Research Paper :

Evaluation of new molecules in the management of bacterial blight of paddy in India

SHRIPAD KULKARNI AND SHAMRAO JAHAGIRDAR

International Journal of Plant Protection, Vol. 4 No. 2 (October, 2011) : 289-291

See end of the article for authors' affiliations

Correspondence to :
SHAMRAO JAHAGIRDAR
Department of Plant Pathology, A.I.C.R.P. on Soybean, University of Agricultural Sciences, DHARWAD (KARNATAKA) INDIA
Email : shamaraoj@gmail.com

SUMMARY

The present study comprised of eight different treatments taken up at Agricultural Research Station (ARS), Gangavati, University of Agricultural Sciences (UAS), Dharwad during *Kharif* 2004 and 2005. The study over two years revealed that spraying with Rhizocin (Validamycin 3L) 0.20 % recorded minimum (7.80) Per cent Disease Index (PDI) followed by 11.80 PDI in case of spraying with Kasu B (Kasugamycin 3SL) 0.20%. However, application of positive check Agrimycin 0.05% alone recorded incidence of 19.40 PDI. The untreated check recorded maximum PDI (33.18 PDI). Maximum seed yield of 54.97q/ha was recorded in Rhizocin 0.20% followed by 51.60q/ha in Kasu B0.20%.Minimum seed yield of 46.04q/ha was recorded in untreated check. The use of new antibiotic molecules like Rhizocin and Kasu B not only significantly reduced the disease pressure but also increased the grain yield when compared to positive checks Agrimycin and Copper fungicide. The present findings opened a new window of opportunity in utilization of new antibiotic molecules like Rhizocin @0.20 and Kasu B@0.20 as one of the spray components in developing strategic management schedule against bacterial blight of rice in India.

Kulkarni, Shripad and Jahagirdar, Shamrao (2011). Evaluation of new molecules in the management of bacterial blight of paddy in India. *Internat. J. Plant Protec.,* **4**(2): 289-291.

Key words : New molecules, Rhizocin, Kasu B, Management of bacterial blight

Received : *March, 2011*
Revised : *June, 2011*
Accepted : *August, 2011*

Rice is perhaps the most widely cultivated food crop all over the world, whose production is constrained by diseases of fungal, bacterial and viral origin. Bacterial leaf blight (BB) of rice, caused by *Xanthomonas oryzae* pv. *oryzae* (*Xoo*) is one of the oldest known diseases and was first noticed by the farmers of Japan in 1884 (Tagami and Mizukami,1962). Subsequently, its incidence has been reported from different parts of Asia, northern Australia, Africa and USA. The disease is known to occur in epidemic proportions in many parts of the world, incurring severe crop loss of up to 50%. Crop loss assessment studies have revealed that the disease reduces grain yield to varying levels, depending on the stage of the crop, degree of cultivar susceptibility and to a great extent, the conduciveness of the environment in which it occurs. The regular occurrence of the disease in one region in ephiphytotic form has aggravated the problem causing heavy economic loss during the last few years. The severity and significance of damages caused by infection have necessitated the development of strategies to control and manage the disease, so as to reduce crop loss and to avert an epidemic. Though the use of Bordeaux mixture, antibiotics and other copper and mercurial compounds were resorted to in the early fifties, environmentally safe and stable chemical control agents rendering control at very low concentrations are yet to be developed. Today, the exploitation of host resistance appears to be the only reliable method of disease management but still there are no stable genotypes available for cultivation. The lack of resistant cultivars and adolescence of old molecules and to tackle fungicide resistance problem present study was aimed in screening the effectiveness of new molecules against bacterial blight of rice in Northern Karnataka. The results of the study are discussed in this paper.

MATERIALS AND METHODS

The present study comprised of eight different treatments taken up at Agricultural Research Station (ARS), Gangavati, University

of Agricultural Sciences (UAS), Dharwad during *Kharif* 2004 and 2005. The treatments were applied twice with first one immediately after appearance of blight symptoms in the field and subsequently at 10 days interval. Eight different treatments comprised of different antibiotics and positive checks were evaluated against bacterial blight.

Each treatment was replicated three times with a plot size of 3m x 5 m on susceptible cultivar BPT 5204. The receipt of more than normal rainfall during August and September months resulted in development of blight during the season. Thus, the season was more congenial for development of strategies for blight management. Observations on bacterial blight severity were recorded as per the scale of Mayee and Datar (1986) when the crop was 85-90 days old. For scoring the intensity of blight, ten plants were randomly selected in the central rows of the plots. The per cent disease index (PDI) was further calculated using the formula of Wheeler (1969) and seed yield (q/ha) was also recorded. The data were statistically analysed as per Panse and Sukhatme (1987).

RESULTS AND DISCUSSION

During 2004, spraying with Rhzocin@0.20% recorded minimum (5.33) Per cent Disease Index (PDI) followed by 6.67 PDI in case of Streptomycin sulphate@0.05%. However, application of check antibiotic Agrimycin@0.05% recorded incidence of 16.00 PDI. The untreated check recorded maximum PDI of 22.67. Maximum seed yield of 62.99q/ha was recorded in Rhizocin@0.20% followed by 58.92q/ha in Kasu B treatment. However, minimum seed yield of 54.09q/ha was recorded in untreated check. The results of *Kharif* 2005 showed that Rhizocin 0.20% recorded minimum (10.37) Per cent Disease Index (PDI) followed by 17.03 PDI in case of spraying with Kasu B 0.20%. However, application of positive check Agrimycin 0.05% alone recorded minimum incidence of 22.96 PDI. The untreated check recorded maximum disease intensity of 43.70 PDI. Spraying with Rhizocin@ 0.20% and Kasu B0.20% were found stastically at par with each other and superior to positive check Agrimycin. In all Rhizocin and Kasu B treated plots, the foliage remained green till maturity that has resulted in better seed yield and reduction of disease pressure which may be due to systemic acquired resistance (SAR) which needs further investigation. Maximum seed yield of 46.95q/ha was recorded in Rhizocin 0.20 % followed by 44.29q/ha in Kasu B 0.20 % treatment and they were stastically at par with each other. However, minimum seed yield of 37.24q/ha was recorded in untreated check (Table 1).

The study over two years revealed that spraying with Rhizocin 0.20% recorded minimum (7.80) Per cent Disease Index (PDI) followed by 11.80 PDI in treatment involving spraying of Kasu B 0.20%. However, positive check Agrimycin 0.05% alone recorded incidence of 19.40 PDI in comparison with untreated check with maximum PDI of 33.18. Maximum seed yield of 54.97q/ha was recorded in Rhizocin (0.20%) treated plot followed by 51.60q/ha in Kasu B (0.20 %).Minimum seed yield of 46.04q/ha was recorded in untreated check. The use of new antibiotic molecules like Rhizocin and Kasu B not only significantly reduced the disease pressure but also increased the grain yield when compared to positive checks Agrimycin and Copper fungicide.

An ideal agent for chemical control will be one that functions at lowest concentration by either killing or inhibiting the multiplication of the pathogen by blocking an important metabolic pathway. It should also readily translocate and be stable in the plant system and cause minimal damage to the environment. Earlier workers also attempted to control bacterial blight through chemicals like Bordeaux mixture with or without sugar; copper–soap mixture and copper–mercury fungicides recommended spraying copper oxychloride (Sulaiman and

Table 1 : Management of bacterial blight of paddy through antibiotics

Sr. No.	Treatments	Conc. (%)	Disease incidence (PDI)			Seed yield (q/ha)		
			2004	2005	Pooled	2004	2005	Pooled
1.	Control	-	22.67	43.70	33.18	54.09	37.24	46.04
2.	Bacterimycin	0.05	18.67	24.44	21.55	56.69	42.25	49.47
3.	K- cycline	0.05	10.67	30.37	20.50	54.84	38.89	46.49
4.	Streptomycin sulphate	0.05	06.67	25.92	16.29	49.65	41.74	45.69
5.	Rhizocin	0.20	05.33	10.37	7.80	62.99	46.95	54.97
6.	Kasu-B	0.20	06.67	17.03	11.80	58.92	44.29	51.60
7.	Copper oxychloride	0.30	12.00	33.33	22.66	53.35	39.78	46.57
8.	Agrimycin	0.05	16.00	22.96	19.40	56.69	43.14	49.92
	C.D. (P=0.05)		7.70	5.64	6.56	6.96	5.34	6.02

Ahmed, 1965) and streptomycin solution at short intervals to control this disease (Seki and Mizukami, 1956). Chlorinating irrigation water with stable bleaching powder was also reported to be effective in minimizing the disease (Chand *et al*., 1979). Synthetic organic bactericides such as nickel dimethyl dithiocarbamate, dithianone, phenazine and phenazine Noxide were also recommended (Fukunaga, 1966). Spraying techlofthalam was more useful than soil application and it translocated readily and inhibited bacterial multiplication in rice plants (Nakagami, 1980; Takahi, 1985 and Gnanamanickum *et al.*,1999).

The present findings opened a new window of opportunity in utilization of new antibiotic molecules like Rhizocin @0.20 and Kasu B@0.20% as one of spray component in developing strategic management schedule against bacterial blight of rice in India.

Conclusion:

The new antibiotic molecules like Rhizocin@0.20% and Kasu B@ 0.20% be used as one of spray component developing Integrated Disease Management spray schedule against bacterial blight of rice in India which will help in reducing the chemical pesticides usage in long term sustainable management.

Authors' affiliations:
SHRIPAD KULKARNI, Department of Plant Pathology, AICRP on Soybean, University of Agricultural Sciences, DHARWAD (KARNATAKA) INDIA
Email : shripadkulkarni@rocketmail.com

REFERENCES

Chand, T., Singh, N., Singh, H. and Thind, B. S. (1979). *Int. Rice Res.Newsl*., **4** : 12.

Fukunaga, K. (1966). In XI Pacific Science Congress, Tokyo.

Gnanamanickam, S.S., Brindha Priyadarisini, V., Narayanan, N. N., Preeti Vasudevan and Kavitha, S. (1999). An overview of bacterial blight disease of rice and strategies for its management. *Curr. Sci.*, **77** : 1435-1443.

Mayee, C.D. and Datar, V.V. (1986). Phytopathometry. Tech. Bull. 1. Marathwada Agricultural Univ., Parbani, India 91pp.

Nakagami, K., Tanaka,H., Ishida, M. and Koremura, M. (1980). *J. Pestic. Sci*., **5** : 237–242.

Nakagami, K., Tanaka, H., Yamaoka, K. and Tsujino, Y., (1980). *J. Pestic. Sci.*, **5** : 607–609.

Panse, V.G. and Sukhatme, P.V. (1987). Statistical methods for agricultural workers, Indian Council of Agric. Res.,381p.

Seki, M. and Mizukami, T. (1956). *Kyushu agric. Res.*, **17** : 98.

Sulaiman, M. and Ahmed, L. (1965). *Indian Farming*, **15** : 27–29.

Takahi, Y. (1985). *Jpn. Pestic. Inf.*, **46** : 25–30.

Tagami, Y. and Mizukami, T. (1962). *Spec. Rep. Plant Dis. Insect Pest Forecasting Serv. Minist. Agric. Jpn.*, **10** : 1–112

Wheeler, B.E.J. (1969). *Introduction to Plant Disease*. John Wiley Sons Ltd., London, 301 pp.

****