Journal of Tropical Agriculture 39 (2001) : 73-75

EFFICACY OF PROPHYLACTIC AND CURATIVE SPRAYINGS ON THE CONTROL OF BACTERIAL BLIGHT OF RICE

Bacterial blight caused by *Xanthomonas oryzae* pv. *oryzae* (Ishiyama, 1922) Swings *et al.*, 1990 is a major disease of rice in Kerala. Antibiotics, fungicides, and even organics such as cowdung were attempted for the control of this disease (Singh *et al*, 1980; Grainge *et al*, 1985; Mariappan *et al*, 1990; Mary *et al*, 1986; Sreekumar and Nair, 1990). But so far, only a partial control of the disease has been possible. In this investigation, the efficacy of two methods of spraying viz. prophylactic and curative using antibiotics, Bactrinol-100 and cowdung extract was tested under field condition at Nedumudi in Kuttanad for the control of bacterial blight of rice.

Two separate field experiments were conducted in a farmers field at Mathur Padasekharam, Nedumudi, Kuttanad during the additional crop season of 1992 and 1993. The five treatments selected were streptocycline (500 ppm), mixture of streptomycin and oxytetracycline in 1:9 proportion at 250 and 500 ppm; Bactrinol-100 at 500 ppm and cowdung extract @ 20 g l^{-1}. The control treatment was maintained without any spray. Two different spray schedules, prophylactic and curative were adopted. A highly susceptible variety of rice, T(N)1 along with a variety cultivated by the farmer, Jyothy was used. The experiment was laid out in randomized block design in plots of 2 x 5 m^2 size. N, P_2O_5, and K_2O fertilizers were applied at the rate of 70 : 35 : 35 kg ha^{-1}. Lime was applied at the rate of 600 kg ha^{-1}. The prophylactic sprayings were given at 25 and 40 days after sowing (DAS) in T(N)1 and 30 and 45 DAS in Jyothy. The curative sprayings were given only after the onset of bacterial blight disease. These were given at 55 and 70 DAS in T(N)1 and 60 and 75 DAS in Jyothy. The disease intensity was scored using standard methods (IRRI, 1980) at 85 DAS in T(N)1 and 90 DAS in Jyothy. Using the disease score, the % disease index was calculated. The grain and straw yield were recorded at the time of harvest.

There was significant reduction in the % disease index after prophylactic spraying with various bactericidal agents except Bactrinol-100 (Table 1). The percentage reduction over control in T(N)1 (34.42) and in Jyothy (34.13) was maximum after spraying with cowdung extract at the rate of 20 g 1" . The extent of

Table 1. Effect of prophylactic and curative sprayings on per cent disease index in T(N)1 and Jyothy (pooled data for additional crop of 1992 and 1993)

Treatment and concentration	Prophylactic spraying				Curative spraying			
	T(N)1		Jyothy		T(N)1		Jyothy	
	% DI	% ROC	% DI	% ROC	% DI	% ROC	% DI	% ROC
Streptocycline 500 ppm	61.86 (51.87)	12.71	36.52 (36.35)	15.03	59.15 (50.27)	16.54	34.27 (34.79)	20.27
Streptomycin + oxytetracycline (1:9) 250 ppm	60.17 (50.90)	15.10	34.32 (34.77)	20.15	56.11 (48.51)	20.83	33.86 (34.49)	21.22
Streptomycin + oxytetracycline (1:9) 500 ppm	54.79 (47.78)	22.69	28.93 (31.62)	32.69	47.92 (43.80)	32.38	28.41 (31.36)	33.90
Bactrinol-100, 500 ppm	69.78 (56.79)	1.54	38.93 (37.97)	9.42	61.12 (51.43)	13.76	37.94 (37.35)	12.65
Cowdung extract 20 g/l	46.48 (42.95)	34.42	28.31 (31.18)	34.13	39.54 (38.91)	44.21	27.32 (30.70)	36.44
Control (no spray)	70.87 (57.70)		42.98 (40.48)		70.87 (57.70)		42.98 (40.48)	

DI = Disease index; ROC = Reduction over control; CD(0.05) for treatment = 3.78; Figures in parentheses are transformed percentages in degrees

Table 2. Interaction between variety and method of spraying on per cent disease index in T(N)1 and Jyothy (pooled data for additional crop of 1992 and 1993)

Variety	Methods of spraying	
	Prophylactic	Curative
T(N)1	50.06	46.58
Jyothy	34.38	33.75
Mean	42.22	40.16

CD(0.05) for methods = 1.19

reduction with 500 ppm streptomycin and oxytetracycline mixture in Jyothy was also on par with above treatment. There was also significant reduction in the % disease index after curative spraying with various plant protection chemicals except Bactrinol-100 in Jyothy (Table 1). The per cent reduction of 44.21 in T(N)1 and 36.44 in Jyothy was maximum after spraying with cowdung extract at the rate of 20 $g1^{-1}$. The extent of reduction after spraying with 500 ppm streptomycin and oxytetracycline mixture in Jyothy was also on par with the above treatment. Between the two methods of spraying, significant reduction in per cent disease index was obtained with curative spraying. The mean per cent disease index of 40.16 was significantly low as compared to 42.22 resulting from prophylactic sprayings (Table 2). The yield increase was maximum after spraying with 20 g l^{-1} of cowdung extract after prophylactic spraying. In curative spray-

Table 3. Effect of prophylactic and curative sprayings on grain yield in T(N)1 and Jyothy (pooled data for additional crop of 1992 and 1993

Treatment and concentration	Prophylactic spraying				Curative spraying			
	T(N)1		Jyothy		T(N)1		Jyothy	
	% GY	% IOC	% GY	% IOC	% GY	% IOC	% GY	% IOC
Streptocycline 500 ppm	4.85	0.21	5.30	7.29	4.99	3.10	5.74	16.19
Streptomycin + oxytetracycline (1:9) 250 ppm	4.90	1.24	5.35	8.30	4.99	3.10	5.80	17.41
Streptomycin + oxytetracycline (1:9) 500 ppm	5.03	3.93	5.44	10.12	5.16	6.61	6.51	31.78
Bactrinol-100, 500 ppm	4.80	-0.83	4.90	-0.81	4.98	2.89	5.28	6.88
Cowdung extract 20 g/l	5.14	6.20	5.58	12.96	5.12	5.79	6.43	30.16
Control (no spray)	4.84		4.94		4.84		4.94	

GY = Grain yield; IOC = Increase over control; CD(0.05) for treatment = 0.66

Table 4. Effect of prophylactic and curative sprayings on straw yield in T(N)1 and Jyothy (pooled data for additional crop of 1992 and 1993)

Treatment and concentration	Prophylactic spraying				Curative spraying			
	T(N)1		Jyothy		T(N)1		Jyothy	
	% SY	% IOC	% SY	% IOC	% SY	% IOC	% SY	% IOC
Streptocycline 500 ppm	4.85	8.02	5.07	12.92	5.03	12.03	4.99	11.14
Streptomycin + oxytetracycline (1:9) 250 ppm	4.96	10.47	5.13	14.25	5.21	16.04	5.15	14.70
Streptomycin + oxytetracycline (1:9) 500 ppm	5.16	14.92	5.28	17.59	5.49	22.27	5.31	18.26
Bactrinol-100, 500 ppm	4.76	6.01	4.88	8.69	4.43	-1.34	4.41	-1.78
Cowdung extract 20 g/1	5.14	14.48	5.39	20.04	5.43	20.94	5.71	27.17
Control (no spray)	4.49		4.49		4.49		4.49	

SY = Straw yield; IOC = Increase over control; CD(0.05) for treatment = 0.57

ing the increase in grain yield was significant in all the treatments in Jyothy except with Bactrinol-100. The maximum increase was 31.78% after spraying with 500 ppm streptomycin and oxytetracycline mixture.

There were significant differences in straw yield in both T(N)1 and Jyothy affected with bacterial blight after prophylactic and curative spraying with different bactericidal agents. The straw yield of 5.16 and 5.14 t ha^{-1} in T(N)1 after spraying with 500 ppm streptomycin and oxytetracycline mixture and cowdung extract @ 20 g l^{-1} and 5.07, 5.13, 5.28 and 5.39 t ha^{-1} in Jyothy after spraying with streptocycline, streptomycin and oxytetracycline mixture of 250 and 500 ppm and cowdung extract, which were significantly higher than that of the respective control treatments (Table 4). The straw yield of 5.21, 5.49 and 5.43 t ha^{-1} in T(N)1 and 5.15, 5.31 and 5.71 t ha^{-1} in Jyothy after spraying with streptomycin and oxytetracycline mixture of 250 and 500 ppm and cowdung extract was significantly higher than that of the respective control treatments (Table 4). The per cent increase in straw yield of 22.27 in T(N)1 and 27.17 in Jyothy was however maximum after spraying with 500 ppm streptomycin and oxytetracycline mixture and cowdung extract @ 20 g l^{-1} respectively.

These results indicated that cowdung extract @ 20 g l^{-1} could be effectively used for the control of bacterial blight disease as a substitute of costly phyto-antibiotic preparations. Cowdung extract (20 g l^{-1}) controlled bacterial blight of rice equivalent to that of antibiotics or better than some of the antibiotics (Mary *et al.*, 1986; Sreekumar and Nair, 1990). In this investigation, it was also found that curative spraying would be most effective for the control of bacterial blight disease in Kuttanad.

College of Agriculture
Thiruvananthapuram 695 522, India

C.A. Mary
S. K. Nair, P. Saraswathy

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