



## IN Vitro EVALUATION OF SELECTED ORGANIC EXTRACTS AGAINST FUSARIAL ROT (*Fusarium oxysporum f. sp. cepae*) OF ONION

VINNY JOHN<sup>a</sup>, AMIT KUMAR MAURYA<sup>b1</sup>, RASHMI RAGHAV<sup>c</sup>, BHAGYASHREE KESHERWANI<sup>d</sup> AND HEMLATA PANT<sup>e</sup>

<sup>ab</sup>Department of Plant Pathology, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh, India

<sup>cd</sup>Department of Environmental Science, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh, India

<sup>e</sup>Department of Zoology, C.M.P. College, Prayagraj, Uttar Pradesh, India

### ABSTRACT

Onion (*Allium cepa* L.) the important bulb crop around the world. Onion crop is affected by several diseases caused by fungi, bacteria virus etc. Basal rot is a soil borne disease which is caused by *Fusarium oxysporum f. sp. cepae*, due to this the onion bulbs destroys during storage condition. The present experiment was conducted *in-vitro* in the department of Plant Pathology SHUATS, Prayagraj to study the effect of selected organic extracts in the inhibition of the growth of *F.oxysporum f. sp. cepae*. It was found that the most effective treatment was T<sub>6</sub> (carbendazim 100%) as check followed by T<sub>3</sub> (neem cake-4.20), T<sub>1</sub> (vermicompost-4.26), T<sub>4</sub> (groundnut cake-4.82), T<sub>5</sub> (FYM-5.10), T<sub>2</sub> (poultry manure-5.20) in comparison to control T<sub>0</sub> (control-8.71). All the treatments significantly reduced the radial growth of *F. oxysporum f. sp. cepae*.

**KEYWORDS:** *Allium cepa*, *Fusarium oxysporum f. sp. cepae*, Organic Extracts, Carbendazim, Radial Growth

Onion (*Allium cepa*) a bulbous, biennial herb, is one of the most important vegetable crops grown thorough out the world and in India. It comes under family *Alliaceae*, and genus *Allium* with approximately 300 species. Onion is one of the potential foreign exchange earners for a country like India, as it is the second largest producer of onions after China, which produces 1.6 million metric tonnes of Anonymous (2018). India ranks first in the world in terms of onion cultivation area and comes second after China in production.

In India about 35-40 % losses estimated to be lost as post-harvest losses during handling and storage. *Fusarium* sp. it has become an important factor for the production of onion and garlic in different growing regions with a wide host's range. In the *Alliaceae*, *Fusarium* sp. in addition to attacking onions under storage conditions, moisture damages onion plants.

*Fusarium* sp. is widely distributed in the world and is among soil-borne fungi that attack onion and garlic. Damage caused by this pathogen can produce 45% less yield (Schwartz and Mohan, 1995). *Fusarium oxysporum f. sp. cepae* has been reported as a pathogen of onion (Kumar *et al.*, 2014). *Fusarium* rot symptoms consist of superficial dry brown necrotic spots that

progress toward the scales and, in some cases, the presence of white mycelium and water-soaked symptoms can be observed. *F.oxysporum f. sp. cepae* is able to colonize onion roots during the crop, remain as a latent infection and develop rot during storage (Laura *et al.*, 2017).

The increase in use of toxic chemicals to control the pest and diseases of crop endangered the environment and reduce bio diversity as well as health of consumers. Use of chemical fertilizers pushed up the agricultural production but the continuous use of chemical fertilizers creating huge problems like diminishing the soil health and cost benefit ratio. Organic amendment produced volatile and non-volatile substances during their decomposition and also stimulate resident and introduced antagonists. Crops cultivated with organic manures are not only free from harmful chemicals; apart from supplying plant nutrients, they improve soil physical and microbial properties and eliminate pollution of underground water (Akinfasoye and Akanbi, 2005). Hence the organic manures help in tackling the problems and in management of diseases affecting the crop without affecting the environment and humans. The present study aimed to evaluates percent inhibition of different organic extracts against *F. oxysporum f. sp. cepae* *in vitro*.

<sup>1</sup>Corresponding author

## MATERIALS AND METHODS

Six organic extracts Vermicompost, Poultry manure, Neem cake, Groundnut cake, FYM and Carbendazim (as check) and control were assessed by poisoned food technique against *F. oxysporum f. sp. cepae*.

Different organic were prepared by suspending 30 g of each organic material in 150 ml sterile distilled water in flask and left for one week. The flasks were shaken on alternate day for thorough mixing and dissolution of the content. After one week, the flasks were thoroughly shaken and content were filtered through double layered muslin cloth and autoclaved at 15lbs pressure for 20 minutes. The sterile extracts were used for testing their inhibitory effect on *F.oxysporum f. sp. cepae in vitro* by poisoned food technique. The autoclaved extracts were individually added in petri plates previously sterilized melted and cooled potato dextrose agar medium and mixed thoroughly and placed the 5 mm disc of actively growing 10 days old pure culture of *F.oxysporum f. sp. cepae*. Three replications for each treatment, plates were incubated at (28°C± 2). Medium without organic extract served as control. The radial growth of the test

pathogen was observed at different intervals of time till the full growth at control plate T<sub>0</sub> (Yelmame *et al.*, 2010).

The per cent inhibition of mycelial growth over control was derived by the following formula -

$$\text{Growth inhibition (\%)} = \frac{dc - dt}{dc} \times 100$$

Where,

dc- diameter of colony in control.

dt- diameter of colony in treatment (Amadioha, 2003).

## RESULTS AND DISCUSSION

In the present investigation selected organic extracts were tested for their antifungal activities against the growth of *F.oxysporumf. sp. cepae* using poisoned food method depicted in a Table below. Maximum percent inhibition was observed at 120 hours in T<sub>3</sub>Neem cake (51.77%), followed by T<sub>1</sub> Vermicompost (51.77%), T<sub>4</sub> Groundnut cake (44.66%) last but not the least T<sub>2</sub> Poultry manure(40.29%). The result showed significant percentage inhibition in the growth of test pathogen Table 1, Figure 1, Plate 1.

**Table 1: *In-vitro* effect of organic extracts on the inhibition of radial growth (cm) of *F.oxysporum f. sp. cepae***

Treatments	Average growth of pathogen (cm)			Mycelium growth inhibition (%) over control at 120 hrs
	48hr	72hr	120hr	
T <sub>0</sub> -Control	2.50	3.80	8.71	0.00
T <sub>1</sub> -Vermicompost	1.30	2.66	4.26	51.09
T <sub>2</sub> -Poultry manure	1.40	3.15	5.20	40.29
T <sub>3</sub> -Neem cake	1.03	1.84	4.20	51.77
T <sub>4</sub> -Groundnut cake	1.26	1.99	4.82	44.66
T <sub>5</sub> -F.Y.M.	1.36	2.25	5.10	41.44
T <sub>6</sub> -Carbendazim	0.00	0.00	0.00	100
S. Ed (±)	0.03	0.03	0.01	.....
C.D (5%)	0.07	0.08	0.02	.....

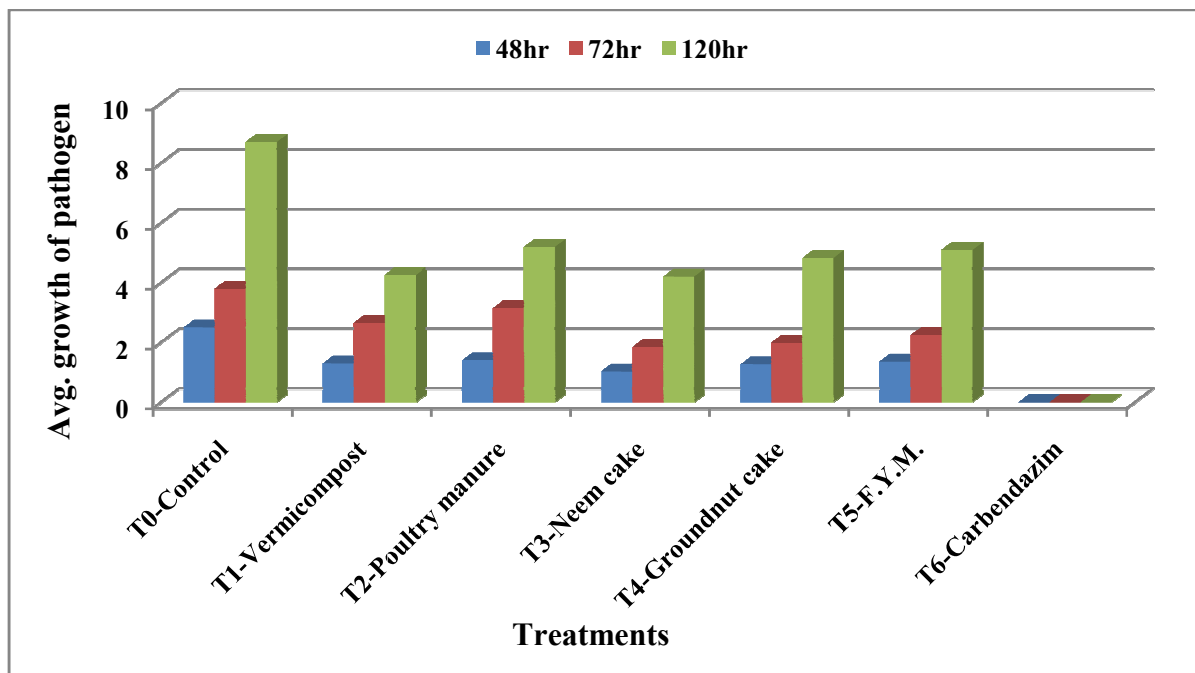


Figure 1: *In-vitro* effect of organic extracts on the inhibition of radial growth (cm) of *F. oxysporum f. sp. cepae*

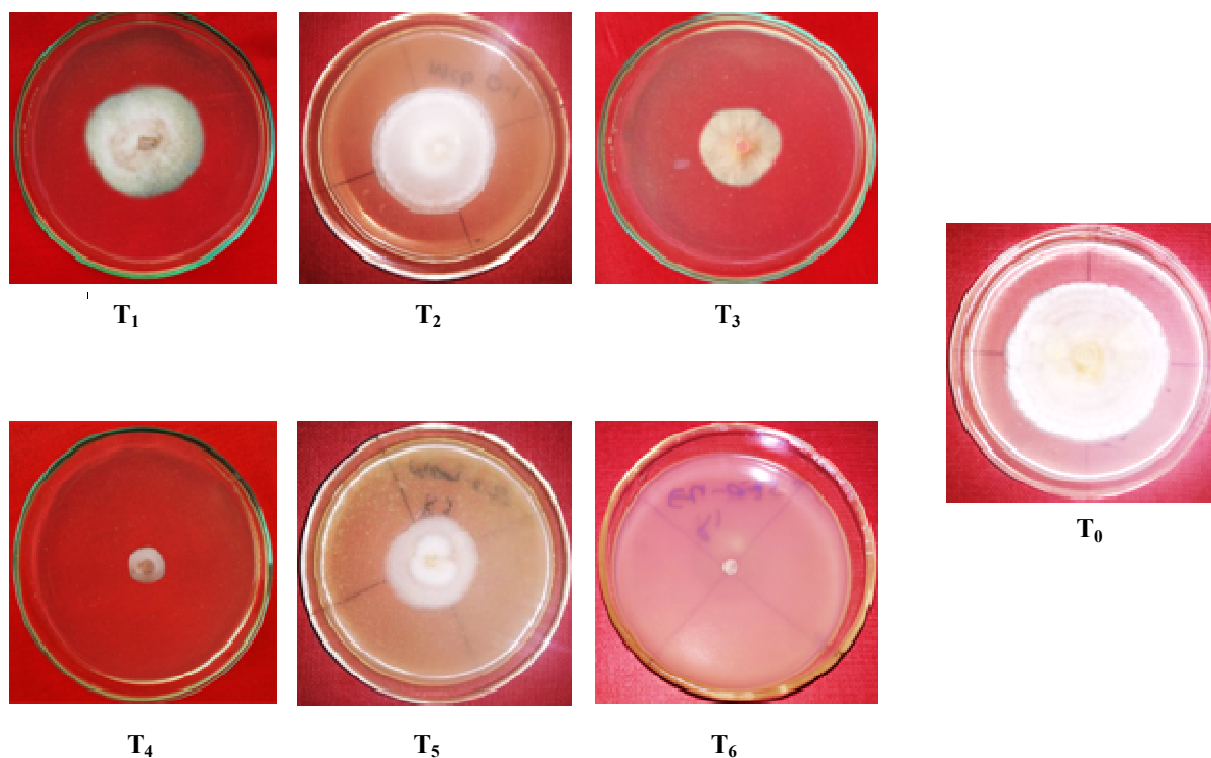


Plate 1: *In-vitro* effect of organic extracts Vermicompost, Poultry manure, Neem cake, Groundnut cake, FYM and Carbendazim against of radial growth (cm) of *F. oxysporum f. sp. cepae*

From the above table showed that 100% inhibition of *F. oxysporum f. sp. cepae* was found in T<sub>6</sub> (carbendazim) used as (treated check) followed by T<sub>3</sub> (neem cake-4.20), T<sub>1</sub> (vermicompost-4.26), T<sub>4</sub> (groundnut cake-4.82), T<sub>5</sub> (FYM-5.10) and T<sub>2</sub> (poultry manure-5.20) in comparison to control T<sub>0</sub> (control-8.71). All the

treatments significantly reduced the radial growth of *F. oxysporum f. sp. cepae*. Among the organic amendments (neem cake) was found most effective also found in Kumar *et al.*, (2014) against *Fusarium oxysporum* causes basal rot of onion. Swer and Kayang (2011) also tested various oilseed cakes *viz.*, groundnut cake, cotton seed

cake, neem cake and castor seed cake. Out of four oil cakes the tested groundnut cake is proved to be effective against *F. oxysporum* sp. *cicero* as compared with neem cake and castor cake. The carbendazim was also found most effective against *Fusarium oxysporum*, John *et al.*, (2019). A similar finding has been recorded by Yisa *et al.*, (2013).

## CONCLUSION

From the present study it was observed that the selected organic extracts were found effective against the inhibition of *F. oxysporum* sp. *cepae* of onion, ecofriendly management of onion disease were effective alternative of harmful chemical for both soil and the crop.

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