

Effect of Freshwater Crab shell Fog as Organic Fertilizers

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Abstract

Chitin a naturally occurring compound specifically from fresh water crabs, is observed to have outstanding effect specifically on cucurbitaceae in controlling plant diseases, growth enhancement increasing size, colour, vigour of the plant & its fruits, leaves etc. When the plant is smoked with dried powder of chitin plant showed extraordinary response in their Growth, Maturation, Disease Resistance, Colour & Size of Fruit & Leaf. The topic was extracted from an ancient book Vyrukhshaveda written by an eminent sage Surapala in 1000 B.C.

Chitin is reported to be active against viruses, bacteria and other pests. Fragments from chitin is known to have eliciting activities leading to a variety of defence responses in host plants in response to microbial infections, including the accumulation of phytoalexins, pathogen related (PR) proteins and proteinase inhibitors, lignin synthesis, and callose formation. Based on these and other proprieties that help strengthen host plant defences, interest has been growing in using them in agricultural systems to reduce the negative impact of diseases on yield and quality of crops. This paper recapitulates the properties and uses of chitin, and will focus on their applications and its effect on growth and growth related aspects.

Keywords: Vyrukhshaveda, Surapala, phytoalexins, pathogen related proteins, chitin.

1. Introduction

Fertilizers are important chemicals compounds which are used for cultivation of crops. Fertilizers play important role in growth, maturation, yield of the plant etc. Inorganic

fertilizers are used in large proportions by farmers these days to increase in the yield. Inorganic fertilizers provided satisfactory output, on the other hand they cause great damage to the nativity of the soil, plant & its yield. Huge amounts of toxic residues are accumulated in plants, fruits & vegetables. Consuming these may lead to many health disorders leading to some life threatening diseases. At the same time these toxic residues damage soil texture, aquatic life, water bodies also. A safe way to solve these problems to a major extent can be provided by usage of organic fertilizers.

Organic cultivation has become a major practice these days. Farmers are getting attracted towards organic cultivation as they could able to see the difference between organic & inorganic cultivation. Organic fertilizers provides nourishment to both plant & soil. They help in conditioning soil texture and in turn helps healthy way of plant growth. Just like inorganic fertilizers, organic fertilizers also have promising results on various crops. Organic farming includes usage of microbes like Nitrogen fixing bacteria, Phosphate Solubilising bacteria, plant growth promoters etc. Usage of Plant extracts, Animal by-products etc are discusses way back in ancient cultivation methods. Famous sages of 1000 B.C like Varahamihara, Surapala etc gave formulations for some miraculous concepts in plant biology. Some most accepted & widely practiced concepts are taken from Surapala's VYRUKSHAYURVEDA which explains about techniques for plant Nourishment, plant healing, plant self defence etc by using plant extracts and Animal by products.

Present topic was selected from Vyruckshayurveda's verses

- "If, the branches burnt off, they should be cut and the spots should be sprinkled
- with water, milk. Smoking done with shells of crab leads to fresh sprouts." (V.204)
- "If the drying is due to the lack of water, the trees should be watered with milk-water and properly fomented by the smoke of crab shells." (V.209)
- Ash guard and cucumber dies if profusely smoked with bones of crabs. (V.275)

Crabshell when powdered and fogged on plants showed very good result on plant's growth, maturation, yield etc. There are some other practices where Chitin from crab shell is utilized as potent plant growth promoters, but studies found that the fog of shell powder of Freshwater crabs showed promising results rather than administering them to soil. The most exciting feature of the freshwater crabshell fog is that it shows its action specifically on *Cucurbitaceae*.

2. Materials and Methods

Test plant was Ash Gourd as it the season and plant is easy to conduct studies on phenotypic changes. F1 Hybrid seeds of ash gourd of Kailash seeds Pvt.Ltd. were taken for the work. Seeds are divided into two sets where set-1 seeds were sown into soil after smoking them with freshwater crab shell powder for 10 mins & set-2 were treated with chitin extracted from freshwater crab shell & then sown into the soil.

Chitin extraction Procedure: *Paratelphusa hydrodromus* known as paddy field crab a natural species of costal Andhra Krishna district, were collected. The shells were removed dried at 60°C for 6 hours, dried shells are powdered by pistle & Mortar into fine powder The shell was demineralised with 1N HCl for 30 min at ambient temperature with a solid/solvent ratio of 1:15 (w/v) (No and Lee, 1995). Following demineralization, the decalcified shell was collected on a filter paper (Whatman No. 3) in Buchner funnel, washed to neutrality in running tap water, and rinsed with deionised water. Deproteinization was accomplished under standard autoclaving conditions (15psi/121°C). The demineralised shell was treated with 3% NaOH for 10 min at 15 psi/121°C and solid/solvent of ratio of 1:10 (w/v) The residue was then washed and filtered as mentioned above. The chitin residue was bleached with 0.32% sodium hypochlorite solution for 3 min with a solid/solvent ratio of 1:10 (w/v). The decoloured chitin was collected, washed and dried at 60°C for 4 h in a forced-air oven. Deacetylation was achieved by treatment of chitin under conditions of 15 psi/121°Cwith 50% NaOH for 30 min and a solid/solvent ratio of 1:15 (w/v). The resulting chitosan was collected, washed and dried at 60°C for 4 h in a forced-air oven.

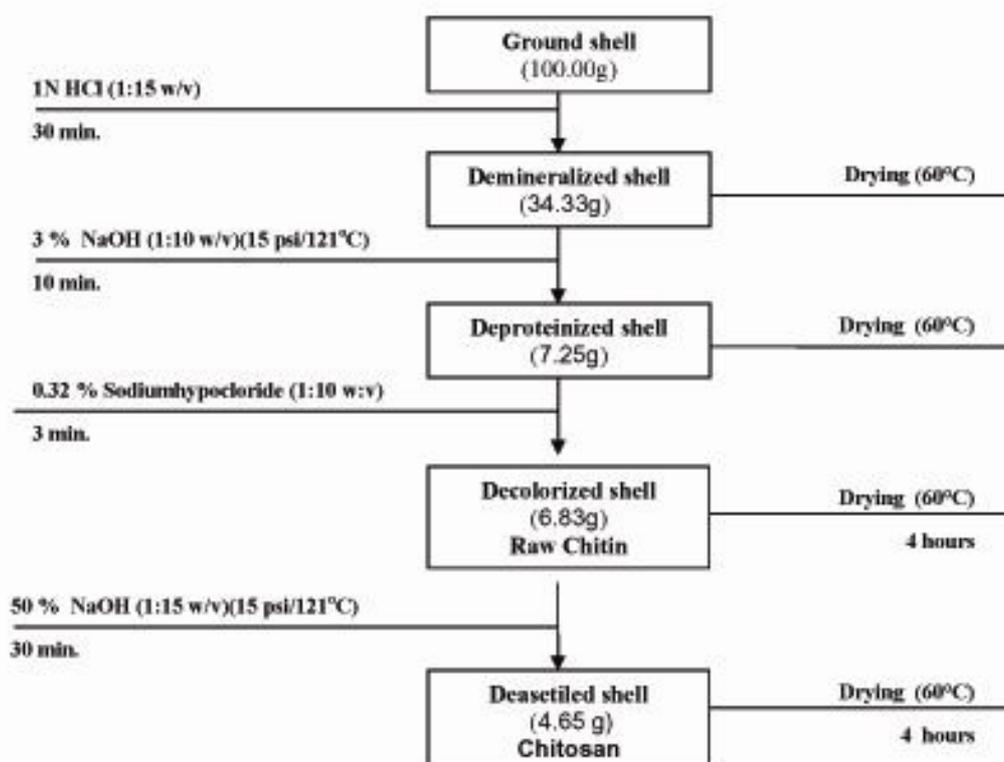


Fig. 1: Process of recovery of chitin–chitosan from crab shells.
(Hong KN & YL mun 1995)

Seed treatment procedure: Seed treatment was done by shaking the seeds and the powder vigorously for 30mins at 10mins interval. Seed were then stored in Ziploc bags and the treatments were labelled according to the acid concentrations used for demineralization. To evaluate effect of the chitin on plant morphogenesis i.e average height, leaf size, flower number, Growth rate etc.

Seed sowing pattern:

Table 1: shows seeds treated with chitin extracted by different concentrations of acid

Acid Concentration	Qt of Chitin	No of Seeds	Treatment Time
1N-HCL	5gms	3	30mins
2N-HCL	5gms	3	30mins
3N-HCL	5gms	3	30mins

Thus treated seeds were sown in the soil taken in small pots & incubated for sprouting under normal conditions. The results are mentioned here under in the following table-2

Table 2: Shows growth time of seeds sown after treatment with chitin.

POT	No OF GERMINATED SEEDS	GERMINATION TIME
1N-HCL	2	9-DAYS
2N-HCL	3	7-DAYS
3N-HCL	3	7-DAYS



1-N HCL



2 N HCL



3 N HCL

Fig. 2: Shows the growth of plants after seed treatment with chitin.

Three smoked Seeds are sown in different pots in accordance with treated seeds and their growth pattern is provided here under in table-2.

Table 3: Shows growth time & rate of germination after smoking with crab shell powder.

POTS	No OF GERMINATED SEEDS	GERMINATION TIME
1	1	3-DAYS
2	1	3-DAYS
3	1	5-DAYS



Fig. 3: Plant Growth after Smoking Seed by Using Crab Shell Powder.

After allowing plants to grow for a period of 25-days, plants having better morphology were separated from germination pots and sown into bigger pots for further growth. Plants which were treated with chitin showed delayed growth rather than plants sprouted from smoked seeds. After 40-days all plants were fogged with crab shell powder and left for further maturation.

Fogging of Crabshell powder on plants: Charcoal mould is used as fire source. Crabshell powder was burnt to ashes to produce smoke thus produced smoke is fogged on to plant during evening time. Observations after 60-days were tabulated here under in table-4.

Table 4: Shows average calculations of Morphological characters of plants smoked by

Morphology	Chitin Treated	Crab shell smoked	Control
Height of the plant Before fogging	95cms	1mts 15cms	2mts 20cms
After fogging	1mts.57cms	3mts80cms	
Size of leaf Before fogging			18cms(w) 16cm(L)
After fogging	13.7cms(w)11.5(L)	14cms(w)11.6(L)	
	16.5cms(w)13.0cms(L)	20.2cms(w)16.2cms(L)	
Number of Flowers Before fogging			9
	2	6	

After fogging	7	17	
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control

plants sprouted from crabshell smoked seeds



Before Smoking by Crab Shell powder



After Smoking by Crab Shell powder

Plants sprouted from 2N-HCL chitin treated seeds



Before Smoking by Crab Shell powder



After Smoking by Crab Shell powder

Fig. 4: Shows the growth of Plants sprouted from both smoked and chitin treated. Crab shell powder. Measurements are taken after 15days from fogging plants.

3. Result & Discussion

From the observation obtained from table -2 & table -4 it is understood that smoke has constructive effect on the plant growth. When the seeds were smoked before sowing they showed early germination when compared to chitin treated seeds according to tables 2&3. From table-4 it is understood the fogging enhanced the growth of the plant, its length and number of flowers. Thus as stated in the verse 209 in Vyrukshayurveda crab shell smoke helps in regeneration & new sprouting is clearly

seen observed. One of the other finds which we came across was smoke not only enhanced sprouting but it also increased the number of flowers and increased the length of lamina. These findings prove that crab shell fog has properties of a fertilizer which enhances the growth and yield of plants. As fog or smoke of crab shell has nourishing effect on plant it can be said as organic fertilizer which enhances the growth of the plant.

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