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Disease management for organic groundnut cultivation

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Abstract
The major diseases on groundnut are collar rot, stem rot, late leaf spot, and rust. For the management of these diseases and to produce organic groundnut various organic treatments were imposed. The experiment comprised of eight treatments replicated thrice in design RBD during *Kharif*-2011 at Oilseeds Research Station, Jalgaon. The results obtained revealed that combinations like seed treatment with mixture of *Trichoderma* sp. and *Pseudomonas fluorescens* @ 10 g each / kg seed + combined furrow application of *Trichoderm*a sp. and *P. fluorescens* @ 2 kg each enriched with FYM @ 300 kg/ha + foliar application of mixture of both @ 5 g each /lit (2.5 kg/ha each) at 30 and 45 DAS was recorded least incidence of seed/soil borne diseases *viz.*, collar rot at 30 DAS (3.58%) and stem rot at harvest (5.40%) as well as foliar diseases *viz.*, late leaf spot (6.8%) and rust (3.8%) as against control 10.85%, 14.88%, 15.6% , 11.1% , respectively.

Keywords: Groundnut, *Trichoderma* sp., *Pseudomonas fluorescens*

Introduction
Groundnut (*Arachis hypogaea* L.) is an important annual photo insensitive legume crop grown in many tropical and subtropical countries of the world. More than 40 fungal diseases attack the crop throughout the world. Amongst those, Collar rot, Stem rot, LLS and rust are the major biotic constraints taking heavy toll of the crop. An effective control for management for these serious diseases along with low cost of control measures is essential to minimize cost of production. In this view, present study was planned to find out effective control measures against Collar rot, Stem rot, LLS and Rust diseases of Groundnut along with minimum expenditure on control measures.

Materials and Methods
A field trial was laid out using Randomized Block Design with eight treatments of different fungicides and bioagents distributed in three replications. Different fungicides and bioagents were applied as seed treatment before sowing the seed of variety JL 220. The incidence of Collar rot and Stem rot was recorded 30 days after sowing. Different organic treatments were applied as seed treatment and sprays at 30 & 45 DAS. The treatments details are as fallows

Treatment Details
T1: ST with *Trichoderma* sp. @ 10 g/ kg + furrow application of *Trichoderma* sp. @ 2.5 kg enriched with FYM @ 300 kg/ha +foliar application of *Trichoderma* sp. @ 2.5 kg/ha at 30 and 45 DAS.

T2: ST with *P. fluorescens* @ 10 g/ kg + furrow application of P. *fluorescens* @ 2.5 kg enriched with FYM @ 300 kg/ha + foliar application of *P. fluorescens* @2.5 kg/ha at 30 and 45 DAS.

T4: ST with *Trichoderma* sp. @ 10 g/ kg + furrow application of *Trichoderma* sp. @ 2.5 kg enriched with FYM 300kg/ha + foliar application NSKE @ 5% at 30 and 45 DAS

T4: ST with *P. fluorescens* @ 10 g/ kg +furrow application of *P. fluorescens* @ 2.5 kg enriched with FYM @ 300 kg/ha + foliar application of NSKE @ 5% at 30 and 45 DAS

T5: ST with mixture of *Trichoderma* sp. and *P. fluorescens* @ 10 g each / kg + combined furrow application of *Trichoderma* sp. and *P. fluorescens* @ 2 kg each enriched with FYM @ 300 kg/ha + foliar application of mixture of both @ (2.5 kg each/ha) at 30 and 45 DAS.

T6: ST with mixture of *Trichoderma* sp. and *P. fluorescens* @ 10 g each / kg seed + combined furrow application of *Trichoderma* sp. and *P. fluorescens* @ 2 kg each enriched with FYM @ 300 kg/ha + foliar application of NSKE @ 5% at 30 and 45 DAS.

T7: Recommended practices (ST with Captan / Thiram / Mancozeb @ 3g/ kg + foliar spray of Hexaconazole @ 1 ml/l at 30 and 45 DAS along with recommended dose of NPK fertilizer)

T8: Control (without any treatment)

Results and Discussion

The seed treatment with mixture of *Trichoderm*a sp. and *Pseudomonas fluorescens* @ 10 g each / kg seed + combined furrow application of *Trichoderm*a sp. and *Pseudomonas fluorescens* @ 2 kg each enriched with FYM @ 300 kg/ha + foliar application of mixture of both @ 5 g each /lit (2.5kg/ha each) at 30 and 45 DAS was recorded least incidence of seed/soil borne diseases *viz.* collar rot at 30 DAS (3.58%) and stem rot at harvest (5.40%) as well as foliar diseases *viz.* late leaf spot (6.8%) and rust (3.8%) as against control *i.e.*,10.85%, 14.88%, 15.6% and 11.1% respectively and same treatment also recorded highest dry pod yield (877 kg/ha) over untreated control (535 kg/ha). These research findings are in agreement with the earlier workers Meena *et al.*,2002; Manjula *et al*., 2004 and Hossain and Hossain (2014) who worked on the same line for management of Collar rot ,Stem rot ,LLS and rust of groundnut using *Trichoderm*a sp., *Pseudomonas fluorescens* and NSKE.

Conclusion

The seed treatment with mixture of *Trichoderm*a sp. and *Pseudomonas fluorescens* @ 10 g each / kg seed + combined furrow application of *Trichoderm*a sp. and *Pseudomonas fluorescens* @ 2 kg each enriched with FYM @ 300 kg/ha + foliar application of mixture of both @ 5 g each /lit (2.5kg/ha each) at 30 and 45 DAS was recorded least incidence of seed/soil borne diseases *viz.* collar rot at 30 DAS (3.58%) and stem rot at harvest (5.40%) as well as foliar diseases *viz.* late leaf spot (6.8%) and rust (3.8%) as against control *i.e.*,10.85%, 14.88%, 15.6% and 11.1% respectively and same treatment also recorded highest dry pod yield (877 kg/ha) over the untreated control (535 kg/ha). In recent years much attention has been given to non chemical means of disease management, the present study has shown that the bio agents *viz.*, *Trichoderm*a sp. and *Pseudomonas fluorescens* are ecofriendly, much more effective and can be used as alternative or in place of chemical fungicides.

Table 1: Effect of different treatments on seed / soil borne and foliar diseases of groundnut.

Treatments	Germination %	Collar rot %		Stem rot %				ELS %	LLS %	Rust %	Pod yield	
		At 30 DAS	PDC over control	At 30 DAS	PDC over control	At Harvest	PDC Over control				g/plot	kg/ha
T1	79.67	4.66(12.37)	57.05	11.04(19.57)	28.86	11.34(19.71)	23.79	6.2(14.32)	12.00(20.21)	5.7(14.16)	1051.67	701
T2	79.75	4.75(12.50)	56.22	10.65(18.98)	31.37	11.05(19.26)	25.73	7.2(15.30)	10.9(19.13)	5.9(15.36)	1177.67	785
T3	78.50	4.67(12.36)	56.95	10.16(18.78)	34.54	10.64(18.95)	28.49	6.7(14.80)	12.8(20.85)	6.2(15.69)	1174.67	783
T4	79.42	4.91(12.68)	54.74	10.50(18.75)	32.34	10.82(19.09)	27.28	7.6(15.72)	9.6(18.0)	5.3(14.63)	1174.33	782
T5	85.00	3.58(10.71)	67.00	5.87(13.92)	62.17	5.40(13.09)	63.70	3.9(11.32)	6.8(15.03)	3.8(11.48)	1316.33	877
T6	84.67	3.85(11.19)	64.51	7.90(16.18)	49.09	7.00(14.99)	52.95	4.5(12.16)	9.9(18.24)	4.1(12.38)	1246.00	830
T7	77.92	7.76(16.23)	28.47	12.52(20.84)	19.32	12.26(20.37)	17.60	6.4(14.58)	10.8(19.16)	5.3(10.52)	979.67	653
T8	76.67	10.85(19.14)		15.52(23.07)		14.88(22.60)		8.0(16.58)	15.6(23.22)	11.1(19.58)	803.33	535
SE+		0.85		1.33		1.77		1.38	1.14	0.81	88.47	
CD at 5%		2.59		4.05		3.56		4.19	3.46	2.46	268	
Cv		12.36		13.09		11.61		17.20	10.6	10.08	12.87	

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