The Pharma Innovation Journal 2022; 11(8): 600-603

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(8): 600-603

www.thepharmajournal.com
Received: 01-05-2022
Accepted: 07-06-2022

Anuradha Jajoriya
Department of Plant Pathology, SKN College of Agriculture, Jobner, Jaipur, Rajasthan, India

RR Ahir
Department of Plant Pathology, SKN College of Agriculture, Jobner, Jaipur, Rajasthan, India

Ranjana Meena
Department of Plant Pathology, SKN College of Agriculture, Jobner, Jaipur, Rajasthan, India

Deepak Sharma
Department of Plant Pathology, SKN College of Agriculture, Jobner, Jaipur, Rajasthan, India

Corresponding Author:
Anuradha Jajoriya
Department of Plant Pathology, SKN College of Agriculture, Jobner, Jaipur, Rajasthan, India

Management studies on *Sclerotinia sclerotiorum (*Lib.) de Bary, causing sclerotinia rot of cauliflower through plant extracts, and amendments

Anuradha Jajoriya, RR Ahir, Ranjana Meena and Deepak Sharma

Abstract
Among six plant extracts tested under *in vivo* condition by seedling-cum-foliar application against the Sclerotinia rot, the garlic extract (48.44%) followed by neem extract (42.94%) was found in maximum percent disease control. Among the six amendments studied under pot condition, poultry manure (37.43%) was found most effective in reducing plant disease incidence followed by goat manure (36.36%).

Keywords: Plant extracts, incidence, Mycelial growth, Sclerotinia, physical parameters, amendments, temperature, *in vivo*

Introduction
Cauliflower (*Brassica oleracea* var. *botrytis* L.) belonging to family *Brassicaceae* is one of the important cole crops and has obtained a popular place in vegetable crops because of its delightfull taste, flavour and nutritive value (Mitra *et al*. 1990) [6]. It has been rightly designated as the aristocrat of cole crops. It is cultivated for tender succulent thick profused and underdeveloped flower stalks (curd). It contains ten times as much as calcium as meat. head is eaten while the stalk and surrounding thick, green leaves are used in vegetable broth or for feeding animals. Cauliflower is rich source of vitamins, especially A and C. It contains about 70 mg of vitamin A and about 75 mg of vitamin C per 100 gm of sample and is deviant in stability of vitamin C after cooking (Singh, 1987) [10]. Curd of Cauliflower is used in curries, soups and pickles. Leaves are used as feeding cattle and also for animals and birds. Cauliflower is reported to have 91.7% water and the food values per 100 g of edible portion are: energy 31 calories, protein 2.4 g, calcium 2.2 g and vitamin A 40 I.U. Cauliflower is rich in minerals like Potassium, Sodium, Iron, Copper, Phosphorous, Magnesium, carbohydrates and amino acids such as Arginine, Histidine, Lysine, Tryptophan, Tyrosine, Cystine, Methionine, Threonine, Leucine and Valine. It contains ten times as much as calcium as meat. Important diseases are white rust caused by *Albugo candida*, powdery mildew caused by *Erysiphe polygoni*, damping off caused by *Pythium debaryanum*, downy mildew caused by *Pernospora parasitica*, sclerotinia rot caused by *Sclerotinia sclerotiorum*, black rot caused by *Xanthomonas campestris pv. Campestris* bacterial soft rot or curd rot caused by *Erwinia caratovora pv. caratovora*, cauliflower mosaic caused by cauliflower mosaic virus etc.
Sclerotinia rot is more common and severe in temperate and subtropical regions of cool and wet seasons (Willetts and Wong, 1980 and Saharan and Mehta, 2008) [12, 8]. Among these sclerotinia rot of cauliflower caused by *Sclerotinia sclerotiorum* (Lib.) de Bary is one of the major soil borne fungal diseases of cauliflower causing losses both in field, especially in the seed crop and in storage. Management of sclerotinia rot cauliflower mainly depends on fungicides (Triphati and Triphati, 2010) [11].

Material and Methods
Efficacy of plant extracts against *Sclerotinia sclerotiorum* (*in vivo*)
The experiment was carried out in earthen pots (30 cm dia.) with host cultivar Early Kunwari. The pathogen multiplied on sorghum grains at 20±1 ^{0}C for one week was used as soil inoculum. Prior to transplanting, pots were filled with sterilized soil. The soil was sterilized at 1.045 kg/cm^2 for one hour for three consecutive days. Early Kunwari variety of cauliflower was sown in these pots as susceptible check with three replications. Six plant extracts (Table-1) were tested by applying as seedling dip application (for 15 min.), and foliar application (25

days after transplanting).Seedlings were raised in pots filled with sterilized soil for all experiments and one month old seedlings were transplanted in all experiments.

The pots were inoculated with fungal inoculum multiplied on sorghum grains before transplanting and seedlings were also dipped in inoculum suspension of pathogen. For inoculation, the upper 5 cm layer of soil of each pot was thoroughly mixed with inoculum @20 g/pot. Five seedlings were transplanted after dipping in 15% concentration of each plant extract. At 25 days after transplanting (DAT), each extract of the 15 per cent concentration was used as single foliar spray. For comparison inoculated control was maintained without plant extract application. The disease incidence and per cent disease control were calculated 45 DAT and 60 DAT with the help of following formulae.

$$\text{Per cent Disease Incidence} = \frac{\text{No. of infected plants}}{\text{Total No. of plants}} \times 100$$

The per cent disease control was calculated by using the following formula: -

$$\text{Per cent Disease control} = \frac{\text{Disease in control} - \text{Disease in treatment}}{\text{Disease in control}} \times 100$$

Table 1: Name of plant extract used against *Sclerotinia sclerotiorum* (*in vivo*)

S. No.	Common Name	Botanical Name	Plant Part used	Concentration (%)
1.	Neem	*Azadirachta indica*	Leaves	15
2.	Garlic	*Allium sativum*	Cloves	15
3.	Turmeric	*Curcuma longa*	Rhizome	15
4.	Hing	*Ferula assa-foetida*	Leaves and young shoots	15
5.	Ginger	*Zingiber officinale*	Rhizome	15
6.	Tulsi	*Ocimum sanctum*	Leaves	15

Efficacy of amendments against Sclerotinia rot of cauliflower (*in vivo*)

The experiment was carried out in pots (30 cm diameter) with cultivar Early kunwari. The pathogen multiplied on sorghum grains at 20±1 ^{0}C for one week was used as the soil inoculum as well as for seedling dip. Six amendments (Table-2) were used by applying as soil application in four replications.

These pots were inoculated with fungal inoculum multiplied on sorghum grains before sowing. For inoculation the upper 5 cm layer of soil of each pot was thoroughly mixed with inoculum @ 20g/pot. Five seedlings were transplanted per pot. For comparison inoculated control was maintained without applying different amendments. The disease incidence and per cent disease control were calculated 45 DAT and 60 DAT.

Table 2: Amendments used against sclerotinia rot of cauliflower (*in vivo*)

S. No.	Amendments	Dose (g/pot)
1.	Vermicompost	100
2.	Poultry manure	100
3.	Farm yard manure	150
4.	Wool waste	100
5.	Goat manure	150
6.	Gypsum	150
7.	Control	-

Results and Discussion

Efficacy of plant extracts against Sclerotinia rot of cauliflower through seedling-cum-foliar application (*In vivo*)

Among the six plant extract evaluated against the disease data (Table: 3 and Fig: 1) revealed that minimum disease incidence was observed with garlic (32.12 and 36.25% at 45 and 60 days after transplanting, respectively) followed by neem (35.30 and 40.12% at 45 and 60 DAT, respectively) as compared to control 55.38 and, 70.32% at 45 DAT and 60 DAT, respectively. Maximum reduction in disease incidence over control was observed with garlic (42.00 and 48.44% at 45 and 60 DAT, respectively) followed by neem (36.16 and 42.94% at 45 DAT and 60 DAS, respectively. Percent disease incidence of tulsi (49.35% at 45 DAT and 55.20% at 60 DAT) was found at par with turmeric 47.10%, 50.21% at 45 DAT and 60 DAT, respectively. Minimum reduction in disease was observed in tulsi (10.88 and 21.50% at 45 DAT and 60 DAT, respectively.

To manage, the disease, six plant extracts namely neem, garlic, turmeric, hing, ginger and tulsi were tested at 15 per cent concentration through seedling-cum foliar application in a pot experiment under *in vivo* condition. All plant extracts were able to reduce the disease incidence significantly over control. Garlic clove extracts was found most effective in reducing disease incidence followed by neem. Garlic has been known for its antifungal and antibacterial activities for decades due to the presence of chemical compound such as allicin *i.e.* well known to be effective against bacteria and fungi. These results are in closeness with the results of Chattopadhyay *et al.* (2004) [3], Chattopadhyay *et al.* (2007) [2], Prasad and Kumar (2007) [7], Meena *et al.* (2013) [5] and Sharma *et al.* (2016) [9]. Effectiveness of garlic clove extract in disease control against *S. sclerotiorum* in mustard crop was reported by them.

Table 3: Efficacy of plant extracts against Sclerotinia rot of cauliflower through seedling-cum-foliar application (*In vivo*)

Plant extract	Dose (%)	45 DAT		60 DAT	
		Disease incidence* (%)	Per cent disease control	Disease incidence* (%)	Per cent disease control
Neem	15	35.30 (36.45)	36.16	40.12 (39.30)	42.94
Garlic	15	32.12 (34.52)	42.00	36.25 (37.02)	48.44
Turmeric	15	47.10 (43.34)	14.95	50.21 (45.12)	28.59
Hing	15	39.22 (38.77)	29.18	44.33 (41.74)	36.95
Tulsi	15	49.35 (44.63)	10.88	55.2 (47.98)	21.50

Ginger	15	42.52 (40.70)	23.22	48.05 (43.88)	31.66
Control	-	55.38 (48.09)	-	70.32 (56.99)	
S.Em±		2.02		2.19	
CD		6.22		6.75	

*Average of three replications
Figures given in the parenthesis are angular transformed values

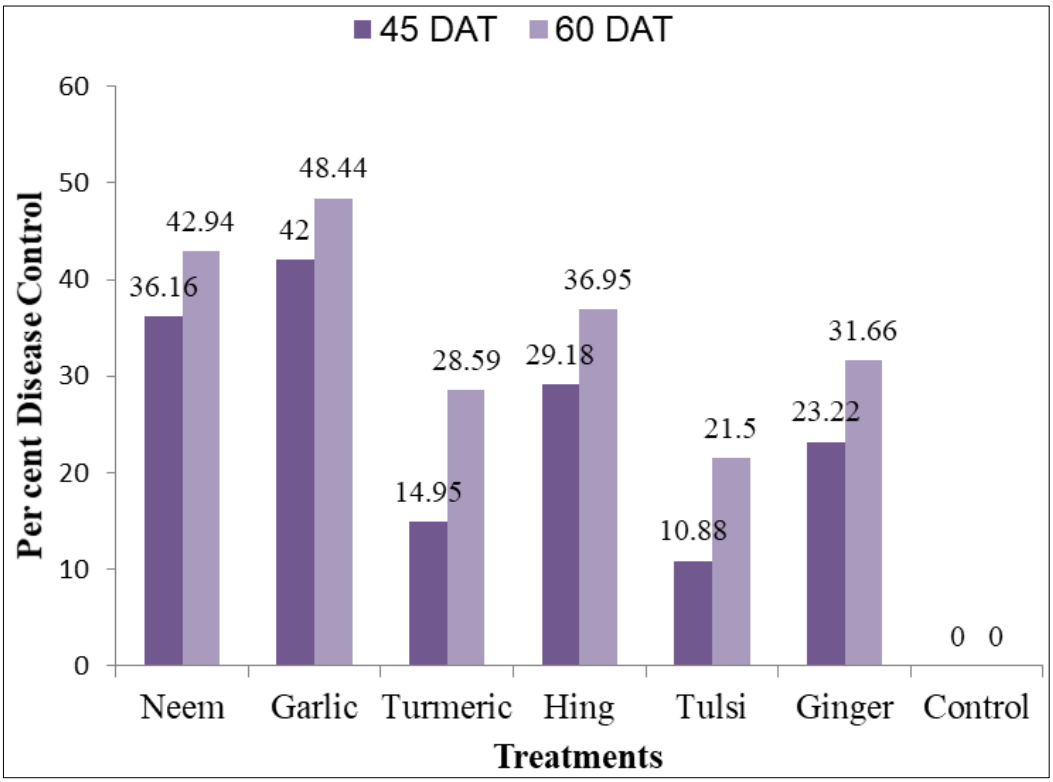

Fig 1: Efficacy of plant extracts against Sclerotinia rot of cauliflower through seedling-cum-foliar application (*In vivo*)

Efficacy of amendments against Sclerotinia rot of cauliflower (*In vivo*)

A perusal of data (Table: 4 and Fig: 2) revealed that minimum disease incidence was observed with poultry manure (37.30 and 44.36% at 45 and 60 DAT, respectively) followed by goat manure (41.25 45.12% at 45 and 60 DAT, respectively) as compared to control 58.98 and 70.90% at 45 DAT and 60 DAT, respectively.

Maximum reduction in disease incidence over control was observed with poultry manure (36.75 and 37.43% at 45 and 60 DAT, respectively) followed by goat manure (30.06 and 36.36% at 45 and 60 DAT, respectively. Percent disease incidence of wool waste (54.22 and 59.09% at 45 and 60 DAT, respectively) was found at par with gypsum (51.55 and 54.24% at 45 and 60 DAT, respectively). Minimum reduction in disease was observed in wool waste (8.07 and 16.65% at 45 and 60 DAT, respectively).

Six amendments were used *in vivo* condition through soil application in pot experiment. Among them, poultry manure was found most effective to control the disease for reducing disease incidence, followed by goat manure. These results are in similarity with the with the results of Aujla *et al.* (2001) [1] and Handoro *et al*. (2001) [4].

Table 4: Efficacy of amendments against Sclerotinia rot of cauliflower (*In vivo*)

Treatment	Dose (g/pot)	45 DAT		60 DAT	
		Disease incidence* (%)	Per cent disease control	Disease incidence* (%)	Per cent disease control
FYM	150	49.66 (44.81)	15.80	51.03 (45.59)	28.02
Goat manure	150	41.25 (39.96)	30.06	45.12 (42.20)	36.36
Gypsum	150	51.55 (45.89)	12.59	54.24 (47.43)	23.49
Poultry manure	100	37.3 (37.64)	36.75	44.36 (41.76)	37.43
Vermicompost	100	46.18 (42.81)	21.70	49.50 (44.71)	30.18
Wool waste	100	54.22 (47.42)	8.07	59.09 (50.24)	16.65

Control	-	58.98 (50.17)		70.90 (57.35)	
S.Em ±		1.80		2.36	
CD		5.36		7.28	

*Average of three replications
Figures given in the parenthesis are angular transformed values

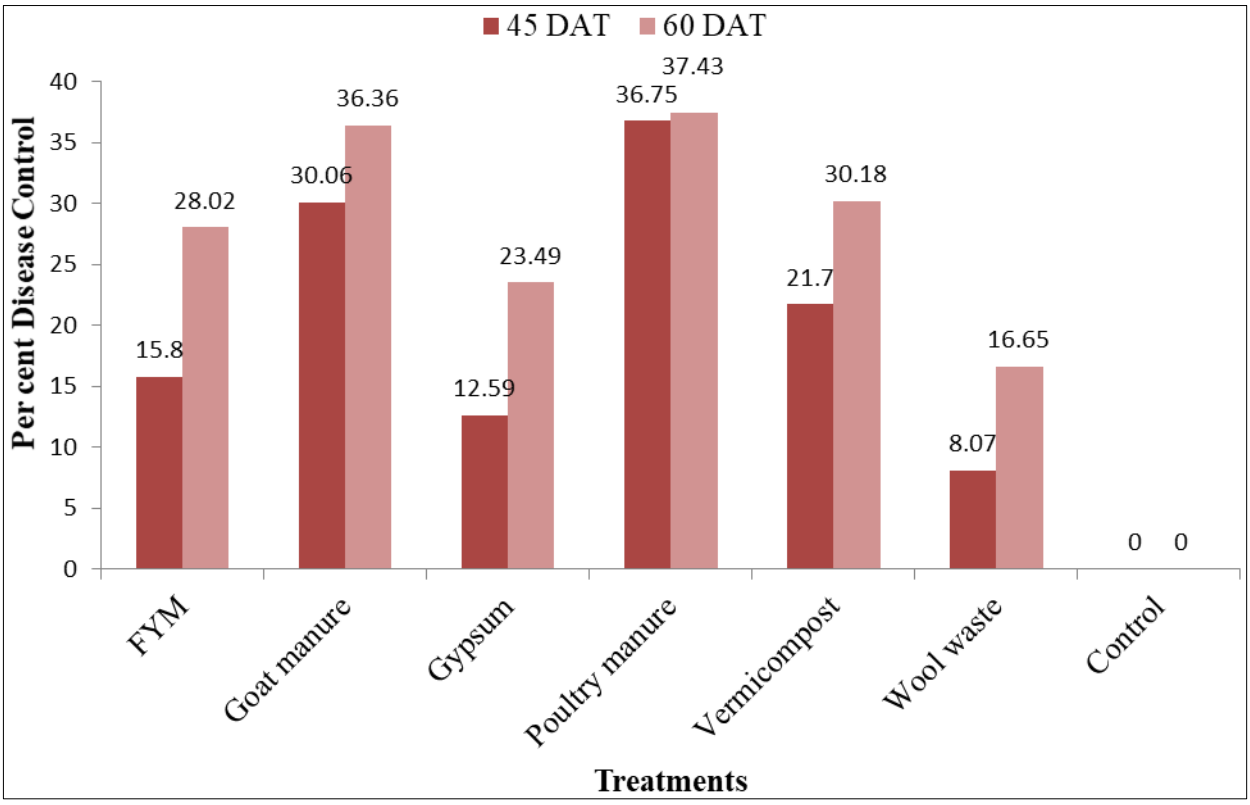

Fig 2: Efficacy of amendments against Sclerotinia rot of cauliflower (*In vivo*)

Conclusion

Plant extracts and amendments were evaluated *in vivo* conditions against *Sclerotinia sclerotiorum*. Result showed that garlic clove extract and poultry manure was found effective respectively.

References

1. Aujla IS, Sandhu KS, Sohal BS, Singh PP. Biochemical basis of efficacy of soil amendments in managing stalk rot of cauliflower. Plant Disease Research. 2001;16(2):220-224.
2. Chattopadhyay C, Kumar VR, Meena PD. Bio management of Sclerotinia rot of *Brassica juncea* in India- a case study. Phytomorphology. 2007;57(1/2):7183.
3. Chattopadhyay C, Meena PD, Meena RL. Integrated management of sclerotinia rot of Indian mustard. Indian Journal of Plant Protection. 2004;32(1):88-92.
4. Handoro F, Sandhu KS, Singh PP. Management of white rot of pea through organic amendments and fungicides. Plant Disease Research. 2001;16(2):193-197.
5. Meena PD, Gour RB, Gupta JC, Singh HK, Awasthi RP, Netam RS, *et al.* Non- chemical agents provide tenable, eco-friendly alternatives for the management of the major diseases devastating Indian mustard *(Brassica juncea*) in India. Crop Protection. 2013;53:169-174.
6. Mitra SK, Sandhu MK, Bose TK. Nutrition of vegetable crops. Naya Prakash Calcutta, India, 1990, p. 133-158
7. Prasad R, Kumar S. Eco- friendly management of Sclerotinia stem rot of mustard. Indian Phytopathology. 2007;60(30):366-369.
8. Saharan GS, Mehta N. Sclerotinia diseases of crop plants: Biology, ecology and disease management. Springer Science + Business Media B.V. The Netherlands, 2008, p. 485.
9. Sharma J, Godika S, Yadav AL, Meena S. Fungitoxicity of plant extracts against sclerotinia rot of Indian mustard incited by *Sclerotinia sclerotiorum*. 6th International Conference, Plant Pathogens and People, Challenges in plant Pathology to Benefit Humankind, Feb. 23-27, 2016, New Delhi. 2016, p 406-607.
10. Sing SP. Production technology of vegetables crops. Agriculture Research Communication Centre, Karnal, 1987, p 379-381.
11. Tripathi SC, Tripathi AK. Effect of fungicides on mycelial growth of Sclerotinia stem rot of Indian mustard. International Journal of Plant Science. 2010;5(1):46-47.
12. Willetts HJ, Wong AL. The biology of *Sclerotinia sclerotiorum*, *S. trifoliorum* and *S. minor* with emphasis on specific nomenclature. Botanical Review. 1980;46:101-165.