SHORT COMMUNICATION

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Efficacy of Tebuconazole 25%WG against blast and sheath blight diseases of rice in Central Western Ghats of Uttar Kannada District

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ABSTRACT

A new molecule Tebuconazole 25% WG was tried against blast and sheath blight diseases of rice during wet season 2010-11 and 2011-12 in Paddy Research Station, Malagi. The two years results revealed that, Tebuconazole @0.2% has significantly reduced the blast (17.72%) and sheath blight (10.24%) incidence and correspondingly increased the yields (41.40 q/h). The maximum blast (62.07%) and sheath blight (28.16%) was recorded in untreated control plots with lower yields (22.96 q/h). Hence, Tebuconazole @ 0.2% can be recommended as an alternate molecule to existing fungicides for effective management of blast and sheath blight diseases of paddy.

Key words: *Rice, blast, sheath blight, Tebuconazole, Hexaconazole*

Rice is one of the most important cereal crops of family poaceae. About 90 per cent of world's rice is produced and consumed in Asia alone. Rice is one of the diverse crops grown in different agroclimatic conditions and is the second largest cereal crops in the world, and Asia is the home for more than half of world's poor and more than half of world's rice cultivators Disease management through newer molecules play crucial role as some of the popular varieties are becoming susceptible to blast and sheath blight diseases of paddy. Blast disease of paddy caused by *Magnaporthe oryzae* B. Couch sp. Nov. is one of the major constraints to rice production. Rice blast is more important in upland and rainfed low land ecosystems than in other ecologies. This disease still remains one among the most serious biotic constraints to rice yield in South Asia. It has been estimated that about sixty per cent of the total yield was affected by blast and approximately 6.5 million tons of paddy lost in Thailand (Disthaporn, 1994). Among the systemic fungicides tested for blast control the most widely used are kitazin and tricyclozole (Mizutani *et al.*, 1995). Resurgence of resistant strains of *M.grisea* is a well known phenomenon and several research articles have been well documented (Lalithakumari and Annamali 1990).

Sheath blight of rice caused by *Rhizoctonia solani* is another most important disease of rice occurring in all the rice growing regions of the world causing considerable loss in grain yield (Ou 1985: Savary *et al.*, 2006). Annual yield losses up to 40 % were reported with sheath blight under optimum conditions of disease development (Tan Wan Zhong *et al.*, 2007). The importance of these diseases in Karnataka has increased in recent years and appeared in severe form and has caused considerable losses in grain yields during wet season 2011 and 2012 in hill zone of Uttara Kannada district. Many epidemics of rice diseases have occurred resulting in threat to food security (Thind, 2002).

Currently these diseases are being managed by application of chemical fungicides such as carbendazim, mancozeb,chlorothalonil, propiconazole etc and many workers have reported carbendazim as the most effective against blast and sheath blight diseases (Pandiaraja Kumar, 1992: Narayanaprasad *et al.*, 2011).

Though same chemical fungicides are being widely used to control blast and sheath blight diseases, but continuous over use of fungicides leaves harmful residues causing environmental pollution and results in the development of resistance in the plant pathogens. As such experimenting new molecule of fungicides is a continuous process and use single molecule to multiple diseases is yet another challenge to effectively reduce the disease over time and reduce the cost of the grower. Therefore, the experiment was carried out in Paddy Research Station, Malagi, Uttarr kannada of University of Agricultural Sciences, Dharwad during wet season 2011-12 and 2012-13.

To know the efficacy of Tebuconazole on severity of blast and shaeath blight experiment was conducted during wet season 2010-11 and 2011-12 at Paddy research station of Malagi, Uttara Kannada District. The susceptible cultivar Abhilash was planted in plot size of 4X2 m^2 in a randomized complete block design with seven treatments and three replications. Thirty days old seedlings of a susceptible rice variety (Abhilash) were planted and the crop was raised following recommended package of practices. The first spray was given immediately after the onset of the disease and subsequent spray at 15 days interval. The details of the treatments are as follows.

Table 1. The treatments use for efficacy of Tebuconazole 25%WG against blast and sheath blast of rice.

Treatments	Dosage g or ml /lit
Tebuconazole 25%WG	0.1%
Tebuconazole 25%WG	0.15%
Tebuconazole 25%WG	0.2%
Market sample of Tebuconazole 25%EC)	0.15%
Kitazin 48 %EC (Check for blast)	0.2%
Hexaconazole 5EC (Check for sheath blight)	0.1%
Untreated Control	-

Percent Disease Index (PDI) for blast and sheath blight (before and after sprays) and yield of paddy (q ha^{-1}) was recorded and analysis was done using standard statistical methods.

In each microplot, 10 plants were randomly selected and graded for blast and sheath blight diseases using 0-9 scale as given below.

Percent Disease Index was calculated as per the following formula (Wheeler, 1969)

$$\text{Percent Disease Index} = \frac{\text{Sum of numerical ratings}}{\text{Total no of plants x maximum grade}} \text{x100}$$

Blast disease scoring (0-9)

Grades	Description
0	No lesions
1	Small brown specks of pinhead size without sporulating centre.
2	Small roundish to slightly elongated, necrotic grey spots,about1 2 mm in diameter with a distinct brown margin and lesions are mostly found on the lower leaves.
3	Lesion type is the same as in scale 2, but significant number of lesions are on the upper leaves
4	Typical sporulating blast lesions, 3mm or longer, infecting less than 2% of the leaf a
5	Typical blast lesions infecting 2-10% of the leaf area.
6	Blast lesions infecting 11-25% leaf area.
7	Blast lesions infecting 26-50% leaf area.
8	Blast lesions infecting 51-75% leaf area.
9	More than 75% leaf area affected.

Shaeath blight disease scoring (0-9)

Grades	Description
0	No infection
1	Vertical spread of the lesions up to 20% of plant height.
3	Vertical spread of the lesions up to 21-30% of plant height.
5	Vertical spread of the lesions up to 31-45% of plant height.
7	Vertical spread of the lesions up to 46-65% of plant height.
9	Vertical spread of the lesions more than 66% of plant height.

The leaf blast and sheath blight diseases were observed in the early stages of crop growth and the incidence of both diseases were considerably more compared to the I season (2010-11). Due to the timely operations and weather conditions the disease did not spread to panicles. Hence, observations were recorded for only the leaf blast incidence. The effect of Tebuconazole 25% WG against blast and sheath blight disease in paddy is presented in Table 1. The treatments differed significantly for the incidence of diseases and yield of paddy at the later stages of crop growth.

Percent disease incidence was recorded in all the treatments before spray and results revealed no significant difference among the treatments where, the PDI ranged between 10.37 to 15.19 per cent for leaf blast incidence. While, it was ranged from 9.17 to 12.80 per cent for sheath blight disease incidence. However, after two sprays at 15 days interval significant variation was observed in blast disease occurrence between the treatments. The results revealed that, Tebuconazole @ 0.2% (T_3) has considerably reduced the blast incidence (13.28%) followed by tebuconazole sprayed @0.15% (T_2) where in, blast was recorded 21.96 per cent which is found on par (23.67%) with market sample of Tebuconazole (T_4). However, tebuconazole used at 0.1 per cent (25.21%) and kitazin @ o.2% (26.21%) were found to be the next best effective treatments *vis-a vis* untreated control (T_7) which has recorded maximum blast incidence of 52.87 per cent. There was no significant difference among the treatments in reducing the sheath blight incidence ranging from 11.17 to 12.76%. Highest sheath blight incidence was recorded (T_7) in the untreated check plots (27.19%). During the second season 2011-12 tebuconazole @0.2% was found significantly superior (22.16%) in reducing the leaf blast incidence as compared to even the recommended check (T_5) in which disease recorded was 40.11 per cent and maximum of 71.26 per cent in untreated control (T_7). In comparison to 2010-11 sheath blight occurrence was significantly reduced in (T_3) which was sprayed with tebuconazole @0.2% and found on par with (T_6) hexaconazole (9.29%) sprayed plots and also which is already in recommendation. The maximum sheath blight incidence (29.13%) was recorded in the untreated control plots (T_7).

The trend in reduction of two diseases of paddy has reflected in the yields (Table 1). The maximum yield 44.40 q/h and 39.40 q/h were recorded in the (T_3) plots during 2010 and 2011 respectively. This is found to be on par with T6 (34.73q/h and 39.10q/h), while treatments T4, T_5 and T_2 were the next best effective treatments in obtaining the yields. The minimum yields of 27.80 q/h and 18.12q/h were recorded in the untreated control plots (T_7). Similar trend of yield were recorded in the pooled analysis (Table 2).

Singh and Sunder, 2015, reported that, use of combination product Trifloxistrobin 25% + Tebuconazole @50% at 0.4g/l reduced the blast incidence from 23.75 to 9.18% along with significant increase in grain yield. Trifloxistrobin 25% + Tebuconazole @50% and propiconazole have been found highly effective in managing sheath blight of rice (Hunjan *et al.*, 2011).

Thus the result indicated that, foliar spray with tebuconazole @ 0.2% and hexaconazole @ 0.1% at disease appearance stage (38 days after transplanting) and 68 days was effective in reducing incidence of both blast and sheath blight diseases and increased the nut yields. These results are well collaborated with the earlier findings (Narasimha Rao *et al.*, 2012).

Field efficacy of Tebuconazole @0.1% has considerably reduced the wilt disease of pomegranate caused by *Ceratocystis fimbriata* (Bhosekar and Ambadkar, 2015). Hegde, GM (2014) reported the significant reduction of sigatoka leaf spot of banana

Table 2. Efficacy of tebuconazole 25% WG against blast and sheath blight of rice (pooled analysis)

Treatments	Dosage	Disease incidence (%)				Yield
	(g or ml/lit)	Before spray	After two sprays			(q/ha)
		Leaf Blast	Sheath blight	Leaf Blast	Sheath blight	
Tebuconazole 25%WG	0.1%	19.68(26.35)	13.0(21.13)	29.20(32.71)	12.26(20.53)	28.91
Tebuconazole 25%WG	0.15%	14.12(22.06)	9.89(18.34)	26.21(30.79)	12.17(20.44)	32.43
Tebuconazole 25%WG	0.2%	16.30(23.81)	9.84(18.24)	17.72(24.58)	10.24(19.28)	41.40
Market sample of tebuconazole 25%EC	0.15%	16.35(23.89)	11.92(20.18)	28.64(32.39)	11.93(20.18)	32.02
Kitazin 48 %EC (Check for blast)	0.2%	16.28(23.81)	11.60(19.91)	33.16(35.18)	12.71(20.44)	31.69
Hexaconazole 5EC (check for sheath blight)	0.1%	-	10.95(19.39)	-	10.90(18.80)	41.14
Untreated Control	-	18.79(25.70)	12.96(21.05)	62.07(52.00)	28.16(32.08)	22.96
S.Em±		1.21	1.18	1.36	1.26	1.19
CD (P<0.05)		NS	NS	3.89	3.78	3.57

* Figures in parentheses are angular transformed values

and maximum yields of banana in the plots sprayed with Hexaconazole @0.1%. Bhuvaneswari and Raju, 2013 reported that, hexaconazole 5%EC @ 2ml/l has considerably reduced sheath blight of rice (13.9%) compared to control (62.4%). Fungicidal control of the sheath blight disease has been successful at field level in majority of the cases (Kandhari *et al.*, 2003). The application of traizole compounds were found effective in reducing the diseases of paddy by other workers (Surulirajan and Khandari 2003: Krishnam Raju et al 2008).

In China, Chen *et al*, (2013), observed that rice pathogen was very sensitive to EBI fungicides such as tebuconazole, difenconazole, hexaconazole and propiconazole.

Although losses due to plant diseases may be reduced by the use of disease resistance cultivars, crop rotation or sanitation practices, fungicides are often essential to maximize crop yields. Fungicides can play an important role in ensuring crop health security by managing devastating diseases in agricultural crops. Fungicides play important role in improving food quality and also contribute to food safety by controlling many fungi that produce mycotoxins such as aflotoxins,ergot toxins, *Fusarium toxins*, patulin and tenuazonic acid (Knight *et al.*, 1997). Fungicides are now well considered to be the second line of defense in plant disease control after disease resistance (Thind, 2015).

It is expected that, fungicides will continue to play a role in disease management programs, especially in intensive production systems. However, to maintain their effectiveness and to minimize their effect on human health and on the environment, they should be used in a rational and informed way.

REFERENCES

Bhosekar AS and Ambadkar CV 2015. Field efficacy of different fungicides against *Ceratocystis fimbriata* causing wilt of pomegranate. *J.Pl.Dis.Sci*.10 (1): 2015: 23-26.

Bhuvaneswari V and Raju VK 2013. Efficacy of new fungicides of strobilurin group against rice sheath blight caused by *Rhizoctonia solani*. *J.Mycol.Pl Pathol*.43 (4): 2013, 447-451

Chen Y Zhang Y Yao J Li YF Yang X Wang WX, Zhang AF and Gao TC 2013. Frequency distribution of sensitivity of Ustilaginoidea virens invades through small gap at the apex of a rice spikelet before heading. *J.General Pl.Pathol*, 78: 228-259.

Distahporn S 1994. Current rice blast epidemics and their management in Thailand. In: Rice blast disease. CAB, International, Wallingford, UK, pp 331-342.

Hegde GM Nargund VB and Nayak GV 2014. Onion twister disease and its management in coastal parts of the Karnataka state, *Ind J Pl Prot 43(1):2015*

Hegde G M and Mesta R K 2014. Integrated management of sigatoka leaf spot of banana, The Bioscan 9 (1): 359-362,ISSN 0973-7049.

Hunjan MS Lore JS Pannu PPS and Thind TS 2011. Performance of some new fungicides against sheath blight and brown spot of rice. *Pl.Dis.Res*.26:61-67

Kandhari J Gupta R L and Kandhari J 2003. Efficacy of fungicides and resistance inducing chemicals against sheath blight of rice. *J Mycol Res* 41: 67-69.

Knight SC, Anthony VM, Brady AM, Greenland AJ, Heaney SP, Murray DC, Powell KA, Schulz MA, Spinks CA Worthington PA and Youle D 1997. Rationale and perspectives on the development of fungicides. *Ann. Rev.Phytopat* 35: 349-372.

Krishnam Raju S, Vijay Krishna Kumar K and ramabhadra Raju M 2008. Efficacy of tebuconazole against sheathblight of rice. Ind J Pl Prot 36: 98-101

Lalithakumari D and Annamalai P 1990. Edifenphos resistance in *Pyricularia oryzae* and *Drechslera oryzae*. In : Proc I international symposium in managing resistance to Agrochemicals. Pp 249-263.

Mizutani A Yukioka H Tamura H Miki N Masuko M and Take R 1995. Respiratory characteristics in Pyricularia oryzae exposed to a novel alkoxyminoacetamide fungicide. Phytopathology 85: 306-311.

Narasimha Rao Ravindrakumar and Ananadraj M 2012. Management of leaf spot of turmeric incited by *Colletotrichun capsici* through fungicides. *J. Spices Aromatc crops* 21: 151-154.

Narayanaprasad Jagadeesh BR, Shivakumarum GB, Prasad PS, Sudarshan GK and Sunil kumar N. 2011. Studies on the nature and properties of sheath rot causing seed borne pathogen on rice. *Int J Sci Nat* 2: 317-320

Ou SH 1985, Rice diseases, Second Edition, C.A.B International Mycological Institute publication,pp.109-121.

Pandiaraja Kumar S 1992. Studies on sheath rot of rice. M.Sc (Ag) Thesis, Tamil Nadu Agricultural University, Coimbatore, India. 181 pp.

Rao K M 2010. Rice blast disease, I[st] Ed, Daya publishibg house, Delhi, P.1

Savary S and Mew TW 1996. Analysing crop losses due to *Rhizoctonia solani:* rice sheath blight, a case study. In: Sneh , Javali Hare S, Neate S,Dijst G (eds) *Rhizoctonia sps*, taxonomy, molecular biology, ecology, pathology and disease control, Kluwer, Dordrecht, pp237-244.

Surulirajan M Kandhari Janki 2003. Screeining of *Trichoderma viride* and fungicides against *Rhizoctonia solani. Annu Pl Prot Sci* 11: 382-384

Singh R and Sunder S 2015. Identification of sources of resistance to blast and false smut of rice and their management with fungicides. *J. of Mycol. Pl.Pathol*. 45(1):55-59.

Thind S 2002. Plant disease scenario in Punjab and Himachal Pradesh, In: Proceedings of the training course on integrated approaches in Plant Disease management for sustainable Agriculture. Thind BS, Cheema SS, Kang, KS and Prem, R.(Eds), PAU, Ludhiana. Pp1-3.

Thind BS 2015. Relevance of fungicides in the present day crop protection and the way ahead. *J.Mycol. Pl. Pathol* 45 (1): 4-12.

Tan Wan Zhong, Zhang Wei, Ou Zeng Qi, Li Cheng Wen, Zhou Guan Jun, Wang Zhi Kun and Yin Li L. 2007. Analyses of temporal development and losses due to sheath blight of rice (*Rhizoctonia solani*) *Agric Sci China* 6: 1074-1081.

Wheeler B EJ 1969. An Introduction to Plant Diseases, John Wiley and Sons Ltd. London, p. 301.