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E: ISSN NO.: 2455-0817 *Remarking An Analisation*

By Organically Enriching The Soil With Vesicular Arbuscular Mycorrhiza and Pongamia Pinnata Oilseed Cake for Management of Disease on Leguminous Crops

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Abstract

In the present study under glass house condition compairing the percentage of colonization and development of VA mycorrhiza on the number of legumes crop, among all the crops pigeonpea has showed the best performance and was selected for further investigation the first treatment is to responded best in the term of colonization percentage by amending the soil with karanj oil seed cake and form yard manure and the second treatment is that the soil is amended with FYM and karanj oil seed cake keeping a control treatment of field soil investigate the development and colonization percent of *G. fasciculatum*. For the management of disease complex caused by root knot nematode *Melidogyne incognita* and root will fungus *Fusarium udum* on pegionpea plant this treatment showing improved plant health as well as when integrated with *G. fasciculatum* was selected to mix with. By this management the disease incidents caused by both nematode and mycoflora to a great extend with most promising improvement in plant growth parameter as complain in plant growth parameter as complain to other when treated with. From yard manure, karanj oil seed cake and VA-Mycorrhiza. In the present study an excellent medium for the proliferation of the obligate bio protectant *G. fasciculatum* in addition to proposing ideal eco-friendly treatment for management of disease complex.

Keywords: Colonisation, Formyard, *Glomus Fasciculatum*, Karanj (*Pongamia Pinnata*) Oil Seed Cake.

Introduction

During recent years many attempts had made to minimize the use of pesticides and hazardous chemical for the pest management for combating plant disease and pest with non chemical method is the integration of soil with Mycorrihiza (*G.fasciculatm*) alone or integrated with other component. This Mycorrihiza plays an important role in defense mechanism and improving plant health by helping conversion of non-soluble phosphorus to soluble phosphorus, suppression of invader by the phenol and thickening of vascular issue for protection against pathogens. In present study the attempts is made for eco-friendly management of disease and for its mass multiplication.

An extensive survey were made to carried out for collection of different spp. of Glomus form various legume crop. Viz rentils, cowpea, chick pea, soybean for the proliferation of his friendly they are established to be one of the most favorable host for its mass multiplication prior to selection of favorable host for better development and frolification and development of *G. fasciculatum* with the mission to have better substrate in integration with karanj oil seed cake and FYM an experiment was carried out in above mentioned crop. For the management of most predominant disease complex caused by root know nematode *M.incognita* and *Fusarium udum* and also improve the health of soil and crop these component expected to perform favorably this integrated package leaves no toxic effect on the soil rather then it maintain soil health with rich Nitrogen, Phosphorus potassium (NPK) and vesicular arbuscular mycorrhiza (VAM) and phosphorus from cake.

The residue of the pesticides which are used to manage the above maladies their properties caused ground water, environmental pollution and residual problem including male sterility and carcinogenic nature. Due to their adverse effect on human health, phytotoxicity and the alarming side effect since 1982 i.e. the chemical killer pesticides were banned. Thus for the devastating disease complex this eco-friendly management package was better option against killer chemical pesticides.

Material and Method

During the cropping season each of the legume crops the 100g soil around the rhizospere from the above surevey. The chlamydospores of *G.fasciculatum* were isolated from the soil sample and identified thought standard technique. The population of *G.fascicultum* was found at maximum level around the *G.fasciculatum* followed by cow pea while is chickpea and lentil the number of chlamydospore are poor. Therefore for the study pigeonpea it being the best host for the *G.fasciculatum* from the same pulse crop field the soil was collected for most suitable host an investigation was done 15 inch size earthen pot filled with 1.5kg sterilized soil collected from the field. In this soil 200 clamydospore were added followed by homogenous mixture in each pot about 10 seeds after surface sterilization with 0.01% HgCl2 were shown 5 replications were made for each treatment including control treatment. After the interval of 15, 30, 45, 60, 75, 90 and 120 days of showing the count of chlamydospose from 50g soil and a percentage of root colonization of fungus form each plant or seeding of above treatment were recorded. The Nicholson's formula determine the percentage of root colonization by the VAM

$$\text{Colonization percentage} = \frac{no\ of\ positive\ colonised\ segment\ with\ VAM}{total\ number\ of\ positive\ colonized\ segment\ with\ VAM} \times 100$$

For the purpose of mass production with following treatment including control on sandy loan soil (SLS) another pot trial for selection of substrate of *G.fasciculatum* was carriedout in earthen pots diameter the sasne as above.

1. SLS (Sandy lamy soil) +200 chlamydospores
2. SLS (Sandy lamy soil) +200 chlamydospores+FYM
3. SLS +200 chlamydospore + karanj
4. SLS + FYM + 200 chlamydospores + KOSC

These integrated oils were sterilized in polypropylene bags at ISPSI for 30 minutes separately autoclaved. 10 days prior to mixing of chlaymydospore the amendment was done in respect to above treatment. 10 seed after surface sterilization with 0.01% HgCl2 for 0 second were sown simultaneously after mixing the chlamydospore in soil.

After the sowing seeds observation were made at the time interval of 15d, 30d, 45d, 60d, 75d, 90d and 120d.

The samples of root which was collects were washed thoroughly in tap water and then placed on blatting paper to absorb excess water. The 1cm piece of root were cut then after mounting the stained root in loctophenol and cover ship were slightly pressed of flatten KOH treated root for clear observation by the method of Biermann and Lindermann the colonization of VA-Mycorrhizal was measured. On the basis of microscopic examination of stained root the presence of various mycorrhizal fungal structure i.e. mycelium viscles and arbusucles were reporten nil (-), abandant (+++) moclerate (++) and scanty (+)

By the wet sieving and decanting technique of G. Erclemann and Nicholson the spores of VA mycorrihizal fungus were extracted 100 gm air dried soil were suspended in 2l of water after setting down the heavier particles for few minutes and suspenantant was decanted through a series of sieve i.e. 60, 100, 200, 300 and 400 mesh sizes by the method of Gil et al finally 100ml volume of each suspension contains spore were made for each soil for each host and substrate samples the spore number was calculated per 50g/substrate.

Table 1
Effect on Colonization and Chlamydospore Population of *G.Fasiculatum* of Various Substrates on In Pigeonpea

	Root colonization (%) after days						
Treatments	**15**	**30**	**45**	**60**	**75**	**90**	**120**
Sandy loam soil	0.0	11.50	25.70	37.72	48.50	62.25	73.85
Sandy loam soil + Karanj oil seed cake@2% w/w	3.10	12.87	30.45	44.20	56.32	67.90	86.20
Sandy loam soil + FYM@5%w/w	8.50	18.25	40.78	54.65	63.40	77.53	80.35
Sandy loam soil + Karanj oil seed cake@1%w/w+FYM@2.5%w/w	14.5	23.48	47.60	67.75	76.20	82.90	89.50
SEm+	0.21	0.17	0.23	0.13	0.23	0.27	0.27
LSD (P = 0.05)	1.48	2.75	4.10	3.20	3.86	4.10	3.41

Values are mean of five replications
Least significant difference (LSD).
Standard error mean (SEm).
Farm yard manure (FYM).

On the Infected Field of Pigeonpea Crops Management of Disease Complex Caused By Root Knot Nematode and Root Wilt Fungus

The study was initiated with preliminary survey of disease incidence involving root know nematode, *M.incognita* in association with wilt causing fungus showing synergistic effect on host proposed management experiment on pigeonpea. During cropping season of pigeonpea 3 replication with highly susceptible seed in 8m2 microplots with 80 seeds/ microplot spacing between plant to plant and row to row evaluate the performance of *G.fasciculatum* @

1kg/hect with 100 chamydospore in integration with karanj oilseed cake @200kg/hect and FYM @6 tone/hect in different combination wide proper about half meter was maintain for each replication, at periodic interval up to maturity of legumes rap the percentage at germination and disease incidents were recorded while yield was recorded at harvest.

Result and Discussion

An investigation was designed to select the best one among the stated crop in which the development and proliferation was remarkable in this study the legume crop were judge an ideal host for beneficial fungus. In respect of percentage root colonization and development *G. fasciculatum* in all seedling observed after 15, 30,45, 60, 75, 90 days of sowing.

Table 2

Chlamydospores Population and Colonization of *Glomus Fasciculatum* in Roots of Different Legumes Crops

Plant growth stage (DAS)								
No. substrate	**15**	**30**	**45**	**60**	**75**	**90**	**120**	**CD(p=0.05)**
1. Chickpea								
Colonization%	15.37	26.42	41.83	54.65	61.74	67.23	74.20	2.68
Myc	++	++	+++	+++	+++	++	++	
Arb	+	++	+++	+++	+++	++	+	
Ves	-	+	++	+++	+++	+++	+++	
Spore/50gsoil	217.30	227.65	242.15	312.45	361.74	437.28	513.55	14.20
2. Pigeonpea								
Colonization%	28.15	41.55	52.40	68.25	76.30	83.65	84.32	3.12
Myc	++	++	+++	+++	+++	++	++	
Arb	+	++	+++	+++	+++	++	+	
Ves	-	+	++	+++	+++	+++	+++	
Spore/50gsoil	268.30	288.63	310.45	409	485.87	525	587.50	12.60
3. Soybean								
Colonization%	12.68	19.87	37.15	48.50	56.10	64.72	76.20	2.68
Myc	++	++	+++	+++	+++	++	++	
Arb	+	++	+++	+++	+++	++	+	
Ves	-	+	++	+++	+++	+++	+++	
Spore/50gsoil	185.89	210.80	230.50	270.35	335.85	380.67	475.30	7.86
4. Lentil								
Colonization%	8.20	15.15	28.47	42.50	47.63	58.21	67.50	3.10
Myc	++	++	+++	+++	+++	++	++	
Arb	+	++	+++	+++	+++	++	+	
Ves	-	+	++	+++	+++	+++	+++	
Spore/50gsoil	137.20	165.35	178.31	210.15	290.78	342.80	451.45	6.92

DAS = days after sowing, (–) = absent, (+) = scanty, (++) = moderate, (+++) = abundant, Myc = mycelium, Arb = Arbuscular and Ves = Vesicles, Values are mean of five replications.

The maximum percent root colonization was observed in pigeonpea followed by percent in cowpea. After 120d after sowing during study first observation after 15d of sowing only mycelia structure were observed in roots of all the legumes crops mention above this increased gradually. Which showed much better development in pegionpea and after 30 days in other legume crops was not so apparent after 45 days of sowing the vesicle formation in pigeonpea was observed the pigeonpea and cowpea showed greater number of vesicles after 60 days and other legume crop shows poor result. Highly developed vesicles and arbuscules were seen to be heaving occupied in the cortical portion of pigeonpea roots. The other legumes crops shows vesicles and mycelia in very thin and low number of arbuscules while observing the rhizosphere of pigeonpea followed by cowpea and minimum in the case of lentil the maximum number count to chlamydospore population was also found. In case of pigeonpea on average there were about 300 to 600.50 spores per 50 gm of rhizosphere soil and the spore population varied 0.15 in different legumes crop. The beneficial fungus *G.fasciculatum* which occupy major portion of cortical tissue of the root both the host to restrict the entry of invaders like root knot nematode or soil born fungi to some extend.

The multiplication of *G. fasciculatum* and two natural media viz FYM and KOSC was attempted alone and together for the subsequent experiment for selecting suitable non-chemical and eco-friendly medium for better proliferation.

The disease complex caused by root knot nematode and wilts causing fungus resulting synergistic effect and caused damage to wide range of crops independently. The plant pathologist have reported number of disease complex incident by above two caused organism on common host mainly on legumes and vegetables the disease complex incidences are reported worldwide. In this present investigation successful attempt have been made for the eco-friendly management of disease complex caused by root knot nematode and wilt causing fungus observed frequently. It is clear from the observation that showed maximum colonization with significantly maximum colorization with remarkably and significantly high number of chlamydospore of *G.fasciculatum* treated with FYM and Karanj oil seed cake showed maximum colonization. *G.fasciculatum* is also know to has both nematicidal and fungicidal

properties in addition to being rich in NPK content like FYM and KOSC making the host more tolerant to the invaders.

Table 3
Effect of Glomus Fasciculatum with Different Combinations for Soil Treatment on Seed Germination, Wilt-Root Knot-Nematode Complex Incident and Grain Yield of Pigeonpea Crops

	Seed germination (%)	Mycorrhizal root Colonization (%)	Wilt –nematode Incidence (%)	Grain yield (kg/ha)
G.fasciculatum (soil based)	57.0(49.0)	47.39(44.26)	06.7(17.2)	1267.3
Formulation of *G.fasciculatum*				
(root based)	58.6(50.6)	67.67(53.75)	08.2(16.6)	1386.9
Farmyard Manure	52.5(45.9)	-	21.5(25.2)	1241.7
Karanj	59.9(50.1)	-	17.7(23.8)	1338.3
Karanj oil seed cake@250kg /h.a.+formulation of G.fasiculatum	64.2(53.8)	79.33(64.27)	05.7(14.0)	1453.0
FYM@5%w/w+Formulation of				
G.fasciculatum	62.1(52.9)	74.50(56.33)	14.7(24.1)	1297.3
Karanj oil seed cake@125kg/h.a. +				
FYM@250kg/h.a.+Formulation of	67.8(56.7)	82.33(64.45)	04.2(10.2)	1556.7
G.fasciculatum				
Check	45.8(42.0)	-	52.3(45.9)	1017.5
SEm+	(0.6)	(0.38)	(0.5)	(14.6)
LDS(P=0.05)	(132)	(1.94)	(1.7)	(31.6)

Least significant different (LSD)
Standard error mean (SEm)
Farm yard manure (FYM)
Figure in parentheses are transformed angular values.

The management as the three components possess fungicidal and nematicidal properties host help to control heavy loss caused by disease complex cause much more loss then either pathogen. The three component used in this investigation for management of disease complex would maintaining. Soil health and improving the diversity of beneficial micro-organism with no toxic residues on soil.

Aim of The Study

Sustainable management of plant diseases by using natural resources and to minimize the use of chemical pesticides.

Conclusion

In present investigation the soil amended by the three nature resources like VA-Mycorrihiza KOSC (Pongania pinnata) and Farmyard manure on pigeonpea. The pesticides which are used for pest control have hazardous effect on human health they are deadly killer and are also carcinogenic. To avoid these chemicals present investigation deals with the management of disease complex with natural resources without leaving any toxic residues which improve the soil health quality and maintain the environmental condition.

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