

Potentized Cina reduces root-knot nematode in infestation of cucumber and the antinematode effect is transmitted through water

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Background: Root-knot nematodes belonging to *Meloidogyne incognita* are responsible for substantial loss in yield of vegetable crops all over the world. Chemical nematicides are expensive, cause environmental pollution and leave toxic residues in crops. Plant substances provide safe alternative [1, 2]. *Cina* is a plant origin. In a series of experiments we have demonstrated that potentized *Cina*, a homeopathic remedy for worm or nematode infection in man, could significantly reduced root-knot nematode infection in several species of crops [3, 4]. We have also demonstrated that the effect of a homeopathic potency could be transferred from one plant to another through water [5].

Objectives: (i) To see whether *Cina* 200 CH could reduce root-knot disease of cucumber; (ii) To see whether the antinematode effect of *Cina* could be transferred from one plant to another through water.

Materials and methods: Aseptically germinated seeds of cucumber, *Cucumis sativus* L were grown in earthen pots at one seed per pot containing a mixture of clay soil and composed manure (2:1, w/w), which was treated previously with boiling water to remove any plant pathogens. The pots were divided into groups (10 pots per group): (i) uninoculated untreated, (ii) inoculated untreated, (iii) inoculated and treated with *Cina* 200 CH, (iv) inoculated and treated indirectly by connection with wet cotton threads to group (iii) and (v) inoculated and treated with *Ethanol* 200 CH. Groups (ii), (iii), (iv) and (v) were inoculated with the second stage larvae of *Meloidogyne incognita* when the plants were at six leaf stage. Just before inoculation plants of group (iii) and (iv) were connected leaf by leaf by wet cotton threads encased in polythene tubes. Then plants of group (iii) were directly pretreated by foliar spray with *Cina* 200 CH diluted with distilled water (1:500). Two days after inoculation plants of group (iii) were treated again with *Cina* 200 CH in a similar way. After a couple of weeks all the plants were harvested and the following parameters were measured: shoot length, shoot weight, root length, root weight, numbers of leaves per plant, leaf area, root gall number per plant, nematode population in roots and rhizospheric soil, leaf chlorophyll content, leaf sugar, protein content and root protein content.

Results: All the data were statistically analyzed by ANOVA followed by t-test. Leaf area and chlorophyll content were significantly higher ($p < 0.01$) with the treated groups direct and connected, than with the inoculated untreated group. Root gall number, nematode population in roots and root protein content were significantly lower ($p < 0.01$) with the treated groups than with the inoculated untreated group. Ethanol 200 CH treated group did not show any significant difference from the inoculated untreated group.

Discussion: Nematode parasites are highly resistant to many chemicals. Potentized Cina did not affect the parasites directly. The drug might have induced natural defence responses in the treated plants. The work further demonstrates that water could carry the molecular memory of the potentized Cina and thus influence the connected plants. Cina 200 CH is an eco-friendly, inexpensive and effective drug against root-knot nematodes.

Conclusion: Cina 200 CH reduces root-knot nematode infestation of cucumber. Water serves as a carrier of information of the drug effect from one plant to another.

Key words: Root-knot nematode, Cina 200 CH, information carrier.

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