

Vesicular Arbuscular Mycorrhizal (VAM) Association With the Roots of Red Rot Resistant and Susceptible Varieties When Inoculated with *Colletotrichum falcatum* Went

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SUMMARY

Varieties resistant to red rot (*Colletotrichum falcatum* M.) showed higher per cent colonization of vesicular arbuscular mycorrhiza (VAM) compared to susceptible varieties both under inoculated and uninoculated conditions of sugarcane.

Key words :

Red rot,
*Colletotrichum
falcatum*,
Vesicular
arbuscular
Mycorrhiza,
Colonization

Sugarcane is one of the important commercial crops in India. Among several diseases attacking sugarcane, red rot is the major disease causing severe yield losses to the sugarcane growing farmers. The role of vesicular arbuscular mycorrhizal (VAM) fungi in host nutrition is more and more appreciated in several crops. In the present investigations, an attempt has been made to correlated resistance to red rot. Mosse(1973) observed that the mycorrhizal colonization alters the host metabolism, which may result in an increase or decrease in host resistance. Certain chemical, physiological and morphological alterations in the host plant are known to induced by the mycorrhizal infection, some of which may be correlated to the altered host resistance or susceptibility. Significant reduction in number of chlamydospores of the root rotting fungus, *Theviolopsis bassicola* were observed on mycorrhizal association in tobacco roots (Baltruschat and Schonbeck, 1975).

MATERIALS AND METHODS

Three resistant (Co 7706, CoA 7602 and Co8013) and three susceptible varieties (Co 419, Co997 and Coc 671) varieties were included in the present studies. About fifty stalks of eight months old February planted crop in each of six varieties were inoculated with three pathotypes of red rot fungus viz., Cf 419, Cf 997 and Cf 671. Plug method of inoculation

was followed. Root samples were collected by random sampling at 60 days after inoculation. Corresponding healthy uninoculated canes were also maintained.

The root samples were treated at 90°C for about two hours in 10 per cent KOH (Potassium permanganate) solution then washed with fresh 10 per cent KOH solution. The samples were then immersed in an alkali solution of hydrogen peroxide, the root samples were acidified in dilute hydrochloric acid. The samples were then stained by steaming for five minutes in 0.05 per cent trypan blue in lactophenol and washed the excess stain with clear lactophenol. The root bits were examined under microscope for the presence of mycorrhizal mycelium, arbuscules or vesicles and the per cent vesicular arbuscular mycorrhizal (VAM) infection was noticed in each variety both in healthy and inoculated ones.

RESULTS AND DISCUSSION

The native mycorrhizal association in the roots of three red rot susceptible (Co 419, Co997 and Coc 671) and three resistant varieties (Co 7706, CoA 7602 and Co8013) were studied under uninoculated and inoculated conditions with three pathotypes viz., Cf 419, Cf 997 and Cf 671 and the data are presented in the Table 1.

Under uninoculated conditions, the per cent mycorrhizal colonization in the resistant (Co

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Table 1 : Vesicular arbuscular mycorrhizal (VAM) colonization in resistant and susceptible varieties of sugarcane

Variety	Un inoculated	Per cent colonization*		
		Inoculated		
		Cf 419	Cf 671	Cf 997
Co 419	70.60 (57.17)	61.87 (51.87)	59.40 (50.42)	58.10 (49.66)*
Co 997	71.47 (57.71)	65.47 (53.95)	64.27 (53.29)	68.47 (55.84)
Co 671	65.47 (53.95)	61.93 (51.90)	60.20 (50.88)	71.83 (57.96)
Co 7706	67.17 (55.04)	65.13 (53.81)	64.33 (53.33)	64.47 (53.41)
CoA 7602	81.00 (64.14)	69.73 (56.62)	73.67 (59.13)	72.27 (58.23)
Co 8013	76.33 (60.19)	81.67 (64.62)	79.57 (63.13)	79.90 (63.37)
S.E.±	0.431	0.207	0.572	0.532
C.D. (0.005)	1.28	0.83	1.44	1.38

* Mean of three replications

** Figures in parentheses are arc sine transformed values

7706, CoA 7602 and Co8013) varieties was significantly higher than the susceptible varieties except in the case of Co7706 where the per cent mycorrhizal colonization was significantly less than in the susceptible variety, Co997. The variety, CoA 7602 among the resistant varieties and Co 997 among the susceptible varieties registered highest per cent mycorrhizal colonization under uninoculated conditions.

On inoculation with the three pathotypes, the resistant variety, Co 8013 registered an uniformly higher per cent of VAM colonization closely followed by CoA 7602. Among the susceptible varieties the per cent VAM association varied with different pathotypes. The varieties, Co 997 and CoC 671 registered higher percentage of VAM colonization. The results of present investigation reveal that VAM colonization is higher in resistant varieties than susceptible varieties under uninoculated conditions. However, general reduction in per cent colonization was observed in both resistant and susceptible varieties under inoculated conditions except in the case of Co 8013 (with three pathotypes) and CoC 671 (with Cf 997) where an increase in per cent colonization with isolate-varietal reactions were also observed. But no definite correlation could be made with disease resistance and mycorrhizal colonization. Alexander and Jothi (1992) observed that roots of about 58 per cent of the sugarcane varieties had VAM association. It was reported that out of twenty two VAM fungi isolated, *Glomus mossae* was highly antagonistic to *Pythium graminicolum* causing root rot in sugarcane seedlings. Soil borne pathogens causing

particularly wilts and root rots are responsive to different soil conditions including dynamics of microbial activity in the rhizosphere (Jalali, 1986). Sharma (1994) and Kaushik and Mandal (1995) reported similar suppressive effects in black pepper and *Acacia nilotica*. Correlation of VAM colonization with disease resistance was reported by Jalali (1986) in *Fusarium oxysporum* f. sp *ciceri* and Kaushik and Mandal (1995) in *Acacia nilotica*.

CONCLUSION

In a crop like sugarcane, where the duration is eight to twelve months, it would be worthwhile to make concerted efforts to study more closely the diseased pattern with different pathotypes under VAM inoculated conditions.

These studies would also be meaningful in the context of awareness about environmental pollution and stress on the use of ecofriendly biological agents and biofertilizers.

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