



Research Article

EFFECT OF ORGANIC AMENDMENTS AGAINST STEM ROT OF CLUSTERBEAN CAUSED BY *Sclerotium rolfsii*

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Abstract- Organic amendments tested against *Sclerotium rolfsii* under *in vitro* condition revealed that significantly fungal growth inhibition and sclerotial production were recorded in castor cake extract at 10, 20 and 30 per cent concentrations. Among all the organic amendments, castor cake recorded significantly highest, per cent inhibition of growth and sclerotial production of *S. rolfsii* in all the three the concentrations tested. The superiority of organic amendments for inhibiting the growth and sclerotial production of the pathogen might be due to release of some fungitoxic substances in the medium which suppressed the growth and sclerotial production of *S. rolfsii*.

Keywords- *Sclerotium rolfsii*, organic amendments, Per cent growth inhibition.

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Introduction

Clusterbean or guar (*Cyamopsis tetragonoloba* L.) classified under the family Leguminous, it has been known for green fodder, cattle feed, vegetable and green manuring purposes. The crop has got a special importance because of gum content in its seed. India is the leading producer of guar and guar gum in the world. Among different diseases stem rot (*Sclerotium rolfsii*) is a serious disease in clusterbean crop. The symptoms of stem rot were the yellowing of lower leaves and gradually wilting of lateral branches. There was whitish mycelial growth creeping around the collar region. The sheathing mycelium quickly produced abundant spherical sclerotia on the surface of the affected plant parts or on the soil surface. Management efforts have been made with limited success, due in part to the extensive host range, prolific growth and ability to produce large number of sclerotia that may persist in soil for several years [1].

Materials and methods

Six different organic amendments (castor cake, cotton cake, fym, mustard cake, neem cake and vermin compost) were evaluated against *S. rolfsii* *in vitro*. The results revealed that all the amendments significantly inhibited the growth of *S. rolfsii* *in vitro* except fym. To study the effect of different organic amendments on growth of clusterbean stem rot pathogen, poisoned food technique was employed under *in vitro* condition. The following amendments were tested viz., FYM, vermi compost, cotton cake, mustard cake, neem cake and castor cake at 10, 20 and 30 per cent concentrations. All the amendments were crushed to make fine powder. Fifty-gram powder of each treatment was taken into 250 ml flasks and 150 ml sterilized water added and allowed to decompose the materials for 15 days. After 15 days, the materials were strained with muslin cloth to obtain extracts. The strained liquids were considered as cent per cent concentration for further use to make different concentrations as described above. The Petri plates were poured with respective PDA containing extracts media and inoculated with seven days old culture discs of 5 mm size of *S. rolfsii*. The plates without extract were served as

control. Observations on radial growth and sclerotial production were recorded after seven days. The percent growth inhibition (PGI) was calculated and analyzed statistically with factorial concept in CRD.

The per cent growth inhibition (PGI) was calculated by using the formula as suggested by Bliss (1934) [2].

$$PGI = \frac{C - T}{C} \times 100$$

Where,

PGI = Per cent growth inhibition

C = Average mycelial growth in control (mm)

T = Average mycelial growth in treatment (mm)

Results

Six organic amendments [castor cake, cotton cake, FYM (Farm Yard Manure), mustard cake, neem cake and vermi compost] were tested by poison food technique *in vitro* to know their fungitoxic effect on the growth and sclerotial production of *S. rolfsii* a causal agent of stem rot of clusterbean. The results presented in [Table-1] and [Fig-1]. All the six organic amendments at different concentrations (10, 20 and 30%) were found inhibitory to the fungal growth. Significantly maximum growth inhibition of the fungus was recorded in castor cake at 10, 20 and 30 per cent concentrations (76.74, 91.71 and 98.55%, respectively) followed by neem cake at 10 (38.11%), 20 (55.52%) and 30 per cent (80.97%). All the six amendments significantly inhibited the sclerotial production of *S. rolfsii*. Significantly highest the inhibition of the sclerotial production was recorded in castor cake at 10, 20 and 30 per cent concentrations (68.67, 18.33 and 0.00, respectively) followed by neem cake at 10, 20 and 30 per cent (149.00, 114.67 and 56.00, respectively). Among all the organic amendments tested, FYM found least effective against *S. rolfsii* for the inhibition of colony growth and sclerotial production at all the concentrations tested.

Table-1 Evaluation of different organic amendments on growth and sclerotial production of *S. rolfsii* in vitro

Sr. No.	Common name	Conc. (%)	Per cent growth inhibition*	No. of mature sclerotia/plate*
1.	Castor cake	10	61.51** (76.74)****	8.31*** (68.67)****
		20	73.76 (91.71)	4.32 (18.33)
		30	83.68 (98.55)	0.70 (00.00)
2.	Cotton cake	10	15.99 (07.52)	15.93 (252.33)
		20	31.43 (26.74)	13.24 (175.00)
		30	42.97 (46.00)	11.89 (141.00)
3.	FYM	10	4.05 (00.00)	19.21 (368.67)
		20	16.01 (07.30)	16.09 (259.00)
		30	23.62 (15.67)	14.02 (198.67)
4.	Mustard cake	10	26.17 (19.00)	13.55 (183.33)
		20	34.94 (32.33)	12.70 (162.00)
		30	39.33 (39.71)	12.38 (153.00)
5.	Neem cake	10	38.39 (38.11)	12.22 (149.00)
		20	48.44 (55.52)	10.73 (114.67)
		30	64.51 (80.97)	7.49 (56.00)
6.	Vermi compost	10	12.14 (04.11)	16.35 (267.33)
		20	27.27 (20.52)	13.07 (182.33)
		30	36.44 (35.85)	12.46 (155.00)
Growth (mm)		O	C	O x C
S.Em.±		0.67	0.47	1.15
C.D. at 5 %		1.91	1.35	3.31
C.V. %		5.29		
Sclerotial Production		O	C	O x C
S.Em.±		0.15	0.10	0.26
C.D. at 5 %		0.43	0.30	0.75
C.V. %		3.78		

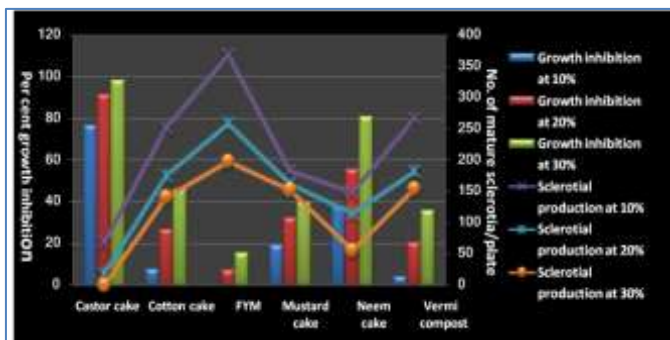
O - Organic extract C - Concentration

* Figures indicate average of three repetitions

** Figures indicate arc sin transformed values

*** Figures indicate SQR + 0.5 transformed values

**** Figures indicate re-transformed values

**Fig-1** Evaluation of different organic amendments on growth and sclerotial production of *S. rolfsii* in vitro**Conclusion**

Highest growth inhibition with lowest number, dry weight and germination of sclerotia were recorded in neem cake and also reducing mortality of jasmine wilt seedlings due to *S. rolfsii* [3]. Significant effect of castor cake and also found highly inhibitory effect on hyphal germination of *S. rolfsii* [5]. Maximum growth inhibition was found in neem cake (82.09 %) followed by castor cake (79.93 %) and coconut cake (65.83%) [5]. Among different organic amendment tested against stem rot Indian mustard and reported that all the organic amendment except groundnut cake, significantly reduced mycelial growth of fungus [6]. The present findings are in conformity with the findings of above research workers. It can be concluded that castor cake was found most effective in inhibiting mycelial growth and sclerotial production of stem rot pathogen (*S. rolfsii*) of cluster bean followed by neem cake.

Application of research: Management of soil borne disease through organic amendment is the present need with reference to eco-friendly, soil health, economy and resources available with farmers.

Research Category: Plant Pathology

Abbreviations:

FYM: Farm yard Manure

PGI: Percent Growth Inhibition

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