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An Experimental Study to Appraise the Role of Cina 30CH in Controlling Ascochyta Blight Fungus in *Pisum sativum*

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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Short Research Article

ABSTRACT

Peas are grown all over the world and are considered an important component of the human diet due to their numerous health advantages and vital components, which include fibre, proteins, complex carbohydrates, vitamin B, folate, and minerals. One of the most destructive diseases is Ascochyta blight, which in large pea-growing areas can cause yearly output losses of 10% to 40%. Considering agro-homoeopathy, a very new and successful farming technique This study assessed the effectiveness of Cina 30, a potentized homoeopathic medication, in reducing the impacts of Ascochyta blight disease in *Pisum* sativum plants. The overall sample size is 15 plants. There were three groups: A, B, and C, where A represents placebo, B represents fungicide, and C represents

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CINA 30CH. Each group has five plants for parameter analysis which include Length of the root, Length of the shoot, Length of the pods, Number of leaves, Number of pods. The recorded data was analyzed statistically by using the ANOVA single factor test. The three study groups' respective variances in the plant parameters—root length, shoot length, pod length, number of leaves, and number of pods—were 41.33, 2864.33, 5.25, 394.33, and 9.33. The calculated value of F is 12.76 which is more than the table value of F crit 3.47 at 5% level with degree of freedom v_1 = 4 and v_2 = 10. The obtained P value 0.00061 is less than 0.01, which is strong evidence to reject the null hypothesis and accept the research hypothesis. According to the findings of this study, CINA 30CH is as effective as a fungicide in improving the features of *Pisum sativum* that are influenced by the Ascochyta blight fungus.

Keywords: Pisum sativum; ascochyta blight; Cina 30CH; agro homoeopathy.

1. INTRODUCTION

One of the most recent methods in agricultural research is Agrohomoeopathy. The physiological functions of plants can be changed by potentized homoeopathic medications, according to recent scientific findings [1]. A potential approach to sustainable agriculture is agro-homeopathy, which bridges the gap between agricultural methods and the natural world to enhance crop health. Through the incorporation of homeopathic principles into agricultural systems, this field provides a comprehensive and environmentally sustainable method of cultivating crops and guaranteeing their long-term viability [2]. Research on diverse crops has improved germination and growth to combat pests, diseases, and viral infections, among other things [3]. Currently, agricultural homoeopathy is being employed more frequently all over the world to lessen the harmful consequences brought on by the careless use of chemical items in traditional agricultural operations [4].

Pisum sativum L. is an herbaceous annual self-pollinated plant in the family Fabaceae grown virtually worldwide for its edible seeds. These are used by people of all age groups due to their nutritive value and pleasant taste [5]. It has long been important in diet due to its content of fiber, protein, starch, trace elements, and many phytochemical substances [5]. Its short growing duration and relatively simple production stimulated its production, making it a commercial commodity [6].

Peas are the second most important source of protein for the people of India, after chickpeas. Pea production has dropped significantly over time as a result of pathogen attack and climate change, raising serious concerns among scientists, decision-makers, and the general public. As a result, numerous solutions have been developed to determine the most effective way to control the illness. Pea has been determined to be particularly vulnerable to fungus-borne diseases. Microorganisms like fungi, bacteria, and certain nematodes are the principal culprits behind disease in pea plants, although fungal pathogens—which are typically soil-borne—are responsible for a large portion of losses [7].

In *Pisum sativum*, Ascochyta blight is one of the most common fungal diseases [8]. One of the most serious diseases of *Pisum sativum*, Ascochyta blight, sometimes known as "black spot disease," is widespread throughout the world, including nearly all of the major pea-growing regions. The Ascochyta complex, which includes the fungi Ascochyta pinodes, Mycosphaerella pinodes, Phoma medicaginis var. pinodella, Ascochyta pisi, and Phoma koolunga, is responsible for its development [9].

Foot rot, black stem pod spot, necrotic leaf spots, stem lesions, shrinkage, dark-brown discoloration of seeds, as well as blackening are only a few of the symptoms caused by this blight complex [10]. Fungicide use and cultural methods like crop rotation are key components in the management of Ascochyta blight. Mancozeb, chlorothalonil, benomyl, carbendazim, and thiabendazole are a few fungicides that have been successfully used to reduce Ascochyta blight and boost yield [11,12,13]. However, the use of fungicides can raise production costs, diminish yields because of residues, and endanger the environment since they can wander into unintended areas. Additionally, the frequent use of fungicides can cause the growth of fungi that are resistant to industrial chemicals [14].

A thorough short review of published homoeopathic research evidence on *Pisum* *sativum* identified multiple articles like "Growth stimulation of dwarf peas (*Pisum sativum* L.) through homoeopathic potencies of plant growth substances, The effects of ultra-high diluted (UHD) homoeopathic medicines on *Pisum sativum*: a hydroponics study in a plant growth chamber, Reproducibility of dwarf pea shoot growth stimulation by homoeopathic potencies of gibberellic acid [15,16,17]. All these studies established the effectiveness of homoeopathic interventions with positive and favorable results. Mulberry diseases such as root knot, leaf spot, powdery mildew, mosaic, and others are caused by naturally occurring fungi. Pretreatment with ultra-high-diluted Cina, mixed with water at an extremely low dose, has shown effectiveness in treating these diseases by triggering their natural defense response against pathogen infection and leaving no residual toxicity in the leaves [18].

This pilot study aims to investigate the efficacy of Cina 30CH in controlling Ascochyta blight fungus in *Pisum sativum* plants based on the successful research results of homoeopathic interventions in *Pisum sativum* and Cina in controlling fungal diseases in plants. Establishing Cina medicine's unexplored therapeutic potential in *Pisum sativum* plants with Ascochyta blight infection is the novelty of this study.

In the current experimental study, 15 Ascochyta blight infected *Pisum sativum* plants were grown in grow bags in their natural habitat. These 15 plants were split into 3 groups, with 5 plants in each group. A fungicide was administered to one group, a control group received no intervention, and a third group received Cina 30 foliar spray once every 15 days. To determine the effectiveness of the suggested intervention in boosting *Pisum sativum* productivity against the Ascochyta blight fungus, measurements of the length of the root, shoot, and pods as well as the number of leaves and pods were made between three groups.

2. MATERIALS AND METHODS

2.1 Study Procedure

- Three groups of infected plants with Ascochyta blight were created. A (without intervention), B (fungicide) and C (CINA 30). Each group contains five plants.
- Lesions on the leaves characterised by small irregular brownish black spots.
- Group B was administered fungicide, Group C was given CINA 30, and Group A received no intervention at all.
- All three groups had the onset of pod growth; however, Group A had less pod development and greater fungal toxic symptoms than the other two groups.
- All of the plants in three groups had fungal symptoms on their leaves, pods, and shoots; however, Group A (no intervention) had the most severe symptoms, Group C (CINA 30) had the less, and Group B (fungicide) had the least.

2.2 Observation

Plant development was observed at various phases when the parameters under consideration for investigation were recorded.

GROUP A GROUP B GROUP C

Fig. 1. Ascochyat blight Ingected plants

Fig. 2. Development of poos

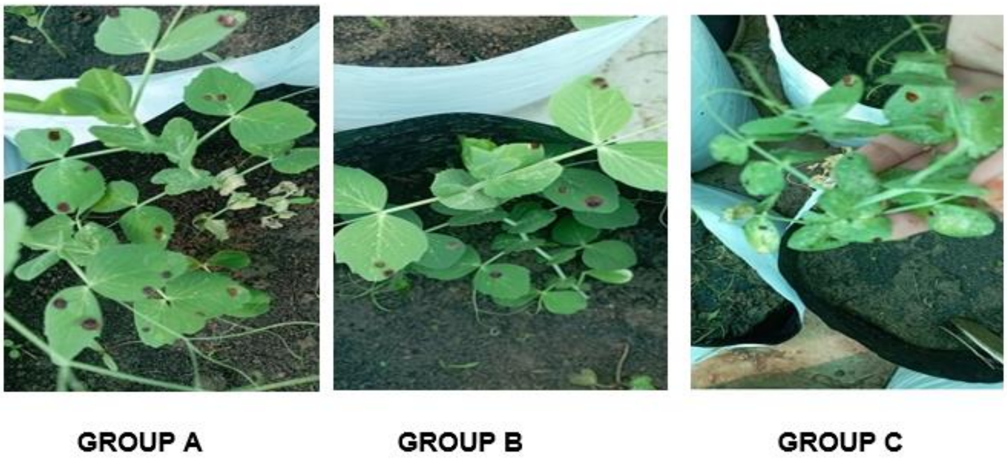

Fig. 3. Leaves infected ascochyta blight

Fig. 4. Shoots infected ascochyta blight

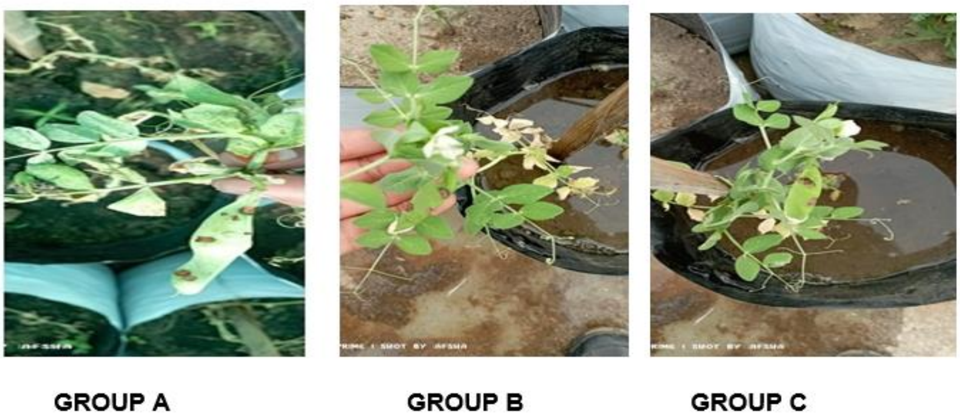

Fig. 5. Pods infected ascochyta blight

Fig. 6. Average number pods per plant

3. RESULTS AND DISCUSSION

3.1 Parameters

Table 1. Average length of the root

Name of the group	Average Length of Root (cm)
No Intervention (A)	15
Fungicide (B)	27
Cina 30 CH	25

Table 2. Average length of the shoot

Name of the group	Average Length of Shoot (cm)
No Intervention (A)	62
Fungicide (B)	158
Cina 30 CH	151

Table 3. Average length of the pod

Name of the group	Average Length of Pod (cm)
No Intervention (A)	4.5
Fungicide (B)	9
Cina 30 CH	7.5

Table 4. Average number of leaves

Name of the group	Average Number of leaves
No Intervention (A)	65
Fungicide (B)	102
Cina 30 CH	96

Table 5. Average number of pods

Name of the group	Average Number of pods
No Intervention (A)	4
Fungicide (B)	10
Cina 30 CH	8

3.2 Statistical Analysis

A one-way Anova statistical test was used in accordance with the recorded data, which is suitable for this research question.

Table 6. ANOVA – single factor

Parameters	Number of groups	Sum	Average	Variance
Length of the root (cm)	3	67	22.33	41.33
Length of the shoot (cm)	3	371	123.66	2864.33
Length of the pod (cm)	3	21	7	5.25
Number of leaves	3	263	87.66	394.33
Number of pods	3	22	7.33	9.33

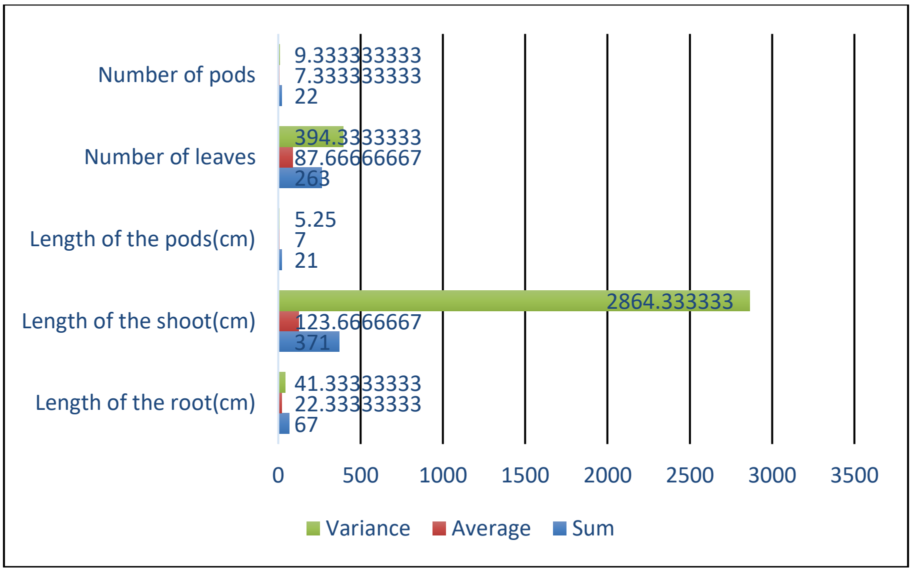

Fig. 7. Variance In groups

3.2.1 Anova single factor result

Table 7. Anova test

Source of Variation	Sum of squares (SS)	Degree of freedom (d_f)	Mean Square	F calculated ratio	F crit	P-Value
Between the Groups	33838.93	4	8459.73	12.76	3.47	0.00061
Within the Groups	6629.16	10	662.91			

This table shows that the calculated value of F is 12.76, which is more than the table value of F crit 3.47 at the 5% level with degrees of freedom v_1 = 4 and v_2 = 10, which shows that this difference is statistically significant. The obtained P value, 0.00061, is less than 0.01, providing strong evidence to reject the null hypothesis and accept the study hypothesis.

Despite the advantages of *Pisum sativum* to agriculture and the national economy its productivity is threatened by biotic and abiotic stressors, including Ascochyta blight, which can lead to annual yield losses of 10% to 40% in major pea-growing areas [19]. Crop rotation and the use of fungicides are essential for controlling Ascochyta blight, but they can also raise production costs, lower yields, and produce fungal resistance. [11,12]. Considering the expenses of production, the negative consequences of using fungicides, and the benefits and practicality of agro-homeopathy Based on the excellent research outcomes of homoeopathic treatments in *Pisum sativum* and Cina in controlling fungal diseases in plants, the purpose of this study was to examine the effectiveness of Cina 30CH in controlling the Ascochyta blight fungus in *Pisum sativum* plants.

For the three experimental groups—the group without intervention (A), the group treated with fungicide (B), and the group treated with Cina 30 (C)—the average root length of the plants was 15cm, 27 cm, and 25 cm, respectively and the average shoot length of the plants was 62cm, 158 cm, and 151 cm, respectively. Similar results were found in a study that was conducted to evaluate the possible effects of potentized homeopathic medicine Arsenicum album and Baryta carbonica on the germination, growth, and photosynthetic activity of pea seedlings (*Pisum sativum* L.). A gradual increase in plant growth was observed with remarkable enhancement of different morphological parameters, surpassing the control set. The shoot length and root length substantially increased in both experimental groups [20].

The other characteristics, such as pod length, leaf number, and pod number, yielded comparable findings.

In terms of managing the Ascochyta blight fungus in *Pisum sativum* with regard to parameters of root, shoot, and pod length, as well as the number of leaves and pods, Group A (no intervention) was more severely impacted, whereas Groups B(fungicide) and C (Cina 30) demonstrated almost equal competence.

4. CONCLUSION

Plant metrics of *Pisum sativum*, such as root, shoot, and pod length, as well as the number of leaves and pods, showed differences across all three experimental groups. Compared to the other two groups, the fungicide-treated group performed better across all research criteria. Furthermore, there is little difference in parameter values between the fungicide and Cina 30 groups. The findings of this research study concluded that CINA 30 is as effective as a fungicide at improving the characteristics of *Pisum sativum* that are impacted by the Ascochyta blight fungus.

Social technologies must be simple, inexpensive, effective, and available to all farmers without requiring costly inputs. Homeopathy's ethical and social potential lends itself well to the toolset of alternative agricultural movements, and it is acknowledged as an effective social technology in agriculture. The findings of this research study address the importance of homeopathy in agriculture, and if farmers are given knowledge of a theoretical and methodological framework that can deal with such complexities on their farms and are able to apply low-cost homeopathic solutions, they will have a unique opportunity to enhance and work with agricultural components.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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