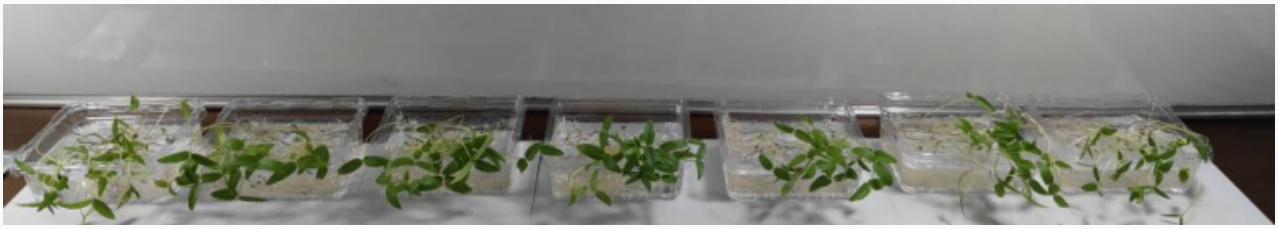
40% of the leaves of the control group began to wilt

EXPERIMENT ENDS

Experimental Result

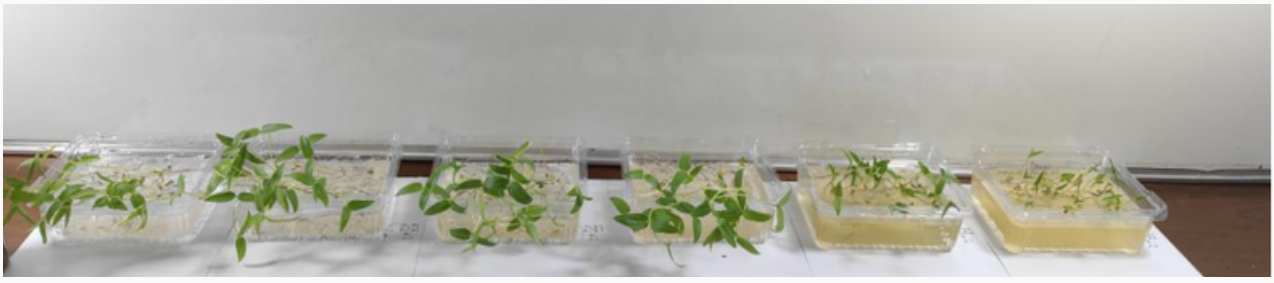
Collection

ChitosanPro



Water as Control	10	50	100	500	1000	5000

High Concentration Chitosan Liquid

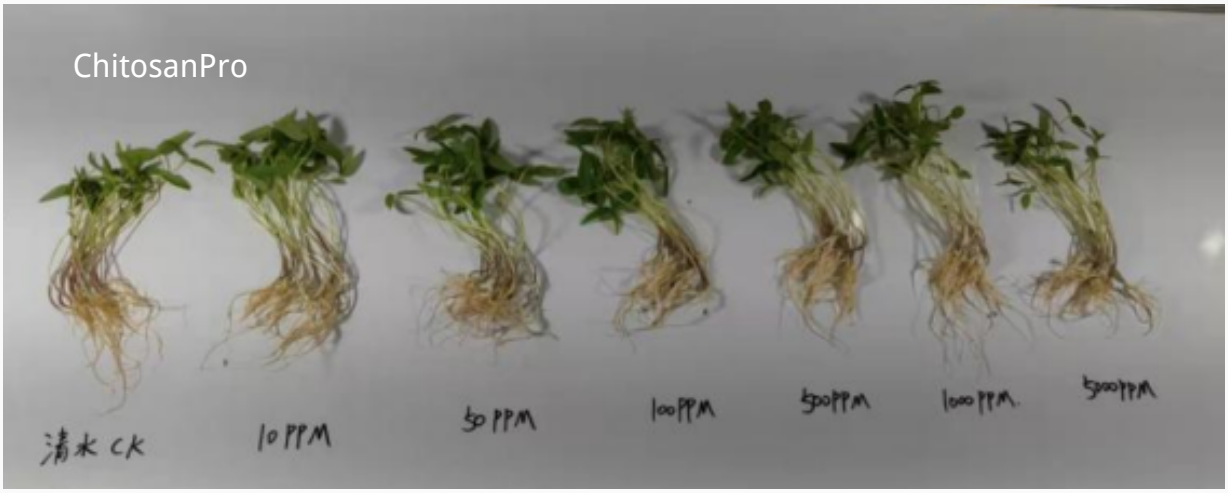


Water as Control	50	250	500	2500	5000

Experimental Result

Collection

High Concentration Chitosan Liquid 2500ppm and 5000ppm significantly inhibited growth, and the measurement data was meaningless and have been rejected.



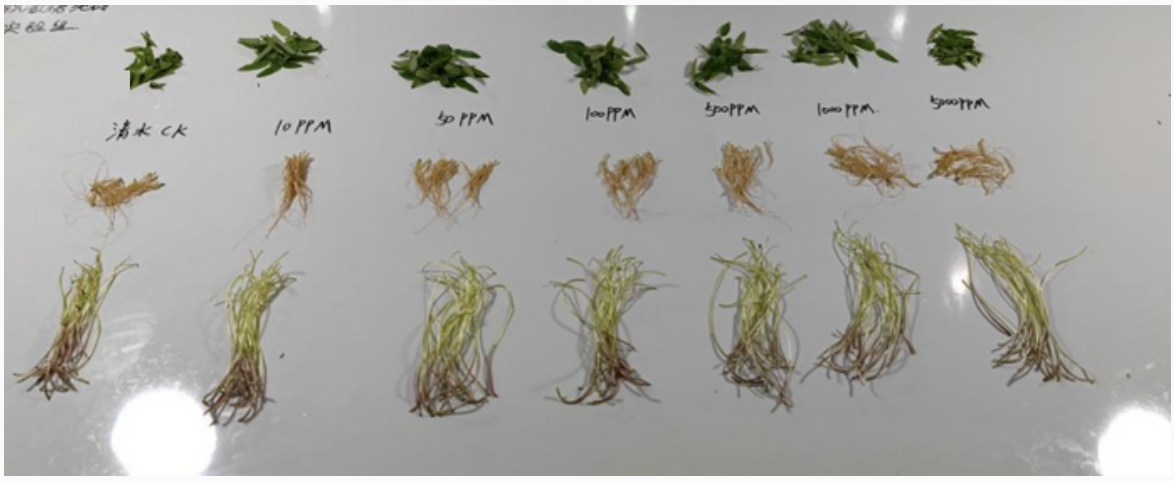
Water as Control	10	50	100	500	1000	5000

Water as Control	50	250	500

Experimental Result

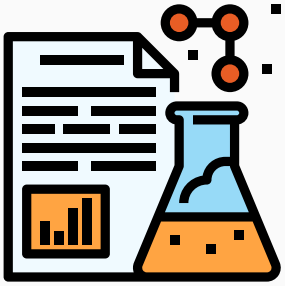
Collection

Twenty plants were taken in each group to measure leaf wet weight, stem wet weight, root wet weight, stem length and root length.



Experimental Result

Collection



WET WEIGHT TEST AND RECORD

Leaf Wet Weight

Test and Record

Root Wet Weight

Test and Record

Stem Wet Weight

Test and Record

Twenty plants were taken in each group to measure leaf wet weight, stem wet weight, root wet weight, stem length and root length.

Experimental Result

Collection

Root Length (cm)

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Average
Water control	9.6	10.2	12.7	8.7	10.6	11.0	13.1	13.3	12.0	10.4	8.3	10.0	10.7	7.7	9.0	5.9	8.0	8.5	11.1	11.2	10.1
ChitosanPro 10ppm	9.2	6.9	10.5	7.0	13.3	9.4	7.9	11.9	10.8	8.9	8.8	7.2	8.1	7.2	6.6	10.0	10.9	13.4	9.2	11.3	9.425
ChitosanPro 50pppm	7.1	6.6	5.2	9.2	8.9	9.6	7.1	7.2	7.2	11.6	5.6	8.4	12.8	9.4	10.0	9.4	9.9	6.6	10.9	8.6	8.6
ChitosanPro100ppm	9.4	11.9	8.8	10.7	10.2	6.8	9.8	10.2	4.2	11.2	9.4	4.0	9.3	10.6	7.3	12.3	10.9	9.7	12.5	8.6	9.390
ChitosanPro 500ppm	5.8	8.9	9.1	10.7	13.4	9.9	7.3	7.2	10.1	9.5	7.9	9.9	10.4	8.3	8.2	8.2	5.5	8.9	6.9	10.9	8.9
ChitosanPro 1000ppm	11.9	7.6	8.6	8.4	11.3	8.2	6.9	10.1	8.2	11.0	10.1	8.1	13.2	6.8	10.8	10.5	9.0	11.6	11.5	8.4	9.610
ChitosanPro 5000ppm	8.9	7.9	7.5	5.3	11.0	7.8	7.4	7.6	9.5	7.9	9.7	7.2	6.4	6.4	8.8	10.1	5.8	12.5	8.5	6.1	8.1
High Concentration Chitosan Liquid 50ppm	8.9	10.5	7.9	4.8	4.8	6.3	8.5	8.9	14.1	9.3	12.7	10.9	7.1	9.5	7.3	6.1	7.9	7.9	12.1	5.9	8.570
High Concentration Chitosan Liquid 250ppm	7.6	6.5	6.1	5.6	5.8	7.3	6.7	5.9	8.3	5.1	10.8	6.0	7.3	6.3	5.9	6.0	5.9	4.8	7.9	8.0	6.7
High Concentration Chitosan Liquid 500ppm	6.5	7.5	6.4	8.6	7.1	6.7	4.8	5.6	6.4	5.1	6.5	6.4	5.0	5.2	4.8	5.4	5.4	6.1	4.0	2.8	5.815

Stem length(cm)

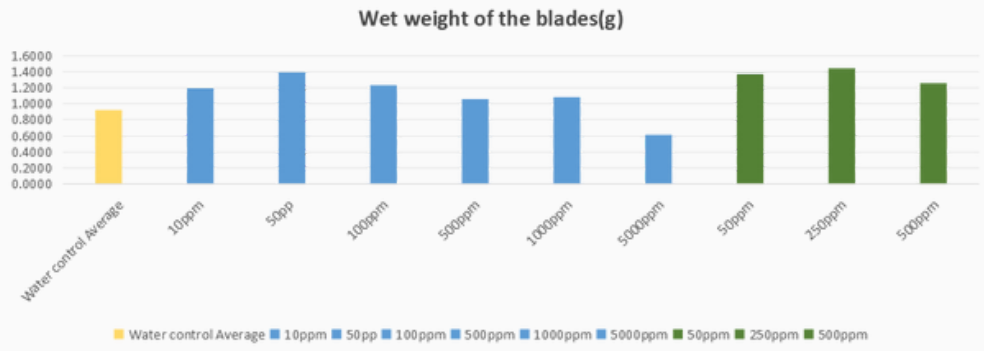
Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Average
Water control	13.6	14.3	12.0	13.9	11.3	11.6	13.7	11.4	11.0	16.3	12.3	11.5	15.4	12.7	16.9	11.3	13.2	12.3	12.3	13.3	13.015
ChitosanPro 10ppm	17.1	15.1	16.0	15.3	16.6	12.2	14.8	16.2	16.0	16.6	16.9	14.5	15.8	17.5	16.1	15.1	15.4	16.2	17.0	13.5	15.695
ChitosanPro 50pppm	19.0	15.8	16.6	14.1	14.8	17.7	16.9	16.5	15.9	15.8	16.6	14.3	17.8	17.2	13.8	17.7	16.5	12.1	14.0	11.1	15.710
ChitosanPro100ppm	17.5	18.2	16.0	14.2	18.1	12.5	14.6	17.5	18.0	16.9	15.5	16.3	13.4	14.4	17.7	10.3	15.0	14.4	13.1	17.2	15.545
ChitosanPro 500ppm	15.1	16.4	13.4	15.0	16.2	13.3	17.7	16.8	14.4	16.9	14.6	12.9	14.9	17.2	13.1	17.4	16.2	16.0	16.2	15.5	15.460
ChitosanPro 1000ppm	14.4	16.7	15.9	13.8	17.8	19.0	16.4	19.2	16.5	15.5	13.5	15.3	17.4	17.2	19.8	13.3	12.0	14.1	12.2	14.7	15.735
ChitosanPro 5000ppm	14.7	16.5	17.6	16.5	15.5	14.5	17.1	19.3	16.1	16.0	11.6	15.7	14.1	16.6	14.0	18.1	17.3	13.0	12.3	16.8	15.665
High Concentration Chitosan Liquid 50ppm	15.2	14.0	15.1	16.3	19.1	14.9	17.6	13.6	13.1	14.8	19.7	18.3	14.9	17.1	16.4	15.3	17.8	14.6	12.1	12.2	15.605
High Concentration Chitosan Liquid 250ppm	12.3	14.5	17.7	13.3	16.8	13.4	15.2	12.3	15.1	12.6	16.5	13.8	13.6	16.4	15.7	17.1	14.4	14.3	12.8	13.9	14.585
High Concentration Chitosan Liquid 500ppm	19.1	17.6	17.7	20.7	18.4	16.9	14.8	17.4	18.1	18.6	18.9	12.8	15.1	16.3	17.4	15.8	15.6	16.3	17.4	15.6	17.025

Experimental Result

Collection

20 Plants	Water Control	ChitosanPro						High Concentrated ChitosanPro(41.95%)		
	Average	10 ppm	50 ppm	100ppm	500ppm	1000ppm	5000 ppm	50ppm	250ppm	500ppm
Wet weight of the blades(g)	0.9233	1.26	1.39	1.23	1.06	1.08	0.62	1.37	1.44	1.26
Wet weight of the root system(g)/	1.68	1.85	2.02	1.77	1.88	1.97	1.78	2	2.01	1.95
The stem is wet and heavy(g)	2.65	3.13	3.16	2.89	2.77	3	3.21	2.95	3.12	3.72
Overall wet weight(g)	5.2533	6.24	6.57	5.89	5.71	6.06	5.61	6.32	6.57	6.93
Root length(average cm)	10.1	9.425	8.565	9.3?	8.85	9.61	8.115	8.57	6.69	5.815
Stem length(average cm)	13.015	15.659	15.71	15.545	15.46	15.735	15.665	15.605	14.585	17.025
Specific root weight	16.63	19.63	23.58	18.85	21.24	20.50	21.93	23.34	30.04	33.53

REMARK： **SPECIFIC ROOT WEIGHT** IS THE RATIO OF ROOT WEIGHT TO ROOT LENGTH, IN G/M, REFLECTING THE THICKNESS OF THE ROOT SYSTEM, THE HIGHER THE VALUE, THE THICKER THE MAIN ROOT AND THE DEVELOPED LATERAL ROOT. THE DATA SHOWED THAT IN THE RANGE OF GROWTH-PROMOTING CONCENTRATION, AMINOSUGARS COULD PROMOTE ROOT THICKNESS AND LATERAL ROOT DEVELOPMENT



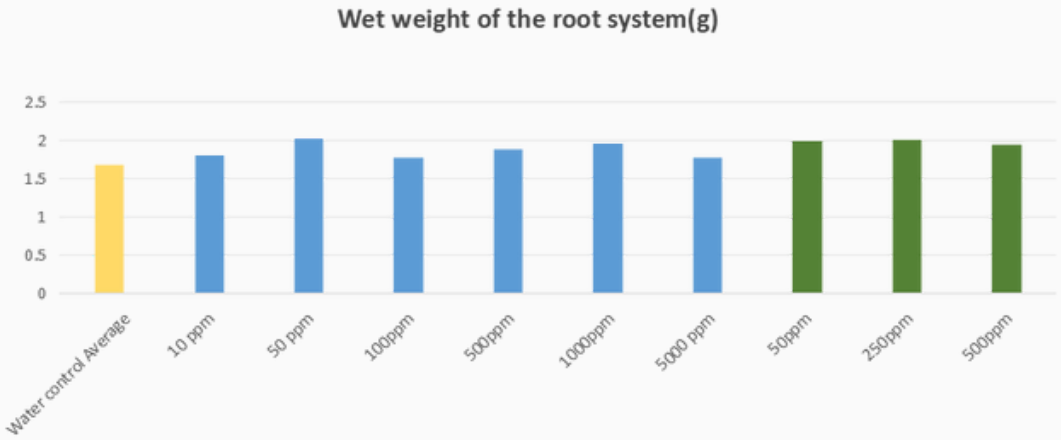
Water control

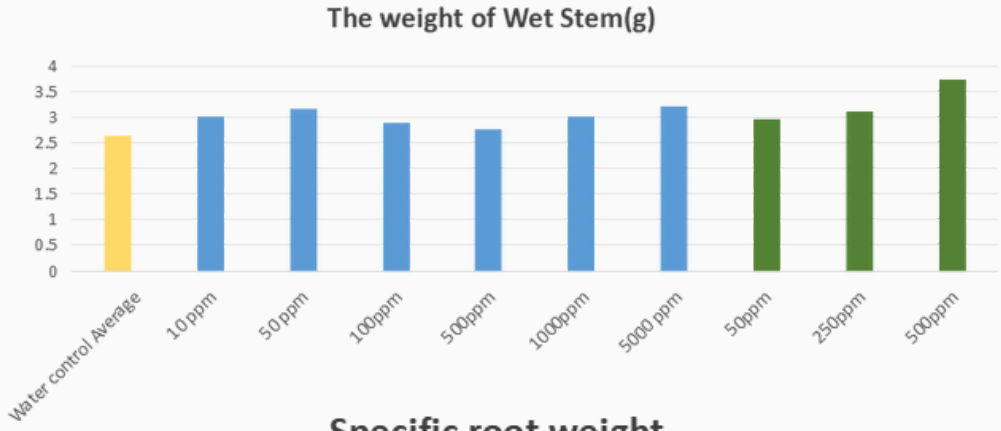
ChitosanPro

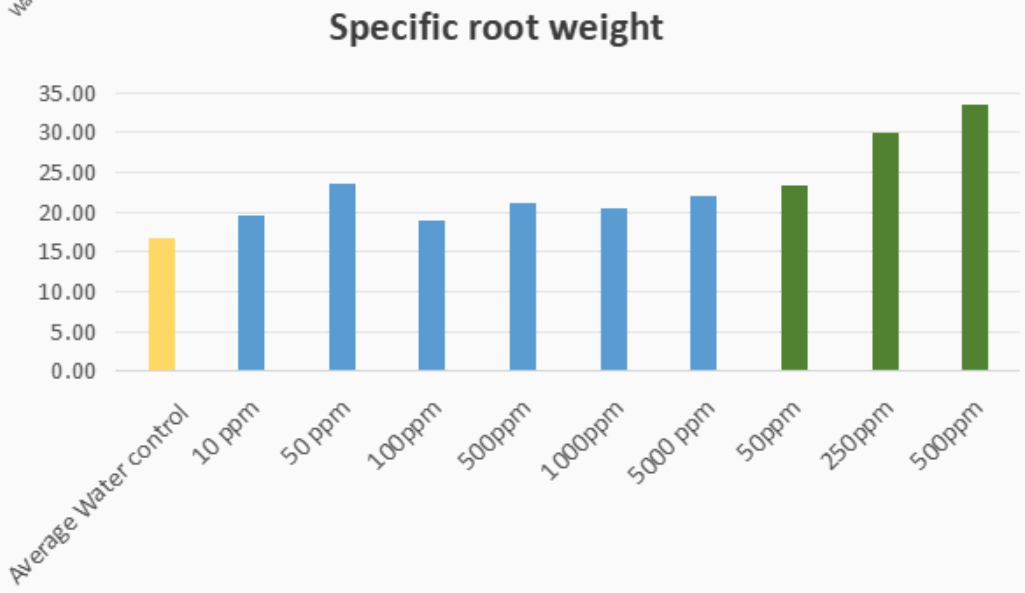
High consentrated ChitosanPro(41.95%)

Experimental Result

Collection





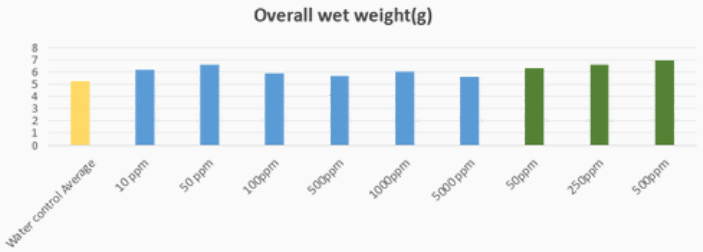


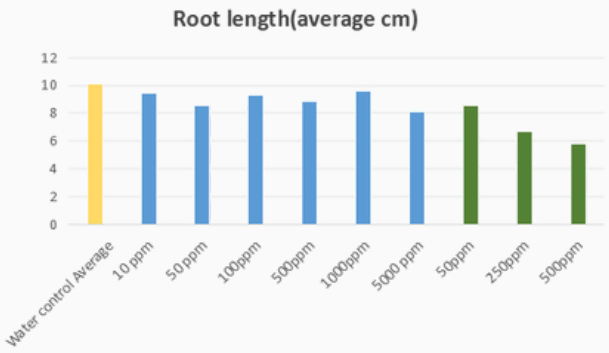
Experimental Result

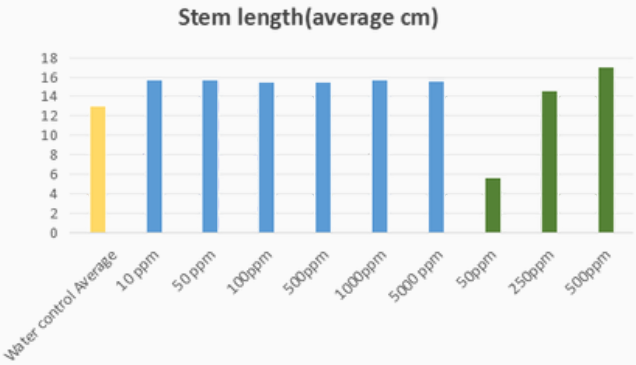
Collection

ChitosanPro can significantly promote the growth of mung bean seedlings:

- ChitosanPro promotes the growth range of 10ppm-1000ppm;
- High Concentration Chitosan Liquid promotes a range of 50ppm-500ppm



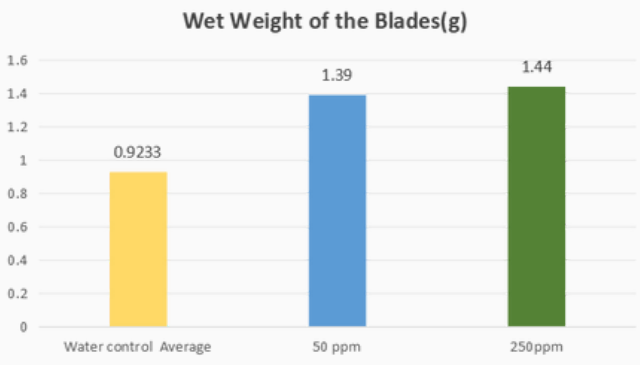




Leaf size is an important criterion for reflecting the growth status of seedlings:

- ChitosanPro 50ppm concentration leaves are the best compared with leaf wet weight, which is 50.55% more weight than Control.
- High concentrated Chitosan Liquid 250ppm concentration leaves were the best, with a weight gain of 55.96% compared with Control.

The data conclusion is consistent with the naked eye observation, High Concentration Chitosan Liquid 250ppm concentration leaves have the best growth, thick leaves, and thick green leaf color

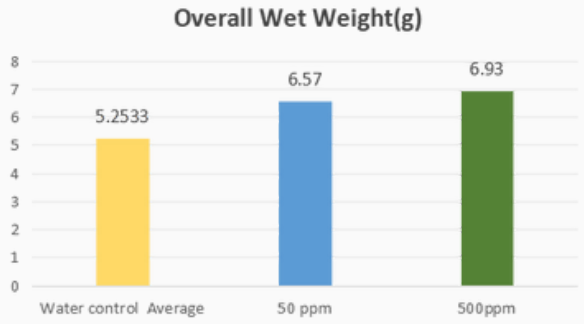


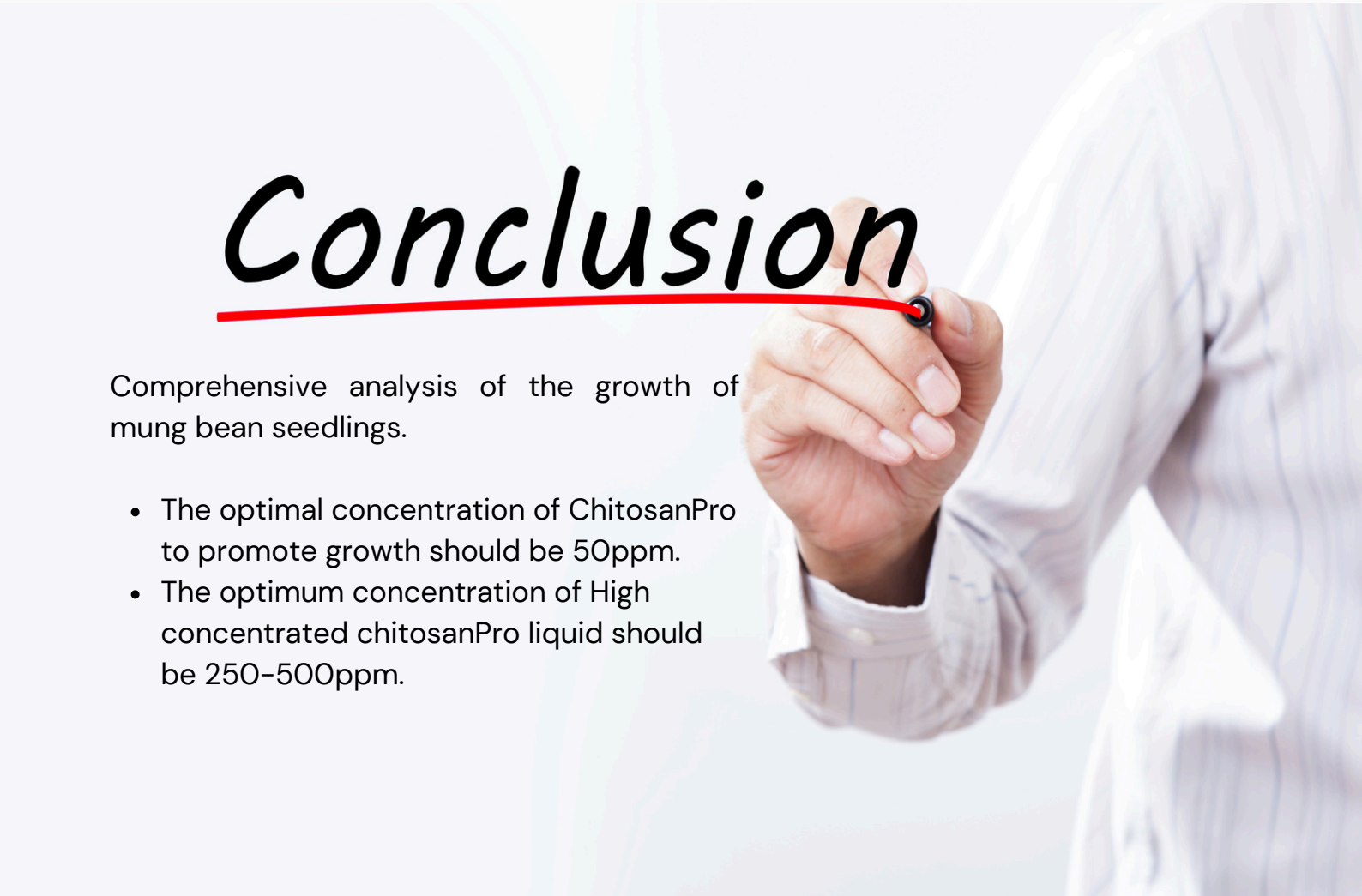
Analysis

AND DISCUSSION OF RESULTS

Overall wet weight reaction overall growth of seedlings

- ChitosanPro had the largest growth in 50ppm concentration, gaining 25.06% compared with the control group.
- High concentrated Chitosan Liquid had the largest growth in 500ppm concentration, with a weight gain of 31.92% compared with the control group.





Comprehensive analysis of the growth of mung bean seedlings.

- The optimal concentration of ChitosanPro to promote growth should be 50ppm.
- The optimum concentration of High concentrated chitosanPro liquid should be 250-500ppm.

Contact us for further inquiries