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Mukesh Kumar Prajapati
Department of Plant Pathology, Sam Higginbottom University of Agriculture, Technology and Sciences, Pryagraj, Uttar Pradesh, India

Anand Nagsen Warghat
Department of Plant Pathology, Sam Higginbottom University of Agriculture, Technology and Sciences, Pryagraj, Uttar Pradesh, India

Sanket Shekhar Mahajan
Department of Plant Pathology, Sam Higginbottom University of Agriculture, Technology and Sciences, Pryagraj, Uttar Pradesh, India

Sobita Simon
Department of Plant Pathology, Sam Higginbottom University of Agriculture, Technology and Sciences, Pryagraj, Uttar Pradesh, India

Corresponding Author:
Mukesh Kumar Prajapati
Department of Plant Pathology, Sam Higginbottom University of Agriculture, Technology and Sciences, Pryagraj, Uttar Pradesh, India

Efficacy of organic Amedments against the purple blotch of garlic casued by *Alternaria porri* (Ellis) CIF

Mukesh Kumar Prajapati, Anand Nagsen Warghat, Sanket Shekhar Mahajan and Sobita Simon

Abstract
The present investigations were carried out to find remedies for problems, and the present studies were conducted under field condition. Field experiments were laid-out in Randomized block design with three replications at research plot of the department of Plant pathology, Sam Higginbottom University of Agriculture, Technology and Sciences, during the Rabi season of 2016-17, reveals the response of different organic manures. The disease of garlic at harvest (120 days after germination) under field condition. The results indicated that among all the organic treatments T_2 was found significantly reduced the disease incidence of purple blotch as compared to T_4(Neem cake),T_3(Goat manure), T_1(farmyard manure) and T_5(vermi compost) whereas non-significant result was found in between (T_1, T_3, T_4) and (T_5, T_1). All the organic manures treated plots significantly reduced the incidence of purple blotch decay as compared with control (untreated).

Keywords: *Alternaria porri,* efficacy, garlic blotch, organic amedments

Introduction
Allium sativum L. (Garlic) is a species of the genus Allium and family Amaryllidaceae along with onion, shallot and chives. It is the second most widely used Allium next to onion (Rubatzky and Yamaguchi 1997). Its folk medicinal use includes treatment of whooping cough, lung diseases, stomach complaints (as healing of ulcers of the intestines) and disorders resulting from child birth and as a specific for colds, sore eyes and ear-ache (Kostalova 1982). Garlic is an ancient crop highly valued for seasoning foods. It is used as spice or condiment in the preparation of soup pickle and other preservatives. It is also an important foreign exchange earner for India. It is cultivated in Madras, Andhra Pradesh, Uttar Pradesh, Gujarat and Maharashtra. India is the second major producing country next after China. Garlic is attacked by many diseases and insect pests. The pathogen can infect the crop both in field and storage conditions. The major diseases of this crop are purple blotch, botrytis rot, botrytis leaf blight, cercospora leaf spot, downy mildew, fusarium basal rot, damping-off, white rot, stem and bulb nematode, mosaic virus etc. *Alternaria* spp. decay is one of the factors responsible for economic losses in garlic grown in Argentina and other countries (Smalley, 1954). This pathogen is responsible for the blue mold disease in garlic and it infects field-grown plants and stored bulbs. Purple blotch of onion and garlic may be caused by several *Alternaria porri* species. Symptoms in the field include clove decay after planting and wilted, yellowed, or stunted seedlings. Infected plants are weak and stands are poor. This fungus attacks many horticultural crops spread by animal and infected plant debris. Spores are spread by cracked of prior infected planting it survives up to seasons to seasons. Symptoms of the disease start as pale blemishes, yellow lesions, and soft spots. When bulbs are cut open, one or more of the fleshy scales may be discoloured and water-soaked. In advanced stages, bulbs may deteriorate into complete decay. In garlic, the pathogens survive in infected cloves. (Dicklow, 2013). These fungi are common saprophytes on plant debris and senescent plant tissue. Invasion garlic is usually through wounds, bruises, or uncured neck tissue. The fungus grows through the fleshy tissue and sporulation occurs on the surface of the lesions. Entire cloves may eventually be filled with spores. Essential oil inhibits postharvest pathogens mainly due to their direct effect on the mycelial growth of the pathogens and spore germination by affecting the cellular metabolism of the pathogens Serrano *et al*., 2005, Tzortzakis and Economakis 2007.

Materials and Methods

The present study was conducted under *in-vitro*, pot and field condition at Central field and Departmental field Department of Plant pathology, Sam Higginbottom University of Agriculture, Technology and Sciences, during the Rabi season of 2016-17. Field experiment was laid-out in Randomized block design with three replications.

Details of Experiment

1. Experimental design: Randomized block design
2. Season: *Rabi*
3. Crop: Garlic
4. Replications (Field/Pot experiment): 3
5. Plot size: 4.5 x 2.5 m
6. Total number of plots/pots: 18
7. Size of bunds: 30.0 cm
8. Width main irrigation channel: 1 m
9. Width sub irrigation channel: 0.5 m
10. Spacing: Row to Row: 15 cm
11. Spacing: Plant to Plant: 5 cm
12. Cloves /plot: 120 cloves
13. Variety: local

A) Standard error of mean

Standard error of means was calculated by following formula:

$$S.Em = \sqrt{\frac{2MSSE}{r}}$$

B) Critical Difference

Critical difference was calculated by following formula:

$$CD = \sqrt{\frac{2MSSE}{r}} \times t\alpha$$

Table 1: Details of Treatments. (Whereas S.A = Soil Application & F.S = Foliar Application)

Treatments	Control	Application	Doses	References
T_0	Control (untreated)	_	_	
T_1	Farmyard manure S.A+F.S	Soil application	17.5t/ha	Zakari *et al*., (2014)
T_2	Poultry manure S.A+F.S	Soil application	12.5t/ha	Gamliel And Stapleton., (1993)
T_3	Goat manure S.A+F.S	Soil application	17.5t/ha	Pakeerathan *et al.*, (2009)
T_4	Neem cake S.A + F.S	Soil application	500kgs/ha	Chaudhary and Kaul., (2013)
T_5	Vermi Composed S.A+ F.S	Soil application	13.50 t/ha	C. Maya & M. Thippanna.(2010)

Table 2: Efficacy of organic amendments against the purple blotch of garlic bulb at harvest: 120 days after germination.

Treatment combinations		R_1	R_2	R_3	Mean
T_0	Control (untreated)	45.5	49.2	51.6	48.77
T_1	Farmyard manure +Taqat	35.2	37.6	35.2	36.00
T_2	Poultry manure +Taqat	27.8	24.5	28.3	26.87
T_3	Goat manure +Taqat	33.7	32.4	35.6	33.90
T_4	Neem cake +Taqat	31.5	33.6	34.3	33.13
T_5	Vermi compost +Taqat	39.5	37.2	39.3	38.67
F- test					S
S. Ed. (±)					1.45
C. D. (5%)					3.24

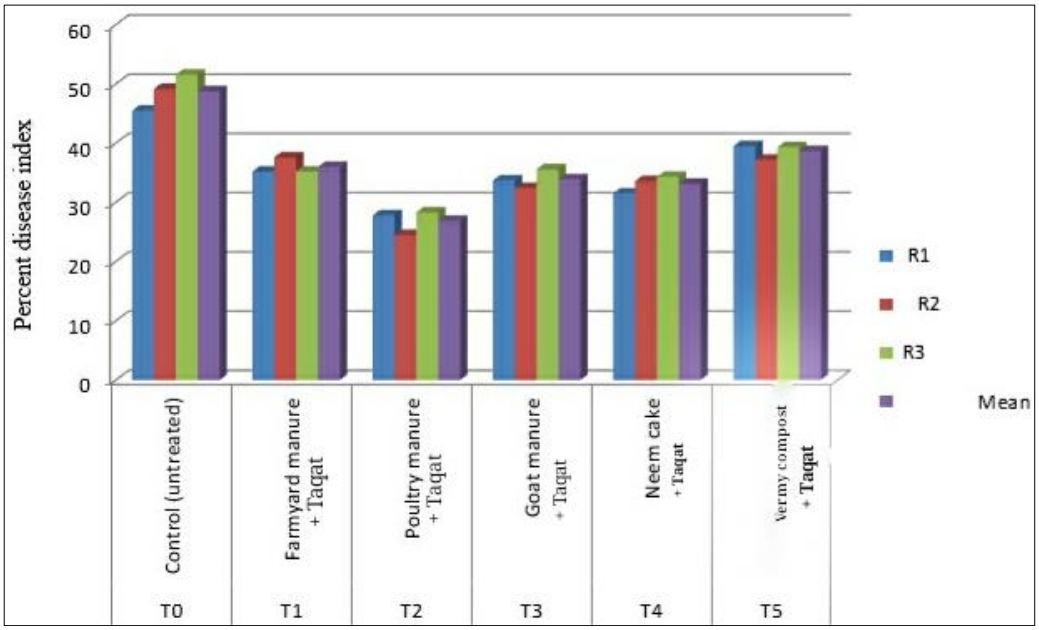

Fig 1: Per cent disease incidence of *Alternaria porri* of garlic at harvest.

The data presented in table No.02 and depicted in figure No. 1.1 reveals the response of different organic manures. The disease of garlic at harvest (120 days after germination) under field condition. The results indicated that among all the organic treatments T_2 was found significantly reduced the disease incidence of purple blotch as compared to T_4(Neem

cake),T_3(Goat manure), T_1(farmyard manure) and T_5(vermi compost) whereas non-significant result was found in between (T_1, T_3, T_4) and (T_5, T_1). All the organic manures treated plots significantly reduced the incidence of purple blotch decay as compared with control (untreated).

Summary and conclusion

Garlic (*Allim sativum* L.) Is the second most widely used Allium next to onion belonging to the family Amaryllidaceae. It is an ancient crop highly valued for seasoning foods. Using only the organic materials for managing the disease, can gain positive impact on the environment. Present studies are conduct to know the efficiency of organic materials in managing the purple blotch of garlic caused by *Alternaria porri*. In field condition, organic amendment treatments were significantly superior over control in managing the purple blotch disease of garlic. Among all treatments, T_2 (Poultry manure) significantly reduced the disease incidence of purple blotch and improved plant height and number of leaves as compared with T_0 (control).

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