

Tests and Trials with Chitosan Hydrochloride

Chitosan Hydrochloride:
Molecular weight: <10 Dalton
DDA: 80%

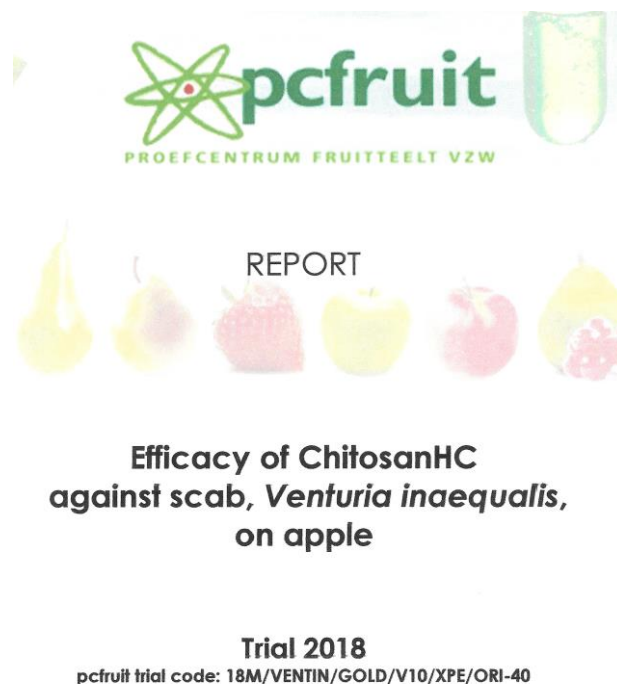
Produced by Process Biotech, India
Marketed in Europe by Xpert4growth in Belgium

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Date	Study by:	Title	Treatment	Reference
2018	PC Fruit	Efficacy of ChitosanHC against scab, <i>Venturia inaequalis</i> , on apple	100 gr/ha every 15 days	Page 31/end Report

Biological efficacy	This indicates that Chitosan has the potential to be used for the control of scab on pome fruit, since only half the number of treatments with Merpan, supplemented with Chitosan treatments in between, only a slightly reduced (not significantly lower) scab control on the leaves was observed.
Phytotoxicity	Chitosan can be considered plant safe for apple cv 'Golden Delicious'.
Fruit quality	Replacing half of the Merpan treatments with Chitosan does not affect fruit quality.



Date	Study by:	Title	Treatment	Reference
2018	Golf Prise d'Eau, NL.	Effect of Chitosan on transpiration of golf greens	100 gr/ha every 15 days	-

Efficacy

The quantity of water to keep the 2 greens, one treated and one no treated, at the humidity of 30% was reduced by 25% for the treated one, during the summer 2018 (very hot and dry).



Date	Application by:	Title	Treatment	Reference
2017/2018/2019	Royal Limburg Golf Club, B	Use of Chitosan to reduce the use of phytoproducts	100 gr/Ha every 15 days	M.D.Driesen, Head Greenkeeper
2018/2019	Goyer Golf and Country Club, NI	Use of Chitosan to reduce the use of phytoproducts	50 gr/Ha every 7 days	M.P.Schalk, Head Greenkeeper

Efficacy

The use of Chitosan is destined to increase the natural defense system of turf against diseases like Dollar Spot and Fusarium principally.

After 2 years of using Chitosan, the use of phytoproducts was reduced to one application a year with Exteris (10 L/Ha) and from the third year , it was reduced to zero use of phytoproduct.

Other conditions are also important as: open structure of the soil, presence of biological life in the soil.

The use of Chitosan is settled further in 2020.



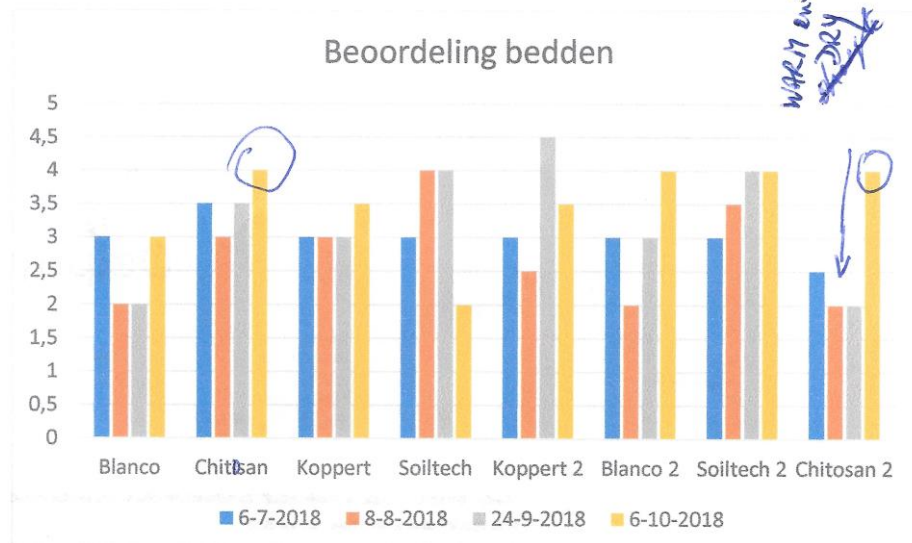
Date	Trial by:	Title	Treatment	Reference
2018	DELPHY, NL. Smeets Agro Consultancy	Demo "Mans Weert" Use of Chitosan for Lily	150 gr/ha before planting and after 15 days. Then, 75 gr/ha every 15 days	Page 8

Efficacy

The use of Chitosan is destined to increase the natural defense system of the Lily against Fusarium, principally. The result of this trial has no value because of the use of Mancozeb by the farmer!

The vigor of the plants was estimated on 4 dates and the observations show, for the treated plot, a quieter grow then other plots with a final result better/equal then other plots with a good growing rate during the warm period.

At the end, the amount of Pratylenchus Penetrans was lower in the treated plot with Chitosan then in the others.



Date	Trial by:	Title	Treatment	Reference
2018	DELPHY, NI. Smeets Agro Consultancy	Demo "Lucassen" 3 Ha Clover for animal feed	100 gr/Ha every 3 weeks after mowing	Mail 18/12/18

Efficacy

The use of Chitosan is destined to increase the natural defense system of the Clover in the presence of nematodes.

The vigor of the plants was estimated every 3 weeks by mowing works.

Despite of the presence of an important quantity of nematodes, the clover stays at a good level of quality. The evolution of nematodes can be see here after.



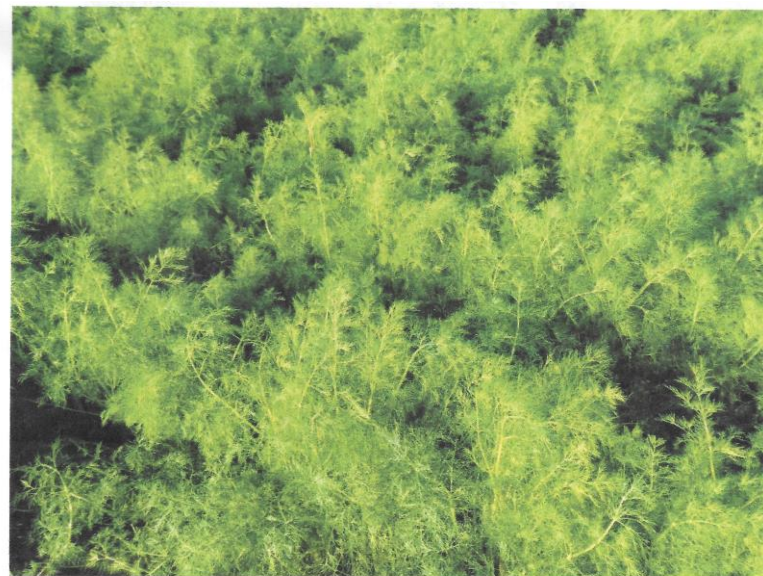
Number per 100 ml soil	Start	27/08/2018	28/11/2018
Prachilentus Penetrans	1876	1233	289
Rotylenchus vulnus	Not Mesured	80	110
Meloidogyna chitwoodi	3116	2225	1570
Meloidogyna falax	N.M.	45	0
Trichodorus	N.M.	20	50
Others	N.M.	4830	2670

Date	Trial by:	Title	Treatment	Reference
2018	DELPHY, NI. Smeets Agro Consultancy	Demo "Hendrickx" Use of Chitosan for Chervil	100 gr/Ha every month	Report 18/02/19

Efficacy

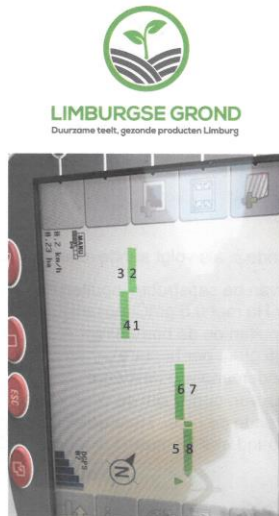
The use of Chitosan is destined to increase the natural defense system of the Chervil against *Alternaria*. Chitosan was used from July until October. There are no results in this case, while *Alternaria* was not active during this period!

The most remarkable ascertainment was that chervil has got a good resistance against night frost (-2°C). This shows one of the a-biotic property of Chitosan.

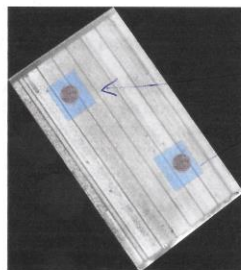


Kervel 30 November 2018

Date	Trial by:	Title	Treatment	Reference
2018	DELPHY, NI. Smeets Agro Consultancy	Demo "Van Monfort"	75 gr/Ha every 2/3 weeks	Report 18/02/19



Locaties zijn uitgezocht samen met de boomkweker op basis van het vermoeden dat er populaties van aaltjes waren. Aan de voorkant van het perceel was een haard met PP aaltjes bekend omdat daar in najaar 2017 een analyse was uitgevoerd. Dat betekent dat de proefblokken op de meest geschikte proeflocatie zijn geplaatst: waar de bomen het minst goed groeiden.



Efficacy

The use of Chitosan is destined to increase the natural defense system of young apple trees in the presence of nematodes. Apple trees were planted in plots with higher nematodes concentration in the field. The results show a normal quality at end and a very constant grow and resistance against warm and dry weather during abnormal summer 2018. Treated trees were 1,25% shorter and 1,08% thicker than untreated trees at the end of the summer. The seasonal end of growing was achieved +/- 3 weeks earlier by the treated plants.



Date	Trial by:	Title	Treatment	Reference
2018	HLB/Westhoven Agro Service	Effect of Chitosan on potato cultivation	100 gr/Ha every 15 days	Report 18139 Dec.2018

Efficacy

Testing the effects of Chitosan on potato/SERESTA cultivation.

Aspect, grading, yield: there were no differences between treated and no-treated plants.



	Aspect 10 - 100	Yield T/Ha	Starch Kg/Ha
Treated	73%	42,3	7889
No-Treated	74,3%	39,6	7273


Grading T/Ha	<35 mm	35-50 mm	>50 mm
Treated	4,5	22,9	14,8
No-Treated	4,5	23	12,1



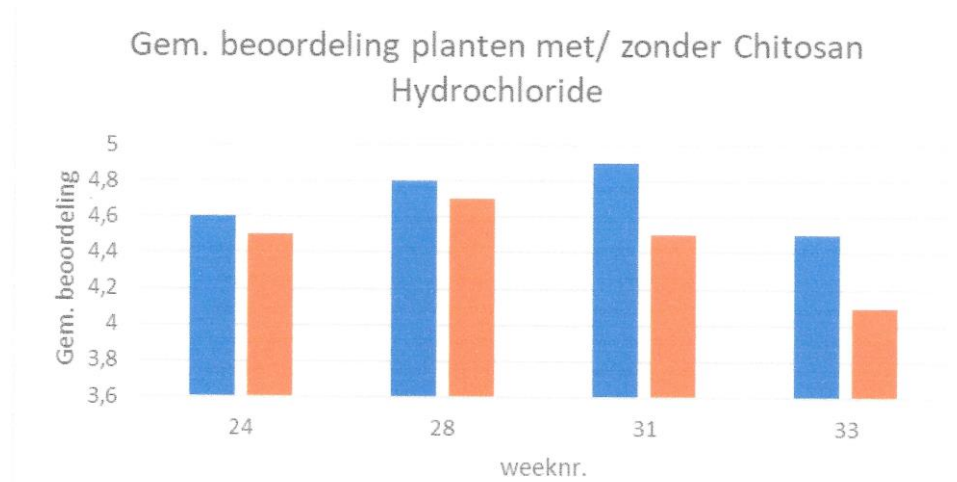
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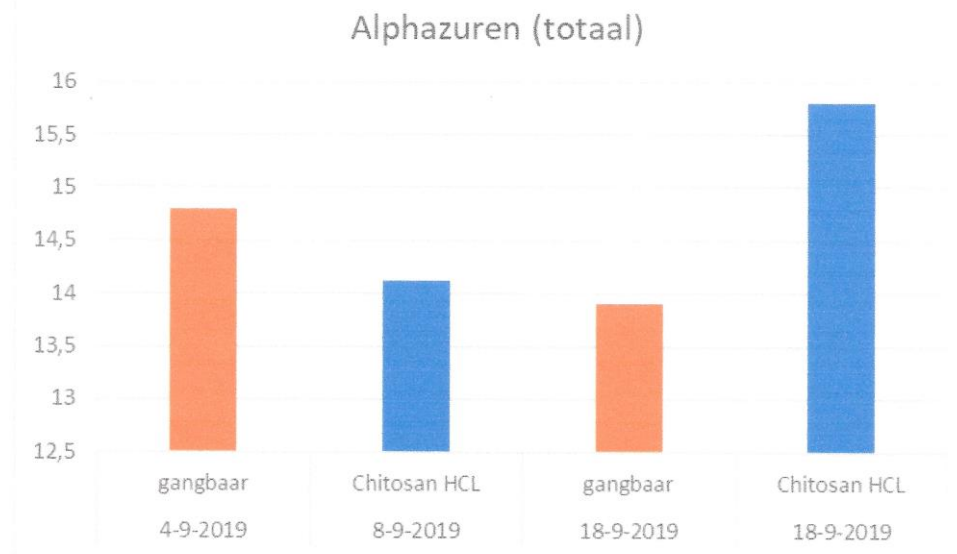
Date	Trial by:	Title	Treatment	Reference
2019	DELPHY, NL Smeets Agro Consultancy	Effect of Chitosan on Hop cultivation following Organic and Planet Proof standards	100 gr/Ha every 15 days	Report Jan.2020

Trial description	The use of Chitosan is destined to increase the natural defense system of the Hop against false mildew and to look to the influence of Chitosan on the grow and development of Hop. This Hop is destined to a Brewery producing organic beer. Chitosan was used, according a strategy with other allowed products, from 16 Mai until harvest in October 2019.			
First result	No one use of "BELLIS"(chemical product) in the two plots treated with Chitosan.			
2d	Visual perception: vigor, growing force, presence of insects. See tab.1 30 plants/plot, 5 time, estimation from 1 to 5. (5 is best)			
3th	Content of Alpha Acids: they give the bitterness (more for more). See tab.2			
4th	Content of Beta Acids: they are necessary for the conservation of the beer. Tab.3			
5th	Hopstorage index: the best level is 0,3. We see that the harvest should take place already on the 14 Sept.! It looks like that the Chitosan bring the plant faster to maturation. Tab.4			
6th	Hop Oil index: Hop Oils give the aroma. A faster harvest was better for the treated plant. Tab.5			
7th	Thikness of the leaves are for untreated 0,9 mm and for treated 1,3 mm at the harvest time. (mesured with electro.microscope). It shows the capability of Chitosan to produce thicker cellular membrane who gives a better resistance against transpiration by warm weather.			
8th		Leaves analyses show that more nutrients are present by the treated plants! Chitosan is playing here an important role in the transportation of all the cations from roots to leaves.		

Tab.1

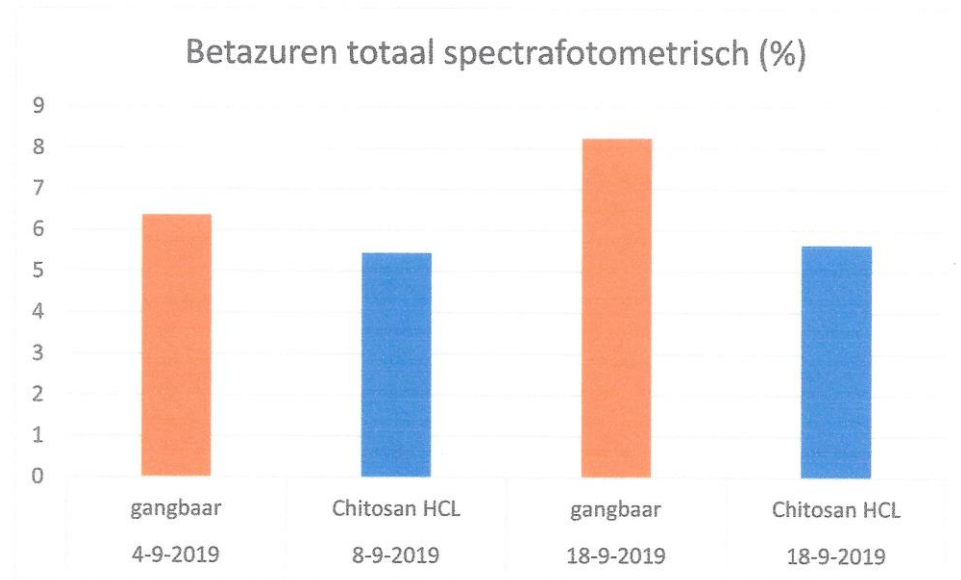


Tab.2

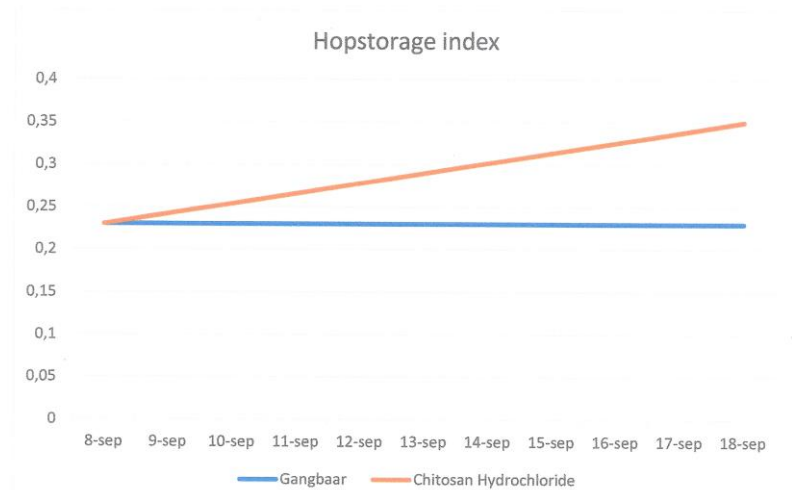


Grafiek: overzicht totale alphazuren

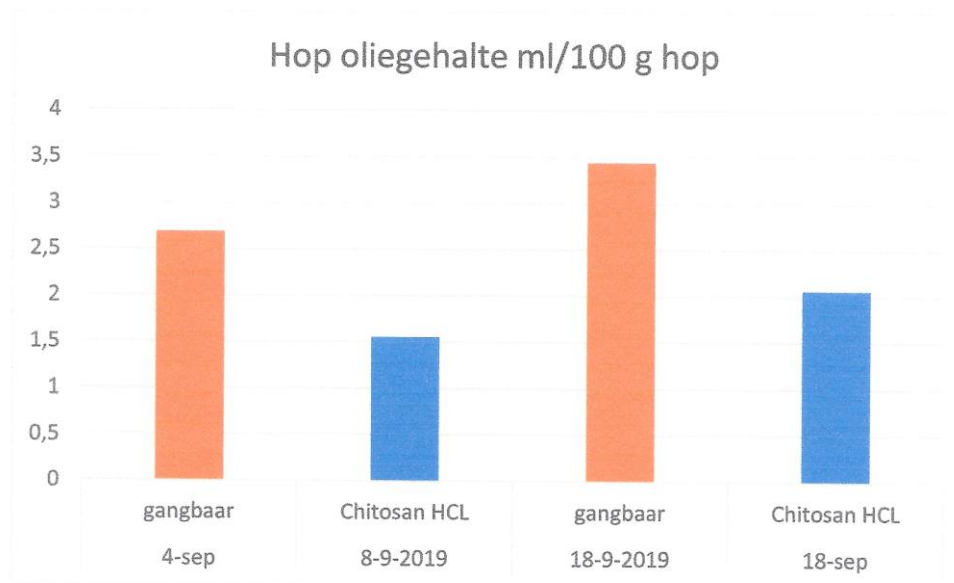
Tab.3



Tab.4



Tab.5



Date	Trial by:	Title	Treatment	Reference
2020	Xpert4growth	Demo “Kempense” Use of Chitosan for Green	100 gr/Ha every 2 weeks	Report 07/10/20

Efficacy

The use of Chitosan is destined to increase the natural defense system of the greens against Dollar Spot and Fusarium. Chitosan was used from march until october. Evaluation made by the team of greenkeepers shows that the quality of the green has increased by 25-30% in comparison with other not treated 2 greens at proximity. Decision is taken to use ChitosanHC for all the greens starting immediatly, 100 gr/Ha each month of the winter and from march 2021, 100 gr/Ha each 14 days.



Date	Executed by	Title	Traitement	Reference
2021/2022	Smeets Agro Consultancy Hessel Marketing & Com.	Demo BBG Use of Chitosan for Blueberries	100 gr/Ha , 8 applications/year	Report 04/2023

- State and evolution of cultures

- ChitosanHC has an effect improving plant resilience: Pseudomonas and Septoria are slowed down or stopped,
- In addition, ChitosanHC ensures a higher content of iron, calcium and silicon in the sheet. Iron is important for chlorophyll formation and nitrogen fixation.
- ChitosanHC complex cations and allows their transport in the plant.
- ChitosanHC stimulates and accelerates the growth and development of plants. For this reason the plant is "ready" earlier at the end of the season and the fruits ripen earlier. The leaves fall earlier in November, and the plant overwinters faster.
- In terms of resistance to winter conditions and frost, we were not able to determine this due to the mild weather.
- No negative comments were noted.

Fruit quality and yield

- Initially and during the season, the fruiting of ChitosanHC-treated plants was slightly better rated: fuller clusters throughout the plant, both on affected stems and on healthy stems. (The original size of the 5 or 7.5 litre pots for the plants to be transplanted may also have influenced the observations).
- When observing fruit analyses, ChitosanHC provides more calcium, magnesium and zinc in the fruit. Calcium contributes to the quality and firmness of the fruit after picking. The N/Ca ratio is lower in treated fruit, which is positive for fruit quality.
- BRIX values are slightly higher for treated fruit. "(more sugars and phenols).
- Performance was not determined due to local circumstances.
- The shelf life test showed no clear difference. (When picking, it was not taken into account that the treated fruit was ready earlier than the untreated fruit).
- No negative comments were noted.

More details on the "references" page of our website: Two-year demo trial on blueberries.