



Management of Rice Sheath Blight with New Chemicals in Srikakulam District of Andhra Pradesh, India

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Rice sheath blight is one of the most economically important rice diseases in the world. Sheath blight, a soil-borne disease caused by the fungus *Rhizoctoniasolani* AG1-IA (Teleomorph: *Thanatephorus cucumeris* (Frank) Donk), is a devastating disease. The disease leads to a significant drop in grain yield and quality and yield losses of up to 50% have been reported under the most favorable circumstances. Despite farmers' chemical control measures against the disease, pathogen causes serious early crop losses every year. KVK Srikakulam conducted on farm trials on Sheath blight management in paddy fields to inform farmers about new and highly effective chemicals during Kharif, 2020 and 2021. A recent new chemical, Azoxystrobin 11% + Tebuconazole 18.3% (T1) at 1.5 ml/l was effective in reducing the incidence of the disease, recorded 88.2% and 81% disease incidence during 2020 and 2021,

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respectively. Trifloxystrobin 11% + tebuconazole 75% (T2) at 0.4 g/l was also comparable to T1, registering disease incidence of 82% and 75% in 2020 and 2021, respectively. Whereas, in the Propiconazole 11.4% @ 1.0ml/l treatment (Farmers method), the incidence in 2020 was only 67.0% and the incidence in 2021 was 65.0%. Azoxystrobin 11% + Tebuconazole 18.3% treated plots produced higher yields compared to farmers' practices. Although the chemical is more expensive than what farmers typically use, disease incidence is significantly reduced after just one spray and results in higher product yields.

Keywords: Azoxystrobin + tebuconazole rice; sheath blight; strobilurins; trifloxystrobin + tebuconazole.

1. INTRODUCTION

Rice (*Oryza sativa* L.) is one of the most important cereals in the world, consumed by 50% of the world's population [1]. In India, it is planted on 53.2 million hectares with a total production of 99.8 million tonnes. The crop is also a major food crop grown in Srikakulam district of Andhra Pradesh with 200,000 ha (Hand book of Statistics [2]). This rice crop is affected by various biological factors (i.e. pests and diseases) which lead to a decrease in grain quality and yield. Among various diseases, sheath blight (ShB), caused by Teleomorph: *Thanatephorus cucumeris* (Frank) Donk, is a devastating disease worldwide, causing significant yield loss and quality decline. The disease was once considered a condition purely of scientific curiosity. However, it is now taking on greater significance and importance in various rice-growing countries. It now ranks second among economic losses in tropical and temperate regions and has become an important disease of great concern. Losses due to sheath blight disease generally vary from 30 to 40 per cent and may be even 100 per cent in endemic areas [3]. The disease develops rapidly during flowering, when rice leaves are densest, creating a microclimate conducive to the growth and spread of the pathogen, especially when relative humidity is high. Under field conditions, fungicide-based management was most effective in most cases [4-6]. Despite the chemical control of the disease by farmers, under field conditions the disease causes severe early crop losses with yield losses of up to 25-30% each year. Many farmers in the Srikakulam region still routinely use the old common chemicals two or three

times, even though there are several new combinations of effective chemicals on the market. Recently, Azoxystrobin 18.2% + Tebuconazole 18.3% SC, Kresoxim Methyl 40% + Hexaconazole 8%, Azoxystrobin 18.2% + Difenconazole 11.4% SC, Trifloxystrobin 25% + Tebuconazole 50% 75WG and Kasugamycin 5% + Copper oxy chloride 45% have been listed to show the control of sheath blight under field conditions [7,8]. Continued use of the same group of fungicides with the same mode of action can lead to resistant strains of the same fungus, so there is a need to find new molecules with different modes of action. KVK Srikakulam has carried out the onfarm trial for the management of Sheath blight in paddy fields using new molecules Azoxystrobin 11% + Tebuconazole 18.3% to educate farmers about new effective chemicals in 2020 and 2021 and provide clarification to farmers.

2. MATERIALS AND METHODS

This trial was conducted at five selected locations in Srikakulam district of Andhra Pradesh, India with the following.

Plots of 0.2 ha at each location were sprayed as soon as the disease was observed. A single spray was applied during the vegetative/ tillering stage of the crop to control sheath blight.

Observations were recorded for the percentage incidence of the disease and the yield (Kg/ha) in the treated plots. Record the disease incidence (DI) using the following formula Disease incidence = (Number of infected tillers / Total number of tillers) x 100 [9].

List 1. Details of locations and crop variety

Village	Mandal/Block	GPS location	Variety
Chintada	Srikakulam	18.39; 83.89	Swarna (MTU 7029)
NT Wada	Amadalavalasa	18.43; 83.82	Swarna (MTU 7029)
Kondavaalasa	Sarubujjili	18.45; 83.92	Swarna (MTU 7029)
KP Valasa	Polaki	18.41; 84.04	Swarna (MTU 7029)
Ambavilli	Hiramandalam	18.61; 83.97	Swarna (MTU 7029)

Table 1. Efficacy of azoxystrobin 11% + tebuconazole 18.3% on the management of Sheath blight incidence in paddy

Treatments	Dosage	2020-21			2021-22		
		% DI Pre-Spraying	DI After one spray	% Decrease in disease	% DI Pre-Spraying	% DI After one spray	% Decrease in disease
T1: Azoxystrobin 11% + Tebuconazole 18.3%	1.5ml/l	38	4.4	88.2	32	6.1	81.0
T2: Trifloxystrobin + Tebuconazole 75WG	0.4g/l	35	5.8	82.7	32	7.5	75.0
T3: Control/ Farmers practice - Propiconazole 25 EC	1ml/l	38	10.6	69.2	32	11.2	65.0
Sd (p=0.05)	-	-	1.79	-	-	1.38	-

Table 2. Sheath blight incidence, yield and Economic particulars in paddy during 2020-21 and 2021-22

Treatments	2020-21				2021-22			
	% DI	% Decrease over control	Yield (Kg/ha)	BC Ratio	% DI	% Decrease over control	Yield (Kg/ha)	BC Ratio
T1: Azoxystrobin 11% + Tebuconazole 18.3%	4.4	58.4	5670	1: 2.25	6.1	45.5	5890	1:2.29
T2: Trifloxystrobin + Tebuconazole 75WG	5.8	45.8	5366	1:2.18	7.5	36.0	5560	1:2.20
T3: Control/ Farmers practice - Propiconazole 25 EC	10.6	-	5164	1:1.98	11.2	-	5210	1:2.09

List 2. Treatment details

Treatments	Particulars
T-1	Spraying of Azoxystrobin 11% + Tebuconazole 18.3% 1.5ml/l at tillering stage OR after disease initiation
T-2	Spraying of Trifloxystrobin + Tebuconazole 75WG @ 0.4g/l at tillering stage OR after disease initiation
T-3	Control or Farmers practice (Spraying of Propiconazole 25 EC @ 1 ml/l after disease initiation)

3. RESULTS AND DISCUSSION

The results showed that the new chemical Azoxystrobin 11% + Tebuconazole 18.3% (T1) at 1.5ml/l was effective in reducing the incidence of Sheath blight in paddy. The disease incidence percentages recorded in 2020 and 2021 were 4.4 and 6.1 respectively. After spraying with Azoxystrobin 11% + Tebuconazole 18.3% in the tillering stage, the disease incidence decreased to 88% in 2020-21 and 81% in 2021-22 (Table 1). Trifloxystrobin 11%+ Tebuconazole 75% (T2) 0.4 g/l, another strobilurin compound, with incidences of 5.8% and 7.5% in 2020 and 2021, respectively, was on par with the T1. While under usual agricultural practices (propiconazole 11.4% @ 1.0 ml/l) (T3), recorded the disease incidence of 10.6% during 2020 and 11.2 % during 2021. Only 69% and 65% disease reductions were observed in 2020 and 2021 after one spray in T3. Azoxystrobin 120 + Tebuconazole 240 SC @ 830 ml/ha had the lowest incidence of disease of 11.34%, 11.04% and 10.95% after the first, second and third sprays respectively [10]. Among the strobilurins, the fungicides azoxystrobin are widely used due to their effectiveness against sheath blight pathogen [11]. The fungicide combination azoxystrobin 18.2% + difenconazole 11.4% SC (strobilurin + triazole) was more effective against sheath blight than the other individual fungicides reported by Bhuvanewari and Raju [5] Pramesh et al. [12] also showed that the chemical Azoxystrobin 11% + Tebuconazole 18.3% w/w at 1000 ml/ha had the lowest percentage incidence of rice head blight. Current research results have also confirmed the superior efficacy of azoxystrobin 11% + tebuconazole 18.3%.

The highest yields were also recorded in the T1 (Azoxystrobin 11% + Tebuconazole 18.3%) 5670, 5890 kg/ha during 2020-21 and 2021-22, respectively, compared to the farmer's practice (5164 and 5210 kg/ha during 2020 and 2021, respectively) (Table 2). Farmers also expressed

satisfaction that the new molecule is reducing disease. Although the price of pesticides was higher than that of conventional chemicals used in farms, the incidence of disease decreased significantly after one spray, and production increased.

Application of fungicides at various crop stages has been reported to increase yield by reducing disease burden [8,13] Siebold et al., 2004; Previous scientific studies by Bag et al., [14] Sivakumar et al. [12] also reported that 11% azoxystrobin +18.3% tebuconazole were effective in reducing the incidence of bursts and increasing rice yield. It has been also reported that preventive measures are more effective in reducing the incidence of rice blast and sheath blight [15-17].

4. CONCLUSION

Rice sheath blight is one of the most economically important rice diseases in the world. Despite the chemical control of the disease by farmers, under field conditions the disease causes severe early crop losses with yield losses of up to 25-30% each year. Many farmers in the Srikakulam region still routinely use the old common chemicals two or three times, even though there are several new combinations of effective chemicals on the market. The present study concluded that, recent new chemical, Azoxystrobin 11% + Tebuconazole 18.3% (T1) at 1.5 ml/l was effective in reducing the incidence of the disease, recorded 88.2% and 81% disease incidence during 2020 and 2021, respectively. Trifloxystrobin 11% + tebuconazole 75% (T2) at 0.4 g/l was also comparable to T1, registering disease incidence of 82% and 75% in 2020 and 2021, respectively. Azoxystrobin 11% + Tebuconazole 18.3% treated plots produced higher yields compared to farmers' practices. Usage of newer molecules against diseases will offer faster control of the disease, in turn will increase the production.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Luo Y, Tenga PS, Fabellara NG, TeBeestb DO. Risk analysis of yield losses caused by rice leaf blast associated with temperature Changes above and below for five Asian countries. *Agri. Ecosys. & Environ.* 1998;68:197-205.
2. Directorate of economics and statistics. Department of agriculture and farmers welfare. Ministry of Agriculture and Farmers Welfare, Govt. of India; 2021. Available:<https://data.desagri.gov.in/website/index.html>
3. Li F, Cheng LR, Zhou Z, Zhang Y, Cun Y, Zhou YL, Zhu LF, Xa JL, Li ZK. QTL mining for sheath blight resistance using the back cross selected introgression lines for grain quality in rice. *Acta Agronomica Sinica.* 2009;35:1729-1737.
4. Kandhari J, Gupta RL. Efficacy of fungicides and resistance inducing chemicals against sheath blight of rice. *Journal of Mycological Research.* 2003; 41:67-69.
5. Bhuvaneswari V, Krishnam Raju S. Efficacy of new combination fungicide against rice sheath blight caused by *Rhizoctonia solani* (Kuhn) *Journal of Rice Research.* 2012;5(1-2).
6. Kumar PMK, Sidde Gowda DK, Rishikant M, KiranKumar N, Pandurange Gowda KT, Vishwanath K. Impact of fungicides on rice production in India In: *Fungicides showcases of integrated plant disease management from around the world* (Open access chapter). 2013;77-98.
7. Kumar PMK, VeerabhadraswamyAL.. Appraise a combination of fungicides against blast and sheath blight diseases of paddy (*Oryza sativa* L.). *Journal of Experimental Biology and Agricultural Sciences.* 2014;2:49-57.
8. Pramesh D, Maruti K, Muniraju M, Mallikarjun K, Guruprasad GS, Mahanta shiva yogayya K, Reddy BGM, Gowdar SB, Chetana BS. Bio-efficacy of combination fungicide against Blast and Sheath Blight disease of Paddy. *Journal of Experimental Agri. International.* 2016; 14(4):1-8.
9. Prabhakara Rao S, Krishnam Raju S, Krishna Prasadji j., and Y Ashoka Rani 2018 Effect of plant characters on sheath blight disease development. *The Andhra Agric. Journal.* 2018;65 (1): 101-106.
10. Groth DE, Bond JA. Initiation of rice sheath blight epidemics and effect of application timing of azoxystrobin on disease incidence, severity, yield, and milling quality. *Plant Disease.* 2006;90: 1073-1076.
11. Pramesh D, Maruti K, Saddamhusen A, Muniraju K M and Guruprasad GS Anew combination fungicide active ingredients for management of sheath blight disease of paddy. *Advances in Research.* 2017; 8(5):1-7.
12. Sivakumar T, Muthukumar A, Sanjeevkumar K, Balabhaskar P, Sudhasha S. Study of bioefficacy and phytotoxicity of azoxystrobin 120 + tebuconazole 240 SC against sheath blight (*Rhizoctonia solani*) diseases in Rice; 2019.
13. Naik GR, Naik GB, Naik BT, Naik KR. Fungicidal management of leaf blast disease in rice. *Global. Journal of Bioscience and Bio technol.* 2012;1(1):18-21.
14. Bag MK, Yadav M, Mukherjee AK. Bioefficacy of Strobilurin Based Fungicides against Rice Sheath Blight Disease. *Transcriptomics: Open Access,* 2016;04(01).
15. Chitti Babu G, Amara Jyoti P, Mounika, B. Chinnam Naidu DP. Venkata Rao. Real-Time Contingency Measures as a Sustainable Strategy for Managing Biotic Stress in Rice Crop. *International Journal of Environment and Climate Change.* 2023;13(9):803-810.
16. Amarajyothi PD, Chinnam Naidu. Sustainable strategy for managing blast

and sheath blight in flood prone rice. 17. MadhaviGB, Annie G, Grace D, Suresh M. Journal Krishi Vigyan. 2020;9(1): 298-301. Chemical science review and letters. Chem Sci Rev Lett. 2021;(38):247–251.

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