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# Efficacy of Different Botanicals Extracts Against Sclerotinia Blight of Brinjal (*Sclerotinia sclerotiorum*) under *In vivo* Conditions

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***Authors' contributions***

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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## ABSTRACT

Among the various diseases the sclerotinia blight (*Sclerotinia sclerotiorum*) is an important disease which causes loss in quality and quantity of fruits of brinjal. In between crop seasons, the species of *Sclerotinia* mainly survive through sclerotia which may be present on soil surface in

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unploughedfields or in crop debris or as admixture with the seed. In past, brinjal sclerotinia blight disease has been managed by various method, viz. chemical, cultural, biological Control and use of resistant varieties. However, it was observed that pathogens have developed resistance against regular use of chemicals. The uses of alternative management are best option for management of this disease such as resistant varieties and bio-agent/biological control.Between crop seasons, Sclerotinia species rely on sclerotia, which can be found on the surface of the soil in unploughed fields, in crop debris, or as an admixture with the seed. In the past, brinjal sclerotinia blight disease was treated with a variety of methods, including chemical, cultural, and biological treatments. Control and the utilisation of resistant cultivars are also important. Pathogens, on the other hand, have acquired resistance to the application of chemicals on a frequent basis. Alternative management strategies, such as resistant varieties and bio-agent/biological control, are the greatest options for managing this disease.Five plant extracts viz., Garlic, Neem, Ocimum, Dhatura, Onion were tested *in vivo* against *Sclerotiniasclerotiorum*at 10 per cent and 15 per cent concentration*.* All plant extracts were more or less effective and exhibited reduction in *sclerotinia* blight disease incidence. The effectivity of extracts increased with an increase in concentration. At ten per cent concentration, minimum disease incidence was found in Garlic (18.85%) followed by Neem (20.21%), Ocimum (22.67%), Dhatura (24.07%) and Onion (28.11%) extract as compared to untreated plants (33.07%). Maximum disease severity control (42.99%) was recorded in Garlic followed by Neem (38.88%), Ocimum (31.44%), Dhatura (27.14%) While minimum was recorded in Onion (14.99%). At 15% concentration the most effective was found in garlic which exhibited maximum disease severity control (50.57%) was recorded in Garlic followed by Neem (47.69%), Ocimum (38.50%), Dhatura (37.38%) While minimum was recorded in Onion (23.69%).

*Keywords: Botanicals; sclerotiniasclerotiorum; In vivo; sclerotinia blight;brinjal.*

## 1. INTRODUCTION

"Brinjal (*Solanum melongena* L.), known as egg plant, is one of the most important vegetable crop. It is thought to have originated in India, where several kinds of this plant still grow wild. In Asia, where more than 90% of the world's eggplant is produced, the egg plant is one of the most significant vegetables. In many states of India's it is grown and known as the poor man's vegetable due to its productivity. It is a perennial crop, but commercially preferred as an annual crop. It is used as a raw material in pickle making and dehydration industries. It is also used in ayurvedic medicine for curing diabetes and is a good appetizer [1]. It provides vitamin A (27.0 IU) and C (2.2 mg) and minerals like iron, phosphorus and calcium" [2]. "Egg plant supplies vital vitamins, minerals and dietary fiber to the human diet, especially in the rainy season, when other vegetables are in short supply for the rural and urban poor [3]. India is the second largest producer of brinjal in the world next to China and is grown throughout the year. In India during 2017-2018, it was cultivated in 0.73 million hectare area with a production of 12.80 million tonnes and productivity of 19.15 tonnes/ha. In Uttar Pradesh, brinjal was cultivated in 0.03 million hectare with a production of 1.06 million tonnes. Among all states, productivity was higher (34.34 tonnes/ha) in Uttar Pradesh" [4]. "Among the various diseases the sclerotinia blight is an important disease which causes loss in quality and quantity of fruits of brinjal [5]. In brinjal, disease incidence of 47.3 per cent has been reported in green house conditions" [6,7]. Chattopadhyay et al. [8] reported that "treatment with GR isolate of *Trichoderma harzianum* and *Allium sativum* clove extract caused significant increase in seed germination and radicle length of Indian mustard by reducing Sclerotinia rot". Yadav [9,10] tested "in vitro efficacy of five botanicals viz., *Allium sativum, Allium cepa, Eucalyptus globosus, Azadirachta indica, Calotropisprocera* against *S. sclerotiorum* causing stem rot of Indian mustard. *Allium sativum* and *Eucalyptus globosus* were more effective than control". Meena et al. [11] also reported that "Sclerotinia rot was reduced in plant that received a combination of seed treatment and foliar spraying with garlic bulb extracts [12,13]. In past, brinjal sclerotinia blight disease has been managed by various method, viz. chemical, cultural, biological Control and use of resistant varieties". However, it was observed that pathogens have developed resistance against regular use of chemicals. The uses of alternative management are best option for management of this disease such as bio-agent/biological control.

## 2. MATERIALS AND METHODS

### 2.1 The Experimental Site

The experimental site Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya (UP) is located on the Raibareli road, 46 kilometres from Ayodhya. At 26.47 N latitude, 82.12 E longitudes, and a height of 113 m above mean sea level, it is located in the Indo-gangetic plains. The region comes under sub-humid and sub-tropical, with an average annual rainfall of roughly 1200 mm. The monsoon months, which last from mid-June to the end-of-September, get about 80% of the total rainfall. Winters are bitterly cold, while summers are scorching hot and dry. Hot winds usually begin towards the end of April and last until the beginning of the monsoon season.

### 2.2 Preparations of Different Plant Extract Against Sclerotinia Blight of Brinjal *In vivo* Conditions

The locally available five plants *viz.,*Ocimum (*Ocimumindicum*L.) leaves, Garlic (*A. sativum* L.) clove, Neem (*Azadirachtaindica*juss.), Dhatura (*Dhaturastramoneum*L.), Onion ( *A. cepa* L.) bulb were used for testing its efficacy against sclerotinia blight. The leaf/bulb extracts of the plants is screened against Sclerotinia blight of brinjal at 10% and 15% concentration.

### 2.3 Preparations of Plant Extract

Extracts of plant were prepared by crushing leaves of tulsi, garlic (clove), neem seed kernel, dhatura (leaf) and onion (bulb) with sterilized distilled water. The material were dried at room temperature ($25^0$C) for 6 hours before extraction to remove the traces of water. 100g leaves of plant crushed separately with 100 ml sterilized water and Neem seed kernels were collected and peel is removed and crushed with mortar pestle and collected in muslin clothed fixed tightly and dipped in distilled water overnight. The extract were then filtered through a muslin cloth and centrifuged for 30 min at 5000 rpm. The extracts were sterilized by passing them through a Millipore filter (0.22 micron pore size) using a filter adopter [14,15].

**Treatment Details**

$T_1$: Foliar spray of tulsi leaf extract (Leaves).
$T_2$: Foliar spray of garlic cloves extract.
$T_3$: Foliar spray of neem seed kernel extract.
$T_4$: Foliar spray of dhatura leaf extract.
$T_5$: Foliar spray of onion bulbs extract.
$T_6$: Control

**Observation recorded**

- Disease severity was recorded at first appearance of disease and after 15 day interval.
- The percent disease control was calculated by using fallowing formula:-

Percent disease control =C-T/C×100

Whereas,

C =per cent disease incidence in control (without control).
T = per cent disease incidence in treatment.

## 3. RESULTS AND DISCUSSION

### 3.1 Efficacy of Different Botanicals Against Sclerotinia Blight of Brinjal under *In vivo* Conditions at 10% Concentration

10 per cent concentration of plant extracts tested *in vivo* to found out the efficacy of five plant extracts. Data presented in (Table 2) indicated that all the plant extracts were more or less effective and exhibited reduction in disease incidence. The minimum disease incidence was found in Garlic (18.85%) followed by Neem (20.21%), Ocimum(22.67%), Dhatura (24.07%) and Onion (28.11%) extractas compared to untreated plants (33.07%).Similar results were observed by Chattopadhyay et al. [8,16,17].

**Table 1. List of plant with common name, botanicals name, family and their part used**

| S. No. | Common Name | Botanical Name | Family | Part used |
|---|---|---|---|---|
| 1. | Tulsi | *Ocimumindicum* L. | Labitaceae | Leaves |
| 2. | Garlic | *Allium sativum*L. | Lilliaceae | Cloves |
| 3. | Neem | *Azardirachtaindica*juss. | Meliaceae | Seed |
| 4. | Dhatura | *Dhaturastramoneum*L. | Solanace | Leaves |
| 5. | Onion | *Allium cepa* L. | Lilliaceae | Bulbs |

**Table 2. Effect of plant extract on percent disease incidence against Sclerotinia blight of brinjal*invivo*at 10% concentration**

| Plant extract | Percent disease incidence | Percent disease control |
|---|---|---|
| Garlic | 18.85(24.64) | 42.99 |
| Neem | 20.21(26.69) | 38.88 |
| Ocimum | 22.67(28.41) | 31.44 |
| Dhatura | 24.07(29.38) | 27.14 |
| Onion | 28.11(32.01) | 14.99 |
| Control | 33.07(35.10) | |
| CD at 5% | 2.25 | |

**Figure given in parenthesis are transformed value**

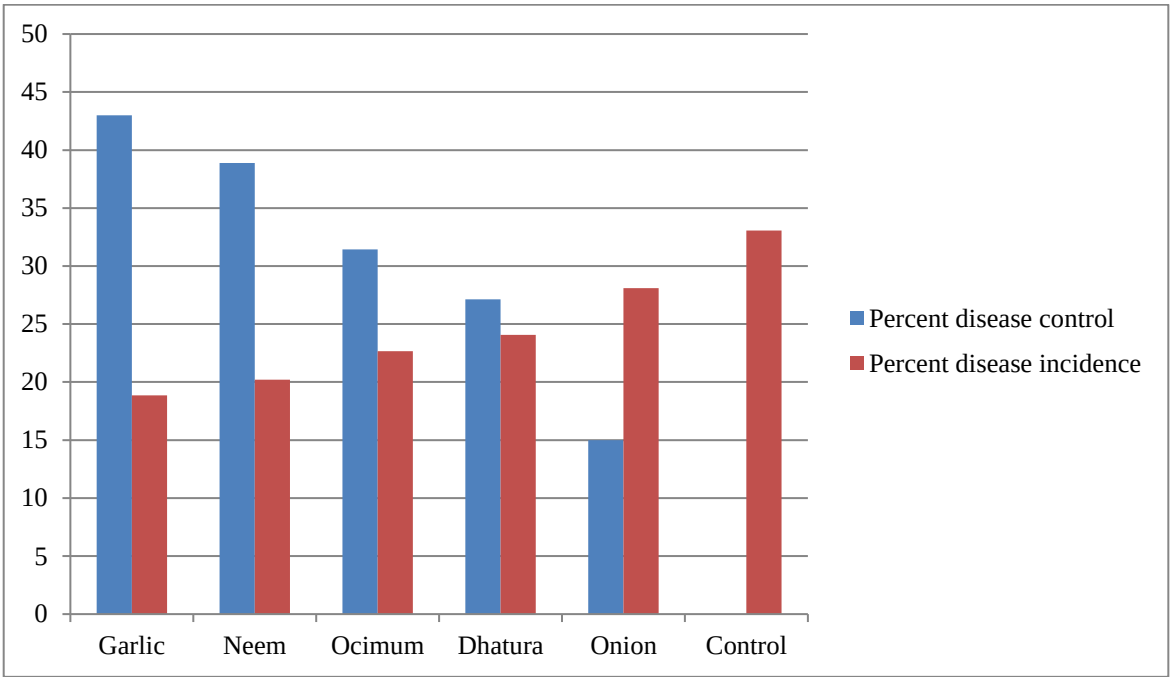


**Fig. 1. Effect of plant extract on percent disease incidence against Sclerotinia blight of brinjal*in vivo* at 10% concentration**

### 3.2 Effect on Per Cent Disease Control

The highest per cent disease control of 42.99% was recorded in Garlic followed by Neem (38.88%), Ocimum (31.44%), Dhatura (27.14%) and Onion (14.99%) as compared to untreated plants.

The disease control in between Garlic and Neem,Ocimum and Dhatura were at par to each other. Rest of the treatments significantly differed from each other with respect to percent disease control. Thus, disease control was highest in Garlic and Neem and minimum in Onion and Dhatura. Similar findings were observed by Yadav et al. [9,18].

### 3.3 Efficacy of Different Botanicals Against Sclerotinia Blight of Brinjal *In vivo* Conditions at 15% Concentration

15 per cent concentration of plant extracts tested *in vivo* to found out the efficacy of five plant extracts.Data presented in (Table 3) indicated that all the plant extracts were more or less effective and exhibited reduction in disease incidence. The minimum disease incidence was found in Garlic (15.98%) followed by Neem (16.91%), Ocimum(19.88%), Dhatura (20.21%) and Onion (24.67%) extracts compared to untreated plants (32.33%). Results are in accordance with Meena et al. [11,19].

**Table 3. Effect of plant extract on percent disease incidence against Sclerotinia blight of brinjal*in vivo* at 15% concentration**

| Plant extract | Percent disease incidence | Percent disease control |
|---|---|---|
| Garlic | 15.98(23.55) | 50.57 |
| Neem | 16.91(24.26) | 47.69 |
| Ocimum | 19.88(26.45) | 38.50 |
| Dhatura | 20.21(26.69) | 37.38 |
| Onion | 24.67(29.77) | 23.69 |
| Control | 32.33(34.65) | |
| CD at 5% | 1.51 | |

**Figure given in parenthesis are transformed value**

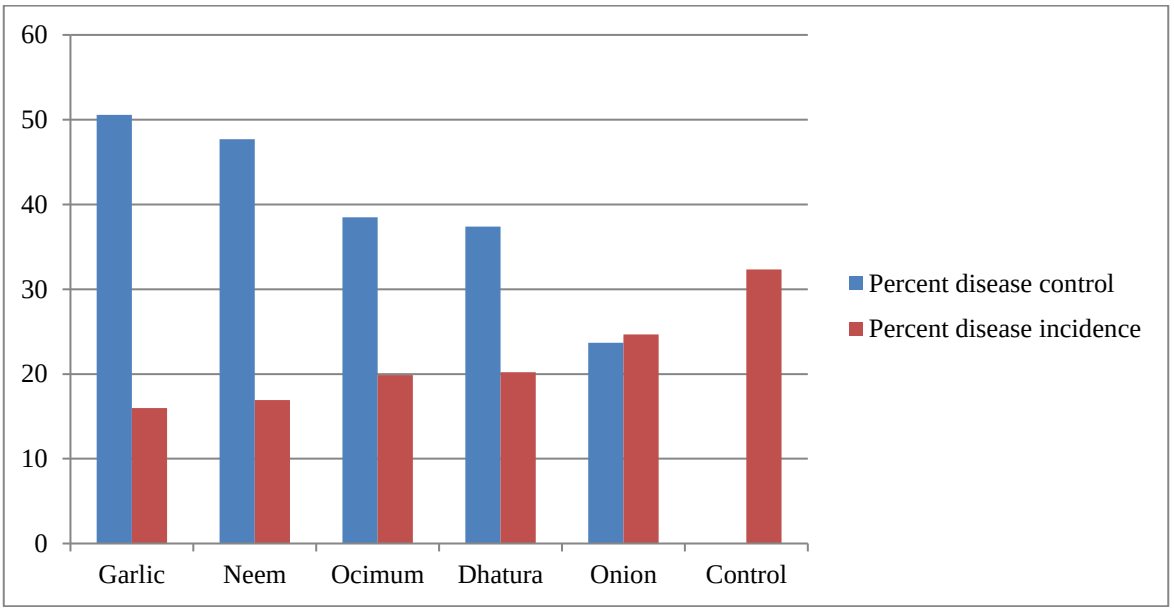


**Fig. 2. Effect of plant extract on percent disease incidence against Sclerotinia blight of brinjal *in vivo* at 15% concentration**

### 3.4 Effect on Per Cent Disease Control

The highest per cent disease control of 50.57per cent was recorded in Garlic followed by Neem (47.69%), Ocimum (38.50%), Dhatura (37.38%) and Onion (23.69%) as compared to untreated plants.

The disease control in between Garlic and Neem, Ocimum and Dhatura were at par to each other. Rest of the treatments significantly differed from each other with respect to percent disease control. Thus, disease control was highest in Garlic and Neem and minimum in Onion and Dhatura [20,21].

## 4. CONCLUSION

Considering the overall performance of the treatments applied in the experiment, it was found that at 15% concentration the most effective was found in garlic which exhibited maximum disease severity control (50.57%) was recorded in Garlic followed by Neem (47.69%) had promising performance in controlling sclerotinia blight of brinjal as well as increasing yield. As an eco-friendly approach, garlic and neem extract may also be recommended to the farmers for profitable production of brinjal against the disease. The use of fungicides are being challenged now a days due to raising concerns about air pollution and health issues.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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