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Synergetic Effect of Gluconacetobacterdiazotrophicus and Glomus Fasciculatum on The Control of Colletotrichumfalcatum In The Cultivation of Sugarcane

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Abstract

Colletotrichum falcatum is a known pathogen which causes red rot disease in sugar cane, if the infection rate is high means heavy yield lose will occurs in sugarcane cultivation. Hence, proper management and control is quite essential to minimize the yield lose. In the present research, a combined inoculation of *Gluconacetobacter diazotrophicus* and *Glomus fasciculatum*were attempted for the control of red rot disease inorder to minimize the yield lose and to control the disease.The outcome of the present research showed efficiency of *Gluconacetobacter diazotrophicus* and *Glomus fasciculatum*in the control of red rot disease incidence to the extent of 65 percent.

Keywords: Mycorrhiza, red rot, glomusfasciculatum, gluconacetobacter diazotrophicus, etc.

1. Introduction

Arbuscular Mycorrhizal fungalorganisms were highly beneficial to many plants, which are found in association with every taxonomic group of plants and the plants which are not infected is probably far shorter than the infected ones. Mycorrhizal interactions associations are beneficial to crop plants in many ways.In majority of cases mycorrhizal interactions scavenge nutrients from the surrounding soil are from deeper layer and bring to the plant rhizosphere and root area. Hence theavailability of nutrients in the root area gets improved and are used by plants especially phosphorus, enhancing water uptake, inducing resistant against diseases and increasing the yield to some extent.AM-fungi are the most abundant kind of mycorrhiza present naturally with every group of plants. Majority of plants naturally requires mycorrhizal interactions inorder to overcome many types of stress conditions. Studies related to AM-fungal organisms

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conducted during last few decades envisaged their occurrence in a wide variety of hosts with different habitats and variability in quality and quantity.

They are geographically ubiquitous and are commonly found in association with agricultural and horticultural crops, shrubs, tropical tree species and some temperate trees. AM-fungal associations are formed by non septate Zygomycetes and Phycomycetes fungi. Some important genera of AM-fungi are *Glomus*, *Gigaspora*, *Acaulospora*, *Entrophospora* and *Scutellospora*,among which *Glomus* is the most common fungus.AM fungal inoculations along with *Gluconacetobacter diazotrophicus*enhances the growth and development of sugarcane by fixing nitrogen in various parts of sugarcane like in the roots, stem and in the leaves along with producing growth promoting hormones and by solubilizing, mobilizing phosphorus, potash, zinc compounds and protecting plants from stress conditions and most important fruitful thing in the interactions of AM-fungi and*G.diazotrophicus*eliminates the and pathogenic microflora from rhizosphere. The combination of AM- fungi and *G. diazotrophicus* not only enhances the plant growth and yield, the coinaulation effectively controls many diseases in sugarcane cultivation.

2. Materials and methods

Cement pots of 20 kg capacity were filled with sterilized sand soil mixture 1:1) *G. fasciculatum* root based soil inoculums at 50 g pot^{-1} was placed two cm below the soil surface as a thin film of uniform layer as per the treatment.Sugarcane (two budded) setts of var. (CoC 24) were planted at two setts pot^{-1} and maintained.The *G. diazotrophicus* best strain (GdVSB*) was used and *Colletotrichum falcatum* culture were obtained from the sugarcane research station, Cuddalore was also used in the present study. The suspensions containing 10^8 cells ml^{-1} were inoculated separately around the seedlings at the rate of 5 ml pot^{-1}. Previously the setts were treated with *Colletotrichum falcatum*.Three replications were maintained for the following treatments:

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T1 - Absolute control

T_2 - *Gluconacetobacter* alone

T_3 - *Colletotrichum falcatum alone*

T_4 - *Colletotrichum falcatum* + *G. diazotrophicus*

T_5 - *Colletotrichum falcatum* + *G. fasciculatum*

T_6 - *Colletotrichum falcatum* + *G. diazotrophicus* + *G. fasciculatum*

The disease accordance in various treatments were recorded on 120th and 180th DAP.

3. Results

G. diazotrophicus with *G. fasciculatum* on the control of red rot of sugarcanewere studied and the recorded data and observations were thoroughly analyzed and recorded.The red rot disease incidence in individual and combined inoculation of *G. diazotrophicus* with *G. fasciculatum* was observed and the results presented in Table 1.According to the recorded data, the disease incidence of red rot was significantly reduced by combined inoculation of *G. diazotrophicus* and *G. fasciculatum*. Compared with their individual inoculationsof *G. diazotrophicus* and AM fungi.The highest per cent reduction in disease incidence was observed in treatments with *G. diazotrophicus* and *G. fasciculatum* (65.00) followed by *G. diazotrophicus* alone (42.00) and *G. fasciculatum* alone (25.00) on 180 DAP.Whereas more disease incidence was noticed on the plants of sugarcane inoculated with the disease causing agent namely Colletotrichum falcatum. Even single inoculation of Glomus fasciculatum showed and recorded moderate values in the control of red rot disease incidence.

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Table 1

The Inoculation Effect of* G. diazotrophicus*and* G. fasciculatum *on the Control of Red Rot Disease in Sugarcane Crop

S. No.	Treatments	Occurrence of Disease incidence (%)		Percent reduction over control	
		Sampling period in days		Sampling period in days	
		120	180	120	180
T_1	Uninoculated control	0.00	0.00	0.00	0.00
T_1	*G.diazotrophicus* alone	42.00	42.00	0.00	0.00
T_1	*Colletotrichumfalcatum alone*	65.00	45.02	0	0
T_1	*Colletotrichumfalcatum +G. Diazotrophicus*	38.00	26.80	43.40	42.20
T_1	*Colletotrichumfalcatum +G. Fasciculatum*	44.62	34.30	35.62	25.00
T_1	*Colletotrichumfalcatum +G. fasciculatum + G. Diazotrophicus*	20.00	14.00	65.00	65.00
	SE	1.7411	1.3066		
	CD (p = 0.05)	4.96	3.73		

4. Discussion

AM fungi enhances increased phosphate uptakeand increasedalso it enhances the phospholipid content of the plant and thereby decreased the severity of root diseases. Huang,et al. reported that the alfalfa seedlings inoculated with *G. fasciculatum* had a lower incidence of wilt caused byVerticillum.Wilt is worst diseasesin many horticultural crops and vegetables in seedlings stage. In tomato plants, root damage caused by *Phytophthora nicotianae* was reduced to the

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inoculation of *G. mosseae*. Rajeswari,et al. reported that the root rot of casuarina *(Rhizoctoniabataticola)* significantly reduced by the inoculation of *G. fasciculatum.*Latha,et al. reported that the inoculation of *G. fasciculatum* with the damping off caused by*Fusarium moniliforme* reduced the disease incidence from the core of 20 to 50 per cent in cardamom. In the present investigation, the red rot disease incidence in sugarcane was significantly reduced by combined inoculation of*G. diazotrophicus* and *G. fasciculatum* on 120 DAP as well ason 180 DAP.

5. Conclusion

The red rot disease of sugarcane causes severe damage in the growth of sugarcane and also the disease incidence reduces the yield parameters. The present outcome clearly showed that the disease incidence of *Colletotrichum falcatum* inoculated soil was reduced by the combined inoculation of *G. diazotrophicus* and *G. fasciculatum* to the maximum extent.

6. Reference

Cordier, C., Gianinazzi, S., &GianinazziPearson, V. (1996). Colonization patterns of root tissues by*Phytophthoranicotianae* var.*parasitica*related to reduced disease in mycorrhizal tomato.*Plant Soil,*185, 223-232.

James, et al. (2008).Effect of vesicular arbuscularmycorrhizafungi inoculation on coppicing ability and drought resistance of*Sennaspectabilis. Pakistan Journal of Botany,* 40(5), 2217-2228.

Latha Thomas, B.C.,Mallesha.,&Bagyaraj, D.J. (1994). Biological control of damping-off of cardamom by the VAM fungus, *Glomus fasciculatum. Microbiological Research,*149, 413-415.

Prabudoss, V., & Stella, D. (2010). Growth enhancing association of *Gluconacetobacter diazotrophicus* and AM fungi in sugarcane.*Journal of Current Research,*4, 140-141.

Rajeswari, et al. (1999). Efficacy of vesicular-arbuscularmycorrhizal fungi on the management of root rot disease of*Casuarinaequisetifolia*Forst.*Madras Agricultural Journal,*85(10-12),577-580.

