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N Rajinimala
Rice Research Station, Tamil
Nadu Agricultural University,
Ambasamudram, Tirunelveli,
Tamil Nadu, India

K Kavitha
ICAR- Krishi Vigyan Kendra,
Tamil Nadu Agricultural
University, Kanyakumari,
Tamil Nadu, India

K Elanchezhyan
Department of Agricultural
Entomology, Agricultural
College and Research Institute,
Tamil Nadu Agricultural
University (TNAU),
Killikulam, Vallanadu 628 252,
Tamil Nadu, India

K Kanmani
Department of Plant
Pathology, Agricultural
College and Research Institute,
Tamil Nadu Agricultural
University (TNAU),
Killikulam, Vallanadu 628 252,
Tamil Nadu, India

J Sheela
Department of Plant
Pathology, Agricultural
College and Research Institute,
Tamil Nadu Agricultural
University (TNAU),
Killikulam, Vallanadu 628 252,
Tamil Nadu, India

Corresponding Author:
N Rajinimala
Rice Research Station, Tamil
Nadu Agricultural University,
Ambasamudram, Tirunelveli,
Tamil Nadu, India

Bio efficacy of fungicides against Ground nut root rot caused by *Macrophomina phaseolina* (Tassi.) Goid

N Rajinimala, K Kavitha, K Elanchezhyan, K Kanmani and J Sheela

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Abstract

Groundnut (*Arachis hypogaea* L.) is an important oilseed crop which is mostly cultivated in tropics and sub tropic countries. It is highly valued as it is an important agriculture export commodity. Since it is a legume, it helps to fix nitrogen to the soil which is valuable for cropping system. Each and every part of groundnut crop is having commercial value. Dry root rot caused by soil borne fungus *Macrophomina phaseolina* is the most destructive and widespread disease worldwide. To evolve a management practice, fungicides were tested against groundnut root pathogen *M. phaseolina* under *invitro* condition. Out of five fungicides tested against *M. phaseolina*, propiconazole 25% EC and carbendazim 12% + mancozeb 63% were completely inhibited (100%) the mycelial growth at 500 and 1000 ppm concentration.

Keywords: Ground nut, root rot, fungicides, *Macrophomina*

Introduction

Groundnut production is affected both by biotic and abiotic stresses during different growth stages of crop. Diseases are one of the biotic stresses which cause a major constraint to groundnut cultivation (Vara Prasad *et al.*, 2010) [5]. Among the diseases, dry root rot caused by *Macrophomina phaseolina* affect the crop at any growth stage and reduce the yield. Diseased plants showed yellowing, drooping of leaves and shredding of barks in the roots (Palaiah *et al.*, 2019) [4]. In the infected area the pathogen produced a greater number of black coloured sclerotia (Ghosh *et al.*, 2018) [1]. To combat the massive yield loss caused by this disease, there is a need to identify the best fungicide for the management of this disease.

Materials and Methods

Isolation, purification and maintenance of the pathogen

Isolation of the pathogen was done on the PDA medium from dry root rot affected roots of the groundnut plant by using tissue segmentation method. Diseased roots were washed with the running tap water. Then, inside the laminar airflow chamber 2-5 mm size of diseased root tissues along with some healthy tissues were sliced out with the help of a sterilized blade. To avoid the surface contaminants, tissues were surface sterilized with 0.1 per cent mercuric chloride for about 30 seconds. After surface sterilization the tissues were washed three times with sterile water to remove the traces of mercuric chloride and blot dried in sterile blotter paper. The diseased root tissues were then transferred aseptically to the sterilized PDA medium and incubated at 28±3 °C for 6 to 7 days. Mycelial growth of the pathogen from the infected tissues was observed periodically. For maintenance of pure culture, fungal hyphae grown from the infected tissues were sub cultured by transferring it into fresh sterilized PDA slants by single hyphal tip method. Then the culture was stored at 5-6 °C and used for further studies.

In vitro evaluation of fungicides against the growth of *M. phaseolina*

In vitro evaluation of antifungal potential of different fungicides on the growth of *M. phaseolina* was performed through poisoned food technique (Nene and Thapliyal, 1993) [3]. Five different fungicides viz., carbendazim 50% WP, propiconazole 25% EC, carbendazim 12% + mancozeb 63% WP, tebuconazole 5% + trifloxystrobin 25% WG, azoxystrobin 23% SC were tested against groundnut dry root rot pathogen at the concentration of 500 ppm and

1000 ppm. Required quantities of fungicidal solutions were prepared and added into 100 ml PDA medium and mixed thoroughly. Then the poisoned media were poured into sterilized Petri plates separately. Then the Petri plates were inoculated with nine mm actively growing *M. phaseolina* culture and incubated at 25±7°C. Three replications were maintained for each treatment along with control. After incubation, the radial growth of the dry root rot pathogen was observed. The mycelial inhibition percentage was calculated using the Vincent formulae (Vincent, 1947) [6].

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

Where,

I = Per cent inhibition over control

C = Growth in control

T = Growth in treatment

Results and Discussion

Table 1: *In vitro* evaluation of fungicides at 500 ppm concentration against the growth of *M. phaseolina*

Treatment No.	Fungicides	*Mycelial growth of the pathogen (cm) at 500 ppm	*Mycelial Inhibition Percentage at 500 ppm
T ₁	Carbendazim (50% WP)	0.93	89.62 (71.21) ^c
T ₂	Propiconazole (25% EC)	0.00	100.00 (89.71) ^a
T ₃	Carbendazim 12% + Mancozeb 63% (WP)	0.00	100.00 (89.71) ^a
T ₄	Tebuconazole (5%) + Trifloxystrobin (25%) (WG)	0.43	95.18 (77.33) ^b
T ₅	Azoxystrobin (23% SC)	2.56	71.48 (57.72) ^d
T ₆	Control	9.00	0.00 (0.28)
SE(d)		0.04	0.52
CD(p=0.05)		0.10	0.95

*Means of three replications

Values in the parentheses are arc sine transformed values

Values in the parentheses which are followed by different alphabets are significantly vary from one another



Fig 1: Effect of fungicides on the growth of *Macrophomina phaseolina* at 500 ppm Concentration

T₁ - Carbendazim

T₂ - Propiconazole

T₃ - Carbendazim + Mancozeb

T₄ - Tebuconazole + Trifloxystrobin

T₅ - Azoxystrobin

T₆ - Control

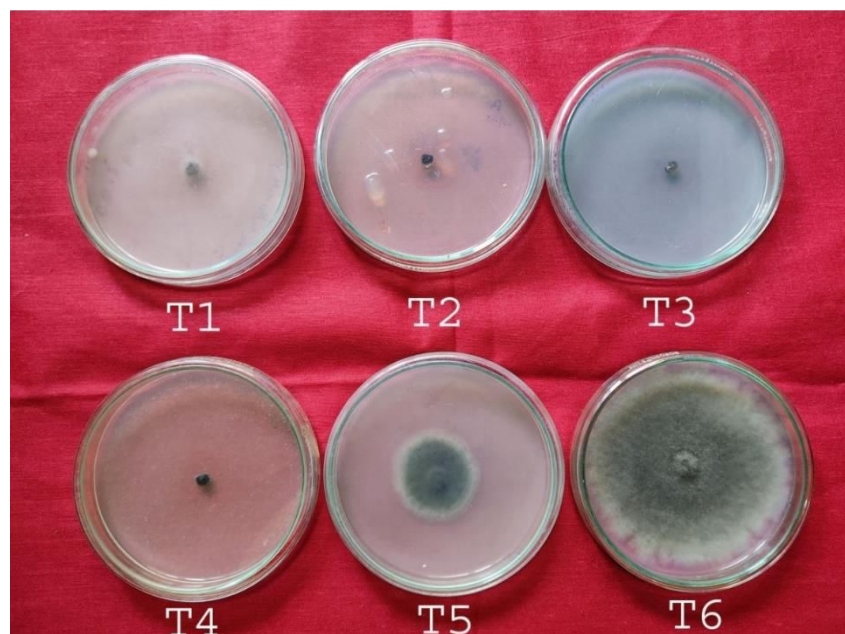


Fig 2: Effect of fungicides on the growth of *Macrophomina phaseolina* at 1000 ppm concentration

- T₁ - Carbendazim
 T₂ - Propiconazole
 T₃ - Carbendazim + Mancozeb
 T₄ - Tebuconazole + Trifloxystrobin
 T₅ - Azoxystrobin
 T₆ - Control

Table 2: *In vitro* evaluation of fungicides at 1000 ppm concentration against the growth of *M. phaseolina*

Treatment No.	Fungicides	*Mycelial growth of the pathogen (cm) at 1000 ppm	*Mycelial Inhibition Percentage at 1000 ppm
T ₁	Carbendazim (50% WP)	0.83	90.74 (72.91) ^c
T ₂	Propiconazole (25% EC)	0.00	100.00 (89.71) ^a
T ₃	Carbendazim 12%+ Mancozeb 63% (WP)	0.00	100.00 (89.71) ^a
T ₄	Tebuconazole (5%) +Trifloxystrobin (25%) (WG)	0.33	96.29 (78.29) ^b
T ₅	Azoxystrobin (23% SC)	1.66	81.48 (64.52) ^d
T ₆	Control	9.00	0.00 (0.28) ^e
	SE(d)	0.05	0.63
	CD(p=0.05)	0.12	1.21

*Means of three replications

Values in the parentheses are arc sine transformed values

Values in the parentheses which are followed by different alphabets are significantly vary from one another

Conclusion

The results of present study revealed that the application of propiconazole 25% EC and carbendazim 12% + mancozeb 63% at 500 and 1000 ppm were completely inhibited the growth of ground nut root rot causing pathogen *Macrophomina phaseolina*.

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References

- Ghosh T, Biswas MK, Guin C, Roy P. A review on characterization, therapeutic approaches and pathogenesis of *Macrophomina phaseolina*. Plant Cell Biotechnology and Molecular Biology. 2018;19:72-84.
- Khamari B, Patra C. Evaluation of potentiality of different fungitoxicants against *Macrophomina*

phaseolina, causing stem and root rot disease of sesame. International Journal of Chemical Studies. 2018;6(6):424-426.

- Nene YL, Thapliyal PN. Fungicides in plant disease control. 3rd ed. New York: International Science Publishers; c1993.
- Palaiah P, Narendrappa T, Mallesh SB. Screening of groundnut varieties and germplasm against collar rot, stem rot, and dry root rot diseases. International Journal of Current Microbiology and Applied Sciences. 2019;8(6):2321-2328.
- Vara Prasad PV, Kakani VG, Upadhyaya HD. Growth and production of groundnut. In: Verheye WH, editor. Plant Growth and Crop Production. Oxford: EOLSS Publishers; c2010.
- Vincent JM. Distortion of fungal hyphae in the presence of certain inhibitors. Nature. 1947;159(4051):850.