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Management of rhizome rot/tip over disease of banana

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Abstract

A serious Rhizome rot/ Tip - over disease of Banana is becoming a major problem in all the banana growing areas of Maharashtra and other Banana growing states of India in post rainy season. The disease was caused by the bacterial strains of *Erwinia chrysanthemi*. The infection occurred on new banana plantation of one month old in poorly drained soil. In post rainy season, banana plantations of 8 to 10 weeks were found severely infected. *E. chrysanthemi* pv. *paradisica* produced soft rot symptom on healthy banana rhizomes within three weeks.

The results of present investigation revealed that the treatment healthy suckers + Soil application with 6 gm. bleaching powder 5 times at monthly interval up to 4 MAP + drenching with streptomycin 1lit / plant (500 PPM) at 1st MAP + Trichoderma viride (50 gm/ plant at 2nd, 4th MAP) + Growing sunhemp in the inter spaces till 6 month after planting recorded least incidence 19.93% and also recorded highest yield (78.01 MT/ha) and B:C Ratio (2.51). These treatments were suggested for management of rhizome rot or Tip over disease.

Keywords: Management, rhizome rot/tip, over disease, banana

Introduction

Banana (*Musa* spp.) is one of the oldest cultivated tropical fruit crop in India next to Mango in both area and production. Banana is subjected to many serious diseases caused by fungi, viruses, bacteria and nematodes. The "Tip-over" or "bacterial rhizome rot" of banana was found to be severe in Karnataka state causing serious losses in all the major banana growing areas (Khan & Nagaraj, 1998) [7].

However tip - over or Bacterial Rhizome rot disease, which was consider to be minor earlier has assumed serious proportions in recent year in India in general and Maharashtra particular. With the advance of tissue culture technique for the mass production of banana plant in view of increasing demand due to the rapid expansion of banana cultivation the disease is spreading fast causing high plant mortality, consequent losses to the planters. A soft rot disease of banana referred to tip - over caused by *Erwinia carotovora* was recorded in Honduras in 1949 (Wardlaw 1950 and stover 1959) [12, 10]. Hildreth (1962) [5] recorded losses as high as 80 - 90 % and up to 93% in Gaurtnala. The disease was recorded in India by Edward *et al.* (1973) [4] and Khan and Nagaraj (1998) [7] recorded the incidence of Tip - over disease of banana up to 70% in Karnataka. Several workers in the past have reported it to be *Erwinia carotovora* subsp. *Carotovora* and *Erwinia chrysanthemi* from across the world (Dickey and victoria 1980 [3]; Choi *et al.* 1988) [2]. From India it was reported to be *Erwinia carotovora* subsp. *carotovora* (Edward *et al.* 1973 [4]; Lakshonanana and Mohan (1980) [8]. In order to investigate the trial was conducted to know the effect different chemicals against the disease.

Materials and Methods

The present investigation was carried out during the year 2011 to 2014 at M.P.K.V's Banana Research Station, Jalgaon, a field trial was laid out to study the effect of various chemicals for the control of Rhizome rot or Tip - over disease, different chemicals were used as soil application drenching and dipping of suckers. The treatment distributed in a randomized block design in ten treatments with three replication. The planting distance was 1.5 x 1.5m and all the recommended agronomic practices for raising crop were followed.

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Treatments

Treatment no.	Treatments
T ₁	Healthy Suckers.
T ₂	T1 + Dipping in streptocycline for 30 min.at 500ppm.
T ₃	T1 + Dipping in <i>Pseudomonas fluorescence</i> for 30 min.at 50g/lit.of water.
T ₄	T1+ Dipping in <i>Trichoderma viride</i> for 30 min. at 50g/lit.of water.
T ₅	T1+ drenching with streptocycline 1-2 lit/plant at 500ppm (15 days, 2 nd month, 4 th month after planting) + Growing sunhemp in the interspaces till 6 month after planting.
T ₆	T1+ drenching with <i>Pseudomonas fluorescence</i> . at 50gm./lit of water 5 times at monthly interval+Growing sunhemp in the interspaces till 6 month after planting.
T ₇	T1+ drenching with <i>Trichoderma viride</i> . at 50gm./lit of water 5 times at monthly interval+Growing sunhemp in the interspaces till 6 month after planting.
T ₈	T1+ drenching with <i>Pseudomonas fluorescence</i> + <i>Trichoderma viride</i> . at 50gm./lit of water 5 times at monthly interval+Growing sunhemp in the interspaces till 6 month after planting.
T ₉	T1+ Soil application with 6g bleaching powder 5 times at monthly interval upto 4 MAP +drenching with streptocycline 1 lit./plant (500ppm) at 1 st MAP + <i>Trichoderma viride</i> (50g/plant at 2 nd 4 th MAP)+ Growing sunhemp in the interspaces till 6 month after planting.
T ₁₀	T1+ Soil application of Emissan (1g/l) 1 liters per plant at the time of planting + drenching with streptocycline 1 lit/plant at 500ppm at 1 st MAP+ <i>Pseudomonas fluorescens</i> at 25 g /plant 2 nd 4 th MAP at Growing sunhemp in the interspaces till 6 month after planting.

The observations were recorded as biweekly and monthly interval on disease incidence and the yield was also recorded at the time of harvesting and statistical analysis was done by Panse and Sukhatme (1989) [9] methods.

Results and Discussion

The data of disease intensity of Rhizome rot or Tip - over and yield of three are presented in table – 2, all the treatments are found significantly superior over control in reducing the rhizome rot disease. Similarly there was significantly difference in yield on treated and untreated plants.

Pooled data revealed that significantly minimum incidence (19.93) with maximum yield (78.01) and highest B:C ratio (2.51) was recorded in (T9) treatment healthy sucker + soil application with 6gm bleaching powder 5 times at monthly interval up to 4 map + drenching with Streptocycline 1 lit /

plant (500 PPM) at 1st MAP + *Trichoderma viride* (50 gm / plant at 2nd 4th MAP) + Growing sunhemp in the interspaces till 6 month after planting.

Other concerned results also confirmed by Anonymous (2008) who reported that sucker dip in COC at 4 g/l for 45 minutes followed by spraying of streptocycline (0.03%) and suckers dip in *Pseudomonas fluorescence* (1:1) for 45 minutes recorded better growth and lower disease infection. The results are also similar with Thammaiah, *et al.* (2006) [11] evaluated different chemicals against rhizome rot of banana in vitro and reported that streptocycline 500 ppm and COC 2000 ppm recorded maximum inhibition. Under field condition Kannan, *et al.* (2006) [6] reported that soil drenching of sodium hypochlorite (0.5%) and streptomycin sulphate (500 ppm) performed well and reduced the rhizome rot disease incidence.

Table 1: Effect of different treatments on rhizome rot disease of banana (Three year data)

Year	2011-12			2012-13			2013-14		
	Rhizome rot Incidence (%)	Yield (MT/ha)	BCR	Rhizome rot Incidence (%)	Yield (MT/ha)	BCR	Rhizome rot Incidence (%)	Yield (MT/ha)	BCR
T1	40.27	43.1	1.48	35.25	51.37	1.25	35.61	52.04	1.23
T2	23.88	51.7	2.3	27.82	64.1	2.39	28.15	64.43	2.35
T3	24.93	55.8	2.32	32.47	60.84	2.27	33.47	61.51	2.25
T4	26.03	58.54	2.1	34.2	61.48	2.3	34.47	62.18	2.29
T5	23.1	69.55	1.78	25.99	70.03	2.17	26.35	71.03	2.15
T6	30.08	66.1	2.03	32.37	60.57	1.88	32.48	61.23	1.85
T7	25.05	53.75	2.1	24.42	60.6	1.91	28.75	61.03	1.9
T8	28.15	50.77	2.33	26.8	66.55	2.16	26.97	67.55	2.12
T9	17.59	75.65	2.6	20.77	78.67	2.49	21.43	79.69	2.44
T10	20.47	67.5	2.35	22.62	67.12	2.15	23.28	68.12	2.1
SE _±	0.11	1.01		0.23	0.19		0.12	0.1	
C D 0.05%	0.38	3.45		0.69	0.75		0.35	0.31	

Table 2: Effect of different treatments on rhizome rot disease of banana (pooled mean data)

Year	2011-2014			
	Treatments	Rhizome rot Incidence (%)	Yield (MT/ha)	B:C Rate
T1		37.04	48.84	1.32
T2		26.62	60.08	2.35
T3		30.29	59.38	2.28
T4		31.57	60.73	2.23
T5		25.14	70.20	2.03
T6		31.64	62.63	1.92
T7		26.07	58.46	1.97
T8		27.31	61.62	2.20
T9		19.93	78.01	2.51
T10		22.12	67.58	2.20
SE±		0.15	0.43	-
CD @ 0.05%		0.47	1.50	-

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