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RESEARCH ARTICLE

CONTROL OF REDROT DISEASE THROUGH COMBINED INOCULATION OF *Gluconacetobacter diazotrophicus* and *Glomus fasciculatum* IN SUGARCANE

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ABSTRACT

The Red rot is the very worst disease in sugarcane caused by Colletotrichum falcatum which leads to drastic reduction in the cane yield .Hence in the present research a combined inoculation of Gluconacetobacter diazotrophicus and Glomus fasciculatum were attempted for the control of red rot disease. The outcome of the present research clearly showed that nearly 70% of the red rot disease incidence reduced by combined inoculation of G.diazotrophicus and Glomus fasciculatum in sugarcane.

INTRODUCTION

Arbuscular Mycorrhiza (AM) fungi are highly beneficial mycorrhizae which are found in association with every taxonomic group of plants and the list of species not infected is probably far shorter than the infected ones. These fungal associations are beneficial to crop plants in many ways, including enhancing the nutrient availability especially phosphorus, enhancing water uptake, inducing resistant against diseases and increasing the yield (Lekberg and Koids, 2005). AM-fungi are the most abundant kind of mycorrhiza described as a universal plant symbiosis. They are found in practically every taxonomic group of plants and the list of species not infected is probably far shorter than the infected ones. Lack of host specificity is even more characteristic of this symbiosis than other types known. Studies on AM-fungi conducted during last few decades envisaged their occurrence in a wide variety of hosts, different habitats and variability in quality and quantity (Jalaluddin, 2005). They are geographically ubiquitous and are commonly found in association with agricultural crops, shrubs, tropical tree species and some temperate trees. Their nutritional requirements are not specific. AM-fungi associations are formed by non septate Zygomycetes and Phycomycetes fungi. Some important genera of AM-fungi are *Glomus*, *Gigaspora, Acaulospora, Entrophospora* and *Scutellospora* of which *Glomus* is the most common fungus (Sureshkumar Singh *et al.,* 2003; James *et al.,* 2008).

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G. diazotrophicus and AM fungal inoculation enhances the growth and development of sugarcane by fixing nitrogen in various parts of sugarcane via roots, stem and leaves along with producing growth promoting hormones and by solubilizing, mobilizing phosphorus, potash and zinc compounds and protecting plants from stress and pathogens (Prabudoss and Stell, 2010). The combination of AM fungi and *G. diazotrophicus not only enhance of stimulated plant growth inadditional the combuned inoculation effectiveltyy controls red not disease in sugarcane.*

MATERIALS AND METHODS

Effect of Inoculation of G. diazotrophicus and G. fasciculatum on the incidence of red rot disease

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 5 ml pot^{-1}. Previously the setts were treated with *Colletotrichum falcatum*.

Table 1. Effect of individual and combined inoculation of G. **diazotrophicus with** G. **fasciculatum on the control of red rot disease in sugarcane**

S. No.	Treatments	Occurrence of Disease incidence (%)		Percent reduction over control	
		Sampling period in days		Sampling period in days	
		120	180	120	180
1	Uninoculated control	0.00	0.00	0.00	0.00
2	Colletotrichum falcatum *alone*	67.00	43.02	0	0
3	Colletotrichum falcatum + *G. diazotrophicus*	38.00	26.84	43.45	42.22
4	Colletotrichum falcatum + *G. fasciculatum*	44.62	34.25	35.62	25.67
5	Colletotrichum falcatum + *G. fasciculatum* +*G. diazotrophicus*	20.00	14.00	68.00	67.00
	SE	1.7411	1.3066		
	CD (p = 0.05)	4.96	3.73		

Three replications were maintained for the following treatments

T1 - Absolute control
T_2 - Colletotrichum falcatum *alone*
T_3 - Colletotrichum falcatum + *G. diazotrophicus*
T_4 - Colletotrichum falcatum + *G. fasciculatum*
T_5 - Colletotrichum falcatum + *G. diazotrophicus* + *G. fasciculatum*

The disease incidence in various treatments was recorded on 120th and 180th DAP (Meyer and Datar, 1986).

RESULTS AND DISCUSSION

***G. diazotrophicus* with *G. fasciculatum* on the control of red rot of sugarcane:** The red rot disease incidence in individual and combined inoculation of *G. diazotrophicus* with *G. fasciculatum* was observed and the results are presented in (Table 1). The disease incidence of red rot was significantly reduced by combined inoculation of *G. diazotrophicus* and *G. fasciculatum*. Compared with the individual inculations of *G. diazotrophicus* and AM fungi The highest per cent reduction in disease incidence was observed in treatments with *G. diazotrophicus* and *G. fasciculatum* (67.00) followed by *G. diazotrophicus* alone (42.22) and *G. fasciculatum* alone (25.67) on 180 DAP. AM fungi enhances increased phosphate uptake increased phospholipid content of the plant and thereby decreased the severity of root diseases (Kaye *et al.,* 1984; Mukerji and Ciancio, 2007). Huang *et al.* (1992) reported that the alfalfa seedlings inoculated with *G. fasciculatum* had a lower incidence of wilt caused by *Verticillium albo-atrum.* In tomato plants, root damage caused by *Phytophthora nicotianae* was reduced to the inoculation of *G. mosseae* (Cordier *et al.,* 1996). Rajeswari *et al.* (1999) reported that the root rot of casuarina *(Rhizoctonia bataticola)* significantly reduced by the inoculation of *G. fasciculatum.* Latha *et al.* (1994) reported that the inoculation of *G. fasciculatum* with the damping off causing organism *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.* The results of the present study were in accordance with the findings of Muthukumarasamy *et al.* (2000); Prabudoss and Stella 2010.

Summary

The red rot of sugarcane caused by *Colletotrichum falcatum* inoculated soil was reduced by the combined inoculation of *G. diazotrophicus* and *G. fasciculatum*.

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