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# Management of Collar rot of Groundnut through seed treatment

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**ABSTRACT**

Groundnut is an economically important edible oilseed crop. Among the groundnut diseases, collar rot is one of the economically important diseases and prevalent in almost all the groundnut-growing states. This disease is extensive in the *Kharif* season rather than *Rabi* season. The present field experiment was conducted for three years to find out effective fungicides for control of collar rot of groundnut in the North Coastal Zone of Andhra Pradesh. Eight treatments along with a check were laid in a randomized block design with three replications. Fungicides *viz.*, Carbendazim , Tebuconazole, Mancozeb, Captan bioagents *viz.*, *Trichoderma asperellum, T. harzianum* , *Pseudomonas fluorecens* were tested in field condition. Minimum disease incidence (12.61%) and higher pod yield (2081 kg/ha) were recorded by seed treatment with tebuconazole followed by carbendazim (15.76% and 1939 kg/ha) as compared to untreated check (36.51% and 913 kg/ha), respectively.

***Keywords*:** *Aspergillus, Collar rot, Ground nut and Tebuconazole.*

Groundnut (*Arachis hypogaea* L.) is an important oil, food and feed legume crop grown in over 100 countries. It is the fourth most important source of edible oil and a third most important source of vegetable protein in the world. It provides nutrition to farm families as a source of energy and protein-rich kernels and nutritious fodder (haulms) to livestock. Groundnut kernels contain about 26% protein, 48% oil, 20% carbohydrates and 3% fiber and are also rich in calcium, thiamine, and niacin (Rakesh *et al.*, 2016). Globally, India ranks first in Groundnut area under cultivation with a total acerage of 54.2 lakh hectares and is the second largest producer in the world with 101 lakh tonnes with a productivity of 1863 kg per hectare in 2021-22. In *Kharif*, 2022-23, groundnut production was 83.69 lakh tonnes in an area of 45.53 lakh hectares. Groundnut is cultivated in one or more (*Kharif, Rabi, and Summer*) seasons, but nearly 90% of acreage and production comes from *Kharif* crops (June-October). In Andhra Pradesh, groundnut is cultivated in an area of 8.23 lakh hectares with a production of 5.19 lakh tonnes, contributing 6.20% to India's groundnut production (des.ap.gov.in) for the year 2021-22.

Collar rot disease of groundnut, caused by *Aspergillus niger van Teighem*, is one of the important seed and soil-borne diseases. These pathogens are polyphagous, omnipresent, non-target and have the most destructive soil and seed inhabiting nature (Bajaya *et al*., 2022). Prominently, this disease is present in almost all the groundnut growing areas of the world. This disease was first reported in India by Jain and Nema (1952). Collar rot is prevalent in almost all groundnut-growing states of India *viz.*, Punjab, Andhra Pradesh, Tamil Nadu, Uttar Pradesh, Gujarat, Maharashtra, Rajasthan, Karnataka, and Orissa (Suman and Tahira ,2019). Incidence of collar rot is causing more prevalent in sandy loam and medium black soils. Most of the groundnut cultivars are susceptible to this disease. The disease expresses its symptoms in pre and post-emergence phases. Infected seeds become black and will not germinate. Post germination, infection on the collar region of plants and result's in wilting of seedlings (Rakholia *et al.*, 2012)

Collar rot emerging as a major and wide spreading problem in the North coastal zone of Andhra Pradesh for the last few years. Considering the increasing importance, the present study was

undertaken to investigate the effect of certain fungicides and bioagents applied through seed dressing.

## MATERIAL AND METHODS

The present study was carried out during *Kharif* 2019, 2020 and 2021 at Agricultural Research Station, Yelamanchili, Acharya N.G.Ranga Agricultural University, Lam, Guntur (Andhra Pradesh, India). Yelamanchili is situated at latitude of 17°.57' N, longitude of 82°85' E and altitude of 5 meters above mean sea level (MSL). This region falls under the North Coastal Zone of Andhra Pradesh.

**Effect of fungicides:** To assess the effect of fungicides and bio-agents, a total of eight treatments were tried under randomized block design with three replications under artificially inoculated field conditions for three consecutive years (2019, 2020 and 2021).

Experiment was laid out with collar rot susceptible ground nut variety k-6 with total eight treatments in 6 m X 4.5m plots adopting the 30x10cm spacing. The inoculum was multiplied on sorghum grains and added in furrows @20 g/m row length to increase the disease pressure at the time of sowing.

Seeds were treated with fungicides *viz*., carbendazim 50% WP(1g/kg), tebuconazole 25% E.C (1g/kg), mancozeb *75% WP (3g/kg,)* captan 70% WP (3g/kg) and the bioagents *Trichoderma asperellum*(10g/kg), *T. harzianum* (10g/kg), *Pseudomonas fluorescens (*10 g/kg) were sown separately in artificially inoculated plots. The untreated seeds were used as check. The observations on disease incidence was recorded 25 days after sowing, while pod yield was recorded at 10 days after harvest. Disease incidence was calculated as per the given formula

Disease incidence (%) = Number of diseased plants /Total number of plants× 100

Data were statistically analyzed using analysis of variance (ANOVA) at significance level ($p < 0.05$) using statistical software.

## RESULTS AND DISCUSSION

Field trials conducted over three growing seasons (2019, 2020 and 2021) provided statistically significant results (Table 1) over the check. Among fungicidal seed application, seed treatment seedtreatment with Tebuconazole(1g/kg) provided minimum mean disease incidence(12.61%) and higher pod yield (2081 kg/ha) followed by seed treatment with carbendazim (15.76% and 1939 kg/ha) as compared to untreated check 36.51% and 913kg/ha. In bio-agents, *Trichoderma harzianum* exhibited lower incidence (25.36%) and higher yield (1793 kg/ha).

The significance of chemicals and bio-control agents cannot be denied in plant disease management, especially bio-agents that were proved to be highly effective in managing soil-borne fungal plant pathogens. In the present investigation, as far as disease control and yield is concerned, all the tested fungicides and bio-agents performed better in reducing per cent disease incidence and in increasing pod yield of groundnut. Our results are in agreement with the findings of Bajaya *et al*. (2022). Who found that seed treatment with hexaconazole (0.2%) provided minimum mean disease incidence (18.00%) and higher pod yield (19.21 q/ha) followed by carboxin + thiram (18.82% and 18.94 q/ha) as compared to untreated check (56.28% and 12.56q/ha, respectively). Among bio-agents, *Trichoderma harzianum* showed lower incidence (24.74%) and higher yield (17.9q/ha). Similar results were obtained by Kapadiya and Moradiya (2017) who recorded seed treatment and two foliar sprays of tebuconazole as highly effective in controlling collar rot disease. The results of the current work were also following Jadon et al. (2015) evaluated ten fungicides against major soil-borne diseases of groundnut and recorded that tebuconazole 2% DS @1.5 g/kg seed, mancozeb 75% WP @3 g kg/seed, Carbendazim 12% + Mancozeb 63% WP @3 g kg/seed were effective in the management of soil-borne diseases including collar rot. On the basis of present experimental findings, it can be concluded that seed treatment with tebuconazole (1g/kg) and seed treatment with carbendazim (1g/kg ) significantly reduces the collar rot incidence and results in increased pod yield.

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**Table 1 Efficacy of fungicides and bio-agents against collar rot of groundnut applied through seed treatment**

| Treatment | PERCENT DISEASE INCIDENCE | | | | Yield (kg/ha)* | | | |
|---|---|---|---|---|---|---|---|---|
| | 2019 | 2020 | 2021 | POOLED | 2019 | 2020 | 2021 | pooled |
| Seed treatment with Carbendazim @ 1g/kg | 15.76 -23.35 | 17.89 -24.81 | 13.65 -21.8 | 15.76 (23.35) | 1798 | 1998 | 2021 | 1,939.00 |
| Seed treatment with Tebuconazole @ 1g/kg | 13.13 -21.7 | 12.08 -20.1 | 12.62 -20.8 | 12.61 (20.78) | 1978 | 2031 | 2234 | 2,081.00 |
| Seed treatment with Mancozeb @ 3g/kg | 25.89 -29.01 | 20.01 -26.04 | 19.51 -25.1 | 21.80 (27.77) | 1800 | 1780 | 1840 | 1,806.67 |
| Seed treatment with Captan @ 3g/kg | 21.42 -27.02 | 26.11 -30.4 | 25 -29.4 | 24.17 (29.42) | 1450 | 1650 | 1840 | 1,646.67 |
| Seed treatment with *T.asperellum* @ 10g/Kg | 24.04 -29.2 | 26.02 -30.08 | 28.04 -31.7 | 26.03 (30.65) | 1550 | 1340 | 1450 | 1,446.67 |
| Seed treatment with *T.harzianum* @ 10g/kg | 26.8 -31.01 | 24.1 -29.2 | 25.2 -30.2 | 25.36 (30.22) | 1800 | 1750 | 1830 | 1,793.33 |
| Seed treatment with *Pseudomonas fluorescens@ 10 g/kg* | 23.07 -28.5 | 27.09 -31.08 | 26.7 -30.4 | 25.62 (30.38) | 1740 | 1650 | 1450 | 1,613.33 |
| Control | 42.5 -40.68 | 31.01 -33.02 | 36.02 -37.1 | 36.51 (37.12) | 1034 | 902 | 804 | 913.33 |
| Sem± | 1.73 | 1.9 | 1.8 | 1.76 | 72.05 | 84 .08 | 86.05 | 74.09 |
| CD(p= 0.05) | 5.34 | 5.86 | 5.6 | 5.3 | 215.6 | 230.4 | 250.05 | 226.9 |
| CV | 12.7 | 11.5 | 12.2 | 12.9 | 8.7 | 7.6 | 8.4 | 7.7 |

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

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