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MANAGEMENT OF SUGARCANE PINEAPPLE DISEASE CAUSED BY *CERATOCYSTIS PARADOXA*

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KEYWORDS

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ABSTRACT

Pineapple disease caused by *Ceratocystis paradoxa* (De Seynes) Moreau. of sugarcane (*Saccharum officinarum*) is one of the most destructive and widespread disease of sugarcane which cause yield losses up to 100 % in severe infection. The pathogen/disease is very difficult to manage with chemicals and also economically. Therefore present study was undertaken with the aim to manage pineapple disease applying organic and inorganic amendments and binoculants under laboratory and screen house conditions. Results revealed that significantly least mycelial growth was recorded with *Azotobacter chrococcum* (18.08 mm), followed by Neemseed cake (19.91 mm), FYM+*Azotobacter chrococcum* (23.66 mm). Whereas, amendments FYM and soyabean cake was found to be less effective. All the organic amendments and bioinoculants applied in sick soil were found effective in reducing the pre-emergence setts rot as well as post-emergence seedling mortality in sugarcane cv. Co 86032. However, highest average reduction in mortality (80.41%) was recorded with FYM + *Azotobacter chrococcum*. The second and third best organic amendment and bioinoculant found were Neem seed cake and *Azotobacter chrococcum* (each 76.25%), followed by *Acetobacter diazotrophicus* (71.25%), FYM+*Azospirillium lipoferum* (70.00%). Whereas, amendments FYM and soyabean cake were found to be less effective.

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INTRODUCTION

Sugarcane (*Saccharum officinarum* L.) is one of the important commercial crops of the tropical and subtropical countries of the world. It contributes nearly 70 per cent of the world's sugar production and remaining is from sugar beet and some other sources (Anonymous, 2011).

Sugarcane is prone to more than 150 diseases caused by many fungal, bacterial, viral, phytoplasma and nematode pathogens as well as abiotic factors right from planting to harvest; which may cause overall loss of 10-25 per cent annually throughout the world (Mohan Raj *et al.*, 2002). Amongst the fungal diseases of sugarcane, pineapple disease caused by *Ceratocystis paradox*a (De Seynes) Moreau. has been reported to cause sugarcane sett rotting (pre- and post-emergence), loss in setts germination or even wilting of the young seedlings, reduction in yield and yield contributing parameters and juice quality. Sett rot or pineapple disease widely distributed in warmer temperate and tropical regions of the world. This disease is prevailing in almost all the sugarcane cultivated regions (Anonymous, 1987).

Worldwide, sugarcane is cultivated over an area of 20.42 million hectares with an annual production of 1333.10 MT and productivity of 65.00 tonnes/ha (Anonymous, 2011). India is the second largest country next only to Brazil in production. In India, sugarcane is grown in about 5.09 million hectares area with a total annual production of about 357.67 million tonnes and a productivity of about 70.31 tonnes per hectare (Anonymous, 2012a). Sugarcane cultivated area is nearly 2.50 per cent of the country's gross cropped area and contributes about 7.00 per cent of total value of the agriculture output. India shares about 0.40 per cent of world's sugar export (Rabindra, 2004; Yadav *et al.,* 2005).

Pineapple disease has been reported from almost all sugarcane-growing countries of the world *viz.,* USA, Australia, Java and Brazil (Anonymous, 1987). In India, the disease prevalence has been reported from all major sugarcane growing states *viz.*, Uttar Pradesh, Assam, Punjab, Maharashtra, Kerala, Karnataka and Tamil Nadu (Agnihotri, 1983; Rao *et al.*, 1995; Nath *et al.*, 1999). Thus resulting in germination loss to the extent of 12 to 20 per cent, while in Maharashtra, the losses ranges from 15 to 20 per cent. Disease ravages in later stages cause yield reduction of 10-15 tonnes per hectare (Anonymous, 2003). Under favorable conditions, the pathogen can cause substantial losses in yield through the failure of buds to sprout and dieback of young seedlings from the infected setts. This can inhibit the production of roots in the infected setts due to production of ethyl acetate (Yadahalli *et al.,* 2007).

The pathogen/disease is very difficult to manage with chemicals alone and also economically and ecofriendly. Therefore present study was undertaken with the aim to manage pineapple disease applying organic and inorganic amendments and binoculants under protected conditions of screen house and *in vitro*.

MATERIALS AND METHODS

***In vitro* evaluation of organic amendments and bioinoculants**

The organic amendments *viz.,* FYM, Vermicompost, Poultry manure, Sheep-goat manure, Oil cakes of groundnut, Cotton cake, Safflower cake, Soybean cake, Caster cake, Neem seed cake were ground to fine powder with mixture cum grinder. The powder of each organic amendment @ 100 g was dispensed in 100 ml sterile distilled water and 100 ml liquid bioinoculants *viz., Azotobacter chrococcum, Azospirillium lipoferum* and *Acetobacter diazotrophicus* was dispensed in equal quantity of distilled water, stirred thoroughly and kept overnight as such. On next day, these were filtered through double layered muslin cloth and the filterate obtained was further passed through Whatman No. 1 filter paper using Funnel and Volumetric flasks. The final clear extracts/filtrates obtained formed the standard organic amendments extract and bioinoculant of 100% concentration (Pal *et al.* 2015 and Ramanujam *et al.* 2005). These organic amendments extract and bioinoculant were evaluated (@10% and 20% each) *in vitro* against *C. paradoxa*, applying poisoned food technique. (Nene and Thapliyal, 1993) and using Potato dextrose agar (PDA) as basal culture medium.

An appropriate quantity of each organic amendments extract and bioinoculant (100%) was separately mixed thoroughly with autoclaved and cooled (40 ^{0}C) PDA medium in conical flasks to obtain desired concentrations of 10 and 20 per cent. This PDA medium amended separately with organic amendments extract and bioinoculant filtrate was then poured (20ml/plate) into sterile glass petri plates (90 mm dia.) and allowed to solidify at room temperature. Each organic amendment extract and bioinoculant filtrate and its respective concentrations were replicated thrice. The plates containing PDA without any organic amendments extract and bioinoculant filtrate were maintained as untreated control. Upon solidification of PDA, all the treatment and control plates were aseptically inoculated by placing in the centre a 5 mm mycelial disc obtained from a week old actively growing pure culture of *C. paradoxa*. Plates containing plain PDA and inoculated with mycelial disc of test fungus served as untreated control. The plates were incubated at room temperature for twelve days and radial colony growth was measured. The efficacy of a organic amendments and bioinoculants was expressed as per cent inhibition of mycelial growth over control that was calculated by using the formula suggested by Vincent (1947).

$$\text{Per cent Inhibition (I)} = \frac{C - T}{C} \times 100$$

Where,

I = Per cent inhibition

C = Radial growth in control

T = Radial growth in treatment

Evaluation of organic amendments and bioinoculants (pot culture)

A total of thirteen (organic amendments and bioinoculants) were evaluated *in vitro* against pineapple disease of sugarcane caused by *C. paradoxa* by soil application and sick soil method. Earthen pots (30 cm dia.) filled with potting mixture (soil + sand + FYM) were inoculated (@ 50 g/kg mixture) with the test pathogen multiplied on sand : maize medium, watered and kept in screen house for 15 days and allowed to proliferate the pathogen in pots (sick soil). Then powdered test organic amendments were applied (@ 50 g/kg soil) and bioinoculants (@ 50 mL/kg soil) to the pots containing sick soil, mixed thoroughly, watered regularly and maintained in screen house. Pots containing sick soil/potting mixture and without any organic amendment/oil cake/ bioinoculants were maintained as untreated control (Kalaimani and Giridharan *et al.*, 2014).

The setts of pineapple disease susceptible sugarcane cv. Co-86032 were planted in both the treated and untreated pots (3 two budded setts/pot). For each treatment, two pots per replication were maintained, kept in screen house and watered regularly. All the treatments were replicated twice.

The entire test amendments were evaluated by preventive method potting mixture in earthen pots was amended with the test amendments, watered regularly and after a week planting of sugarcane cv. Co-86032 was done.

Observations of setts germination and pre-emergence setts rot (PESR) were recorded at seven days after planting and that of post-emergence seedling mortality (PESM) at 35 days after planting.

The percentage setts germination, pre-emergence setts rot and post-emergence seedling mortality were calculated by following formulae.

$$\text{Germination (\%)} = \frac{\text{No. of setts (buds) germinated}}{\text{Total no. of setts (buds) planted}} \times 100$$

$$\text{PESR (\%)} = \frac{\text{No. of setts (buds) ungerminated}}{\text{Total no. of setts (buds) sown}} \times 100$$

$$\text{PESM (\%)} = \frac{\text{No. of seedlings died}}{\text{Total no. of seedlings}} \times 100$$

Further, reduction in both PESR and PESM were calculated by applying following formulae.

$$\text{Reduction (\%) in PESR \& PESM} = \frac{C-T}{T\,C} \times 100$$

Where,

C = Per cent rot/mortality in treatment

T = Per cent rot/mortality in control

RESULTS AND DISCUSSION

***In vitro* effect of organic amendments and bioinoculants**

Aqueous extracts of organic amendments and filtrates of bioinoculants were evaluated *in vitro* (each @ 10 and 20 %) against *C. paradoxa* and the results obtained on its mycelial growth and inhibitions are presented in the Table 1, revealed that all the 16 organic amendments and bioinoculants

evaluated were found fungistatic against *C. paradoxa* and recorded significantly reduced mycelial growth and increased mycelial inhibition of the test pathogen over untreated control. The mycelial growth was found to be decreased and its inhibition was increased with increase in concentrations of the organic amendments and bioinoculants tested.

Mycelial growth inhibition

Results (Table 1) revealed that all the aqueous extracts of the organic amendments and filtrates of bioinoculants tested exhibited a wide range of mycelial growth inhibition of *C. paradoxa* and was found to be increased drastically with increase in the concentrations of the organic amendments and of bioinoculants tested.

At 10 per cent, percentage mycelial growth inhibition was ranged from 50.18% (Soybean cake) to 75.37% (*Azotobacter chrococcum*). However, significantly highest mycelial growth inhibition was recorded with the bioinoculant *Azotobacter chrococcum* (75.37 %). This was followed by the organic amendments and bioinoculants *viz.,* Neemseed cake (72.77%), FYM+ *Azotobacter chrococcum* (70.18%), *Acetobacter diazotrophicus* (66.85%), FYM+ *Azospirillium lipoferum* (65.74%), *Azospirillium lipoferum* (65.55%), FYM+ *Acetobacter diazotrophicus* (64.44%), Castor cake (62.22%), Cotton cake (61.11%), Poultry manure (57.22%), Oil cake of groundnut (55.92%), Vermicompost (55.74%), Safflower cake (55.55%), Sheep-goat manure (53.88%), FYM (50.74%) and Soybean cake (50.18%).

At 20 per cent percentage mycelial growth inhibition was ranged from 58.33 (Soybean cake) to 84.44 (*Azotobacter*

Table 1: *In vitro* effect of organic amendments and bioinoculants on growth of *C. paradoxa*

Treatments	Colony Diameter (mm) * at Conc.		Av. (mm)	% Inhibition at Conc.		Average inhibition (%)
	10 %	20 %		10 %	20 %	
FYM	44.33	35.17	39.75	50.74 (45.42)	60.92(51.31)	55.83(53.57)**
Vermicompost	39.83	31.17	35.50	55.74(48.29)	65.37(53.95)	60.55(57.25)
Poultry manure	38.50	28.00	33.25	57.22(49.15)	68.88(56.10)	63.05(59.58)
Sheep-goat manure	41.50	31.17	36.33	53.88(47.23)	65.37(53.95)	59.62(56.79)
Oil cake of groundnut	39.67	28.83	34.25	55.92(48.40)	67.96(55.52)	61.94(58.73)
Cotton cake	35.00	25.50	30.25	61.11(51.42)	71.66(57.84)	66.38(62.11)
Safflower cake	40.00	28.83	34.41	55.55(48.19)	67.96(55.53)	61.75(58.64)
Soybean cake	44.83	37.50	41.16	50.18(45.10)	58.33(49.79)	54.25(52.02)
Castor cake	34.00	26.83	30.41	62.22(52.07)	70.18(56.91)	66.20(61.56)
Neemseed cake	24.50	15.33	19.91	72.77(58.55)	82.93(65.60)	77.94(71.77)
Azotobacter chrococcum	22.17	14.00	18.08	75.37(60.25)	84.44(66.78)	79.90(73.34)
Azospirillium lipoferum	31.00	22.50	26.75	65.55(54.06)	75.00(60.00)	70.27(65.14)
Acetobacter diazotrophicus	29.83	21.00	25.41	66.85(54.85)	76.66(61.12)	71.75(66.14)
FYM + *Acetobacter diazotrophicus*	32.00	24.33	28.16	64.44(53.39)	72.96(58.67)	68.70(63.69)
FYM + *Azotobacter chrococcum*	26.83	20.50	23.66	70.18(56.91)	77.22(61.49)	73.70(67.60)
FYM + *Azospirillium lipoferum*	30.83	25.50	28.16	65.74(54.17)	71.66(57.84)	68.70(56.00)
Control	90.00	90.00	90	0.00(0.00)	0.00(0.00)	0.00(0.00)
S.E. ±	0.47	0.46	0.46	0.31	0.34	0.32
C.D. (P=0.05)	1.36	1.32	1.34	0.90	0.97	0.93

* Mean of three replications,**Figures in parenthesis are arc sine transformed values.

Table 2: Evaluation of organic amendments and bioinoculants against *C. paradoxa* (pot culture)

Treatments	Germination(%)	Rot/Mortality (%)*		Av. (%)	Reduction (%)* over control		Av. (%)
		PESR	PESM		PESR	PESM	
FYM	58.34(35.90)	41.66 (24.73)	29.16(16.97)	35.41(20.85)	37.50(22.23)	70.83(45.19)	54.16(33.71)**
Vermicompost	66.67(41.80)	33.33(19.46)	12.50(7.23)	22.91(13.34)	50.00(29.99)	70.83(45.19)	60.41(37.59)
Poultry manure	58.34(35.90)	41.66(24.73)	12.50(7.23)	27.08(15.98)	37.50(22.23)	87.50(69.28)	62.50(45.75)
Sheep-goat manure	66.67(41.80)	33.33(19.46)	37.50(22.23)	35.41(20.84)	50.00(29.99)	62.50(39.29)	56.25(34.64)
Oil cake of groundnut	66.67(41.80)	33.33(19.46)	25.00(14.47)	29.16(16.96)	50.00(29.99)	75.00(41.84)	62.50(35.91)
Cotton cake	75.00(49.12)	25.00(14.52)	32.50(19.02)	28.75(16.77)	62.50(39.29)	70.00(44.99)	66.25(42.14)
Safflower cake	58.34(35.90)	41.66(24.73)	12.50(72.37)	27.08(48.55)	37.50(22.23)	87.50(69.28)	62.50(45.75)
Soybean cake	58.34(35.90)	41.66(24.73)	29.16(16.97)	35.41(20.85)	37.50(22.23)	70.83(45.19)	54.16(33.71)
Castor cake	75.00(49.12)	25.00(14.52)	32.50(19.02)	28.75(16.77)	62.50(39.29)	67.50(42.72)	65.00(41.00)
Neemseed cake	75.00(49.12)	25.00(14.52)	10.00(5.76)	17.50(10.14)	62.50(39.29)	90.00(71.55)	76.25(55.42)
Azotobacter chrococcum	75.00(49.12)	25.00(14.52)	10.00(5.76)	17.50(10.14)	62.50(39.29)	90.00(71.55)	76.25(55.42)
Azospirillium lipoferum	66.67(41.80)	33.33(19.46)	12.50(7.23)	22.91(13.34)	50.00(29.99)	87.50(69.28)	68.75(49.63)
Acetobacter diazotrophicus	75.00(49.12)	25.00(14.52)	20.00(11.78)	22.50(13.15)	62.50(39.29)	80.00(63.42)	71.25(51.35)
FYM + *Acetobacter diazotrophicus*	58.34(35.90)	41.66(24.73)	0.00(0.00)	20.83(12.36)	37.50(22.23)	100.0(89.98)	68.75(56.10)
FYM + *Azotobacter chrococcum*	91.67(73.21)	8.33(4.79)	26.66(15.50)	17.49(10.14)	87.50(69.28)	73.33(47.46)	80.41(58.37)
FYM + *Azospirillium lipoferum*	75.00(49.12)	25.00(14.52)	22.50(13.00)	23.75(13.76)	62.50(39.29)	77.50(50.85)	70.00(45.07)
Control(Untreated)	33.33(19.47)	66.66(41.80)	100.00(89.98)	83.33(65.89)	0.00(0.00)	0.00(0.00)	0.00(0.00)
S.E. ±	4.25	4.25	5.67	4.96	8.57	13.23	10.90
C.D. (P=0.05)	12.68	12.68	16.90	14.79	25.53	39.41	32.47

*Average of two replications; ** Figures in parenthesis are arc sine transformed values

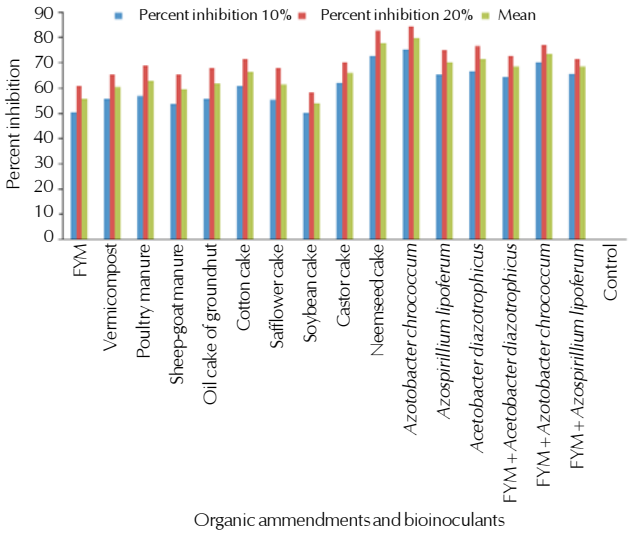


Figure 1: *In vitro* effect of organic amendments and bioinoculants on growth of *C. paradoxa*

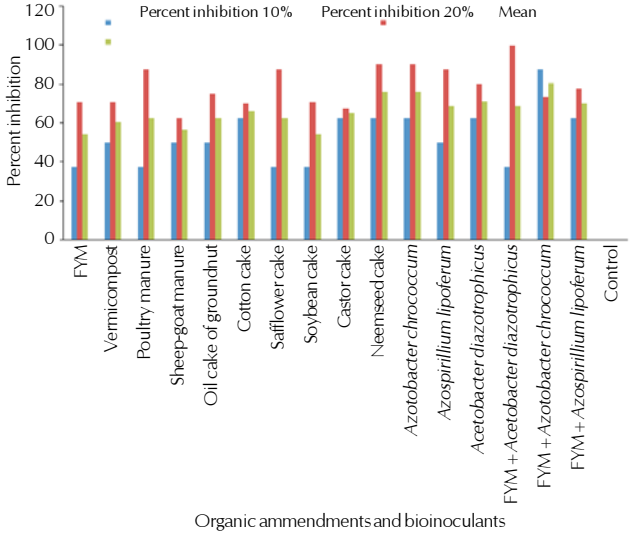


Figure 2: Evaluation of organic amendments and bioinoculants against *C. paradoxa* (pot culture)

chrococcum). However, significantly highest mycelial growth inhibition was recorded with the bioinoculant *Azotobacter chrococcum* (84.44%). This was followed by the organic amendments and bioinoculants *viz.,* Neemseed cake (82.93%), FYM + *Azotobacter chrococcum* (77.22%), *Acetobacter diazotrophicus* (76.66%), *Azospirillium lipoferum* (75.00%), FYM + *Acetobacter diazotrophicus* (72.96%), Cotton cake, FYM + *Azospirillium lipoferum* (each 71.66%), Castor cake (70.18%), Poultry manure (68.88%), Oil cake of groundnut, Safflower cake (each 67.96%), Vermicompost, Sheep-goat manure (each 65.37%), FYM (60.92%) and Soybean cake (58.33%).

Average percentage mycelial growth inhibition recorded with all the test organic amendments and bioinoculants was ranged from 54.25 (Soybean cake) to 79.90 (*Azotobacter chrococcum*). However, significantly highest average mycelial growth inhibition was recorded with the bioinoculant *Azotobacter chrococcum* (79.90%). This was followed by the organic amendments and bioinoculants *viz.,* Neemseed cake (77.94%), FYM + *Azotobacter chrococcum* (73.70%), *Acetobacter diazotrophicus* (71.75%), *Azospirillium lipoferum* (70.27%), FYM + *Acetobacter diazotrophicus*, FYM + *Azospirillium lipoferum* (each 68.70%), Cotton cake (66.38%), Castor cake (66.20%), Poultry manure (63.05%), Oil cake of groundnut (61.94%), Safflower cake (61.75%), Vermicompost (60.55%), Sheep-goat manure (59.62%), FYM (55.83%) and Soybean cake (54.25%).

The result of present investigation were more or less similar with the findings of earlier reporter Ramanujam *et al.* (2005) who found the Extracts of Neem (20%), Groundnut (20%) and Sunflower (20%) cakes show inhibitory effect on the *C. paradoxa*. Narasimhalu and Bhaskaran, 1987; Somasekhara *et al.,* 2005 also reported similar results to the present study.

Evaluation of organic amendments and bioinoculants (pot culture)

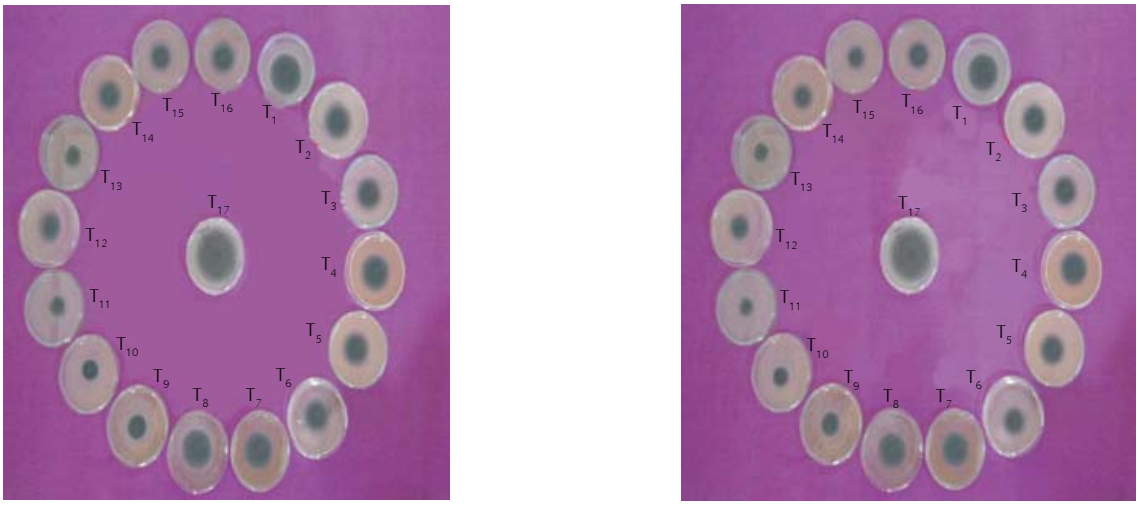
A total of sixteen organic amendments and bioinoculants *viz.,* FYM, Vermicompost, Poultry manure, Sheep goat manure, oil cakes of groundnut, Cotton cake, Safflower cake, Soybean cake, Caster cake, Neem seed cake, *Azotobacter chrococcum*, *Azospirillium lipoferum*, *Acetobacter diazotrophicus*, FYM + *Acetobacter diazotrophicus*, FYM + *Azotobacter chrococcum* and FYM + *Azospirillium lipoferum* were evaluated by soil application and sick soil method against *C. paradoxa* causing pre emergence setts rot and post emergence seedling mortality in sugarcane cv. Co 86032. The results obtained are presented in Table 2

Germination

Results (Table 2) revealed that all the organic amendments and bioinoculants applied in sick soil (*C. paradoxa*) were found effective against *C. paradoxa* and recorded germination in the range of 58.34 to 91.67 per cent as against 33.33 per cent in untreated control. However, FYM + *Azotobacter chrococcum* was found most effective and recorded significantly highest (91.67%) germination percentage. This was followed by the organic amendments and bioinoculants *viz.,* Cotton cake, Caster cake, Neem seed cake, *Azotobacter chrococcum*, *Acetobacter diazotrophicus* and FYM + *Azospirillium lipoferum* (each 75.00%), Vermicompost, Sheep goat manure, oil cakes of groundnut and *Azospirillium lipoferum* (each 66.66%), FYM, Poultry manure, Safflower cake, Soybean cake and FYM + *Acetobacter diazotrophicus* (each 58.34%).

Reduction in mortality

Result (Table 2) revealed that both PESR and PESM were significantly reduced with the application of all the organic amendments and bioinoculants tested. The percentage reduction in PESR recorded with test organic amendments and bioinoculants were ranged from 37.50 to 87.50 per cent as against 0.00 per cent in untreated control. However, significantly highest reduction in PESR was recorded with FYM + *Azotobacter chrococcum* (87.50%). This was followed by the the organic amendments and bioinoculants *viz.,* Cotton cake, Caster cake, Neem seed cake, *Azotobacter chrococcum*, *Acetobacter diazotrophicus* and FYM + *Azospirillium lipoferum* (each 62.50%), Vermicompost, Sheep goat manure,



T_1:FYM; T_2:Vermicompost;T_3:Poultry manure; T_4:Sheep-goat manure;T_5:Oil cakes of groundnut; T_6:Cotton cake;T_7:Safflower cake; T_8:Soybean cake;T_9:Caster cake;T_{10}:Neem seed cake;T_{11}:*Azotobacter chrococcum* ;T_{12}:*Azospirillium lipoferum*;T_{13}:*Acetobacter diazotrophicus*;T_{14}:FYM + *Acetobacter diazotrophicus*; T_{15}:FYM + *Azotobacter chrococcum*;T_{16}:FYM + *Azospirillium lipoferum*;T_{17}:Control

Plate 1: *In vitro* efficacy of organic amendment extracts and bioinoculant filtrates at 10% (A) and 20% (B) on mycelial growth of *C. paradoxa* Treatment details

T_1:FYM; T_2:Vermicompost;T_3:Poultry manure;T_4:Sheep-goat manure;T_5:Oil cakes of groundnut ;T_6:Cotton cake;T_7:Safflower cake;T_8:Soybean cake; T_9:Caster cake ;T_{10}:Neem seed cake;T_{11}:*Azotobacter chrococcum* ;T_{12}:*Azospirillium lipoferum*; T_{13}: *Acetobacter diazotrophicus*;T_{14}:FYM + *Acetobacter diazotrophicus*; T_{15}:FYM + *Azotobacter chrococcum*;T_{16}:FYM + *Azospirillium lipoferum*;T_{17}:Control

Plate 2: Efficacy of organic amendments and bioinoculants against *C. paradoxa* pot cultureTreatment details

oil cakes of groundnut and *Azospirillium lipoferum* (each 50.00%), FYM, Poultry manure, Safflower cake, Soybean cake and FYM + *Acetobacter diazotrophicus* (each 37.50%).

The percentage reduction in PESM recorded with the organic amendments and bioinoculants tested were ranged from 62.50 to 100 per cent as against 0.00 per cent in untreated control. However, significantly highest reduction PESM was recorded with FYM + *Acetobacter diazotrophicus* (100%). This was followed by organic amendments and bioinoculants *viz.,* Neem seed cake and *Azotobacter chrococcum* (each 90.00%), Poultry manure, Safflower cake and *Azospirillium lipoferum* (each 87.50%), *Acetobacter diazotrophicus* (80.00%), FYM + *Azospirillium lipoferum* (77.50%), oil cakes of groundnut (75.00%), FYM + *Azotobacter chrococcum* (73.33%), FYM, Vermicompost and Soybean cake (each 70.83%), Cotton cake (70.00%), Caster cake (67.50%) and Sheep goat manure (62.50%).

The average (PESR + PESM) reduction in mortality recorded with all the organic amendments and bioinoculants tested were ranged from 54.16 to 80.41 per cent as against 0.00 per cent in untreated control. However, highest average reduction in mortality (80.41%) was recorded with FYM + *Azotobacter chrococcum*. The second and third best organic amendment and bioinoculant found were Neem seed cake and *Azotobacter chrococcum* (each 76.25%). This was followed by organic amendments and bioinoculants *viz, Acetobacter diazotrophicus* (71.25%), FYM + *Azospirillium lipoferum* (70.00%), *Azospirillium lipoferum* and FYM + *Acetobacter diazotrophicus* (each 68.75%), Cotton cake (66.25%), Caster cake (65.00%), Poultry manure, oil cakes of groundnut and Safflower cake (each 62.50%), Vermicompost (60.41%), sheep goat manure (56.25%), FYM and Soybean cake (each 54.16%).

Thus, all the organic amendments and bioinoculants applied in sick soil (*C. paradoxa*) were found effective in reducing the pre-emergence setts rot as well as post-emergence seedling mortality in sugarcane cv. Co 86032. However FYM + *Azotobacter chrococcum* was found most effective with highest average reduction in mortality. In the order of merit of effectiveness in reducing mortality, the other organic amendments and bioinoculants found effective were Neem seed cake, *Azotobacter chrococcum*, *Acetobacter diazotrophicus*, FYM + *Azospirillium lipoferum*, *Azospirillium lipoferum*, FYM + *Acetobacter diazotrophicus*, Cotton cake, Caster cake, Poultry manure, oil cakes of groundnut, Safflower cake, Vermicompost, sheep goat manure, FYM and Soybean cake.

The results of present investigation were more or less in agreement with the findings of Yadahalli (2007) who reported

that the 7.5 g Neem cake and 7.5 g Vermicompost/kg) on sett rot (*C. paradoxa*) of sugarcane and he found that all organic amended treatments exhibited higher sett germination than the control. Similar results also reported by Kalaimani *et al.*, (1996). The variation in the present finding was due to the weather parameters.

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