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Evaluation of filia 52.5 se (Tricyclazole 34.2% + propiconazole 10.7%) against rice blast disease

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Abstract
Rice blast disease, caused by the fungal pathogen *Magnaporthe oryzae*, is one of the most damaging plant diseases worldwide. Use of chemicals is an important tool to control rice blast disease. Therefore, a new combination molecule of Filia 52.5 SE (Tricyclazole 34.2% + Propiconazole 10.7%) was tried against leaf and neck blast of rice under field condition. The results from first and second season trial revealed that, Filia 52.5 SE @ 1.5 ml/lit was highly effective against Rice leaf blast, which recorded 79.89 per cent control over untreated check at par with Filia 52.5 SE @ 1.25 ml/lit (79.07%). This was followed by Filia 52.5 SE @ 1.0 ml/lit (72.80%), Tricyclozole 75 WP @ 0.8 g/lit (71.02%). Untreated check recorded a PDI of 25.56 at 15 days after 2nd spray. Similarly, the second season also, Filia 52.5 SE @ 1.5 ml/lit was highly effective against Rice leaf blast, which recorded 79.89 per cent control over untreated check at par with Filia 52.5 SE @ 1.25 ml/lit (79.07%). This was followed by Filia 52.5 SE @ 1.0 ml/lit (72.80%), Tricyclozole 75 WP @ 0.8 g/lit (71.02%). In both seasons, the control of neck blast also, similar trend was exhibited among the various treatments and Filia 52.5 SE @ 1.5 ml/lit and 1.25 ml/lit were very effective and at par with each other in checking neck blast. Filia 52.5 SE at 1.5 and 1.25 ml/lit recorded significantly higher grain yields, which were on par with each other and followed by Filia 52.5 SE @ 1.0 ml/lit in both seasons.

Keywords: Rice, Rice leaf and neck blast, Filia 52.5 SE

Introduction
Rice (*Oryza sativa* L.) is considered one of the most important cereal crop grown all over the world. It serves as a primary source of food (Pooja and Katoch, 2014) [22]. In India, rice occupies an area of 39.47 million hectares with a production of 87.1 million tonnes and productivity of 2207 kg ha-1. India is the second largest producer of rice in the world after China (Hayasaka *et al.*, 2008) [10]. Rice blast, caused by the fungus *Pyricularia oryzae* has been identified as one of the major rice cultivation constraints worldwide (Wang *et al.*, 2015) [28]. Depending on cultivar susceptibility, environmental conditions and management system, it causes yield losses up to 100%. The blast fungus is capable of infecting rice at any stage of the host life cycle. The disease appears early as white to grey/brown leaf spots or lesions, followed by nodal rot and as neck blast, which can cause necrosis and frequently breakage of the host panicles (Katsantonis *et al.*, 2007) [11]. Planting of resistant cultivars, application of fungicides, and manipulation of planting times, fertilizers and irrigations are the most usual approaches for the management of rice blast disease (Georgopoulos and Ziogas, 1992; Moletti *et al.*, 1988; Mbodi *et al.*, 1987; Naidu and Reddy, 1989) [6, 18, 17, 20]. Among several methods developed for the control of the disease (Mariappan *et al.*, 1995) [16], chemical control has been widely practiced in many countries. Seed treatments with systemic fungicides and foliar sprays with those fungicides had been demonstrated to be effective in minimizing blast disease (Manandhar, 1984; Manandhar *et al.*, 1985, Sah and Karki, 1988; Chaudhary and Sah, 1998; Chaudhary, 1999) [14, 15, 23, 2, 1]. Keeping this view, the present study reports on the influence combination fungicide Filia 52.5 SE (Tricyclazole 34.2% + Propiconazole 10.7%) on leaf and neck blast of Rice and their impact on rice yield.

Materials and Methods
A field experiment was carried out in a randomized block design to assess the bio-efficacy of Filia 52.5 SE (Tricyclazole 34.2% + Propiconazole 10.7%) on leaf and neck blast of Rice. The plot size was 40sq.m and each treatment was replicated three times. The treatments included were

Tr. No.	Treatments	Dose rate g.ai/lit (w/w basis)	Dose rate Product (ml/lit)
T1	Untreated Check	-	-
T2	Filia 52.5 SE (Tricyclazole 34.2% + Propiconazole 10.7%)	0.45	1.0
T3	Filia 52.5 SE (Tricyclazole 34.2% + Propiconazole 10.7%)	0. 56	1.25
T4	Filia 52.5 SE (Tricyclazole 34.2% + Propiconazole 10.7%)	0.67	1.50
T5	Filia 52.5 SE (Tricyclazole 34.2% + Propiconazole 10.7%)	1.35	3.00
T6	Tricyclazole 75 WP	0.6	0.8
T7	Propiconazole 25 EC	0.25	1.0
T8	Tebuconazole 50% + Trifloxystrobin 25% WG	0.3	0.4
T9	Kitazine 48 EC	1.0	2.0

The test fungicide Filia 52.5 SE contains Tricyclazole 40% + Propiconazole 12.5%) on w/v basis which is equal to Tricyclazole 34.2% + Propiconazole 10.7%) on w/w basis. Tebuconazole 50% + Trifloxystrobin 25% WG (Nativo 75 WG) and Kitazine 48 EC were used as standard check chemicals and compared with untreated check. The various fungicides were applied as foliar spray using a water volume of 500 lit/ha.

Methods of assessment of incidence of Rice leaf and neck blast diseases

Diseases grade was recorded using score chart – scale 0-9

Grade Symptoms

0 - No lesion
1 - Small brown specks of pinhead size without sporulating centre
2 - Small roundish to slightly elongated, necrotic grey spots, about 1-2 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, 3 mm of longer, infecting less than 2 % of the leaf area
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

The per cent disease index (PDI) was calculated as under,

$$PDI = \frac{\text{Sum of all ratings}}{\text{Total leaves observed}} \times \frac{100}{\text{Max. Grade in scale}}$$

Results and Discussion

Efficacy of Filia 52.5 SE against rice blast disease, grain yield and phytotoxicity

The results from first season trial revealed that, Filia 52.5 SE @ 1.5 ml/lit was highly effective against rice leaf blast, which recorded 79.65 per cent control over untreated check at par with Filia 52.5 SE @ 1.25 ml/lit (78.59%). This was followed by Filia 52.5 SE @ 1.0 ml/lit (68.70%), Tricyclozole 75 WP @ 0.8 g/lit (68.50%), Kitazine 48 EC @ 2.0 ml/lit (52.26%), Tebuconazole 50% + Trifloxystrobin 25% WG @ 0.4 g/lit (50.11%) and Propiconazole 25 EC @ 1.0 ml/lit (13.92%). Untreated check recorded a PDI of 25.56 at 15 days after 2nd spray (Table 1).

Similarly, the second season trial result revealed that, Filia 52.5 SE @ 1.5 ml/lit was highly effective against Rice leaf blast, which recorded 79.89 per cent control over untreated check at par with Filia 52.5 SE @ 1.25 ml/lit (79.07%). This was followed by Filia 52.5 SE @ 1.0 ml/lit (72.80%), Tricyclozole 75 WP @ 0.8 g/lit (71.02%), Kitazine 48 EC @ 2.0 ml/lit (53.90%), Tebuconazole 50% + Trifloxystrobin 25% WG @ 0.4 g/lit (53.08%) and Propiconazole 25 EC @ 1.0 ml/lit (10.17%). Untreated check recorded a PDI of 28.20 at 15 days after 2nd spray. In both seasons, the control of neck blast also, similar trend was exhibited among the various treatments and Filia 52.5 SE @ 1.5 ml/lit and 1.25 ml/lit were very effective and at par with each other in checking neck blast (Table 2).

The grain yield results from first season trial revealed that, Filia 52.5 SE at 1.5 and 1.25 ml/lit recorded significantly higher grain yields of 6.60 and 6.45 t/ha which were on par with each other and followed by Filia 52.5 SE @ 1.0 ml/lit (5.90 t/ha), Tebuconazole 50% + Trifloxystrobin 25% WG @ 0.4 g/lit (5.60 t/ha), Tricyclozole 75 WP @ 0.8 g/lit (5.50 t/ha), Kitazine 48 EC @ 2.0 ml/lit (5.20 t/ha) and Propiconazole 25 EC @ 1.0 ml/lit (4.23 t/ha) while it was lower (3.56 t/ha) in untreated check. The same trend in grain yield was observed in second season also.

Our results are in conformity with those of Naik *et al*. (2012) [21] who reported that tricyclazole, kitazine and ediphenphos were significantly superior in controlling the rice blast disease. Singh *et al.* (2000) [25] reported that the new generation chemicals like tricyclazole and propiconazole *etc*. can provide effective protection against rice blast disease. Maji and Imolehein (2015) [13] tested different fungicides and reported ausilazol, difenoconazole, difenconazole + propiconazole fungicides as the most effective in suppressing blast disease as compared to other fungicides. Magar *et al.*, (2015) [12] reported that, Tricyclazole 22% + Hexaconazole 3% SC was found to be the most effective with least leaf blast severity (6.23%), neck blast incidence (8.97%), and highest percentage disease control (87.08% and 79.62% in leaf blast and neck blast respectively) and grain yield (4.23 t/ha) followed by Prochloraz 25% EC (0.3%) and Udaan (Hexaconazole 3% SC) (0.2%). Also, Sood and Kapoor, 1997 [26] evaluated 7 fungicides against leaf and neck blast of rice at recommended rates at booting and heading stage and found that tricyclazole was the most effective. It reduces leaf and neck blast by 89.2% and 97.5% respectively and increases the yield by 43.3% as compared with control. Ganesh Naik *et al.*, 2012[5]. evaluated ten fungicides against blast disease out of that, Tricyclazole, Kitazine and Ediphenphos were found significantly superior in controlling the disease with the lowest PDI (16.01,18.01 and 18.52 respectively), also significant increase in yield in Tricyclazole sprayed plots (7783.33 kg/ha.) followed by Ediphenphos (6941.66kg/ha.), Kitazine (6850.00 kg/ha.) and other fungicides. Vinod Kumar Nirmalkar *et al.,* (2017) [27] found that Tricyclazole 75% WP was effectively manage the incidence of leaf and neck blast (16.3 and 21.22 %, respectively) and found most economical fungicide among all treatments with highest yield (35.61q/ha). Filia 52.5 SE @ 1.5 and 3.0 ml/lit dose rates tested for its phytotoxicity studies did not show any phytotoxic symptoms like leaf injury, wilting, vein clearing, necrosis, epinasty and hyponasty at any day after treatments on rice crop in both the seasons.

Shiba and Nagata (1981) [24] reported that tricyclazole inhibited the mycelial growth, conidial germination and appressorial formation of *Pyricularia oryzae* at concentrations less than 125 ppm. Gohel *et al.* (2008) [8] reported that tricyclazole, mancozeb, carbendazim, iprobenfos, propiconazole and edifenphos were found highly fungitoxic with cent per cent growth inhibition of *Pyricularia oryzae.* Gohel *et al*. (2009) [7] tested nineteen fungicides against *P. oryzae in vitro*. Among these tricyclazole and propiconazole were found highly fungitoxic with 90.0 % growth inhibition. Gouramanis (1995) [9] found that fungicides carbendazim, pyroquilon, thiophanate methyl and chlobenthiazone reduce the leaf blast disease of rice on the other hand tricyclazole was effective in reducing the neck blast. Enyinnia (1996) [4] evaluated two systemic fungicides Benomyl and Tricylazole on Faro / 29, a rice cultivar, at full booting stage and reported good control of natural infection of rice leaf blast. Ridomil Gold 68% WP at 4 and 8 g/l did not show any phytotoxicity symptoms on chilli plants (Muthukumar *et al*., 2016) [19]. Tricyclazole 45% + hexaconazole 10% WG at higher concentration did not show any symptoms of phyto-toxicity till 15 days after application (Chethana, 2018) [3].

Table 1: Efficacy of Filia 52.5 SE against blast and grain yield in rice: I season

S. No.	Treatments (ml/lit)	Leaf blast (PDI)*				Neck blast (PDI)*		Grain Yield (t/ha)
		PTO	15 days after I spray	15 days after II spray	% control over untreated check	25 days after II spray	% control over untreated check	
1	Untreated Check	1.23	15.10 (22.87)^{e}	25.56 (30.37)^{e}	-	22.87 (28.57)^{e}	-	3.56
2	Filia 52.5 SE @ 1.0	1.40	5.67 (13.78)^{b}	8.00 (16.43)^{b}	68.70	8.25 (16.69)^{b}	63.92	5.90
3	Filia 52.5 SE @ 1.25	1.26	4.30 (11.97)^{a}	5.47 (13.53)^{a}	78.59	6.90 (15.23)^{a}	69.82	6.45
4	Filia 52.5 SE @ 1.5	1.33	3.90 (11.39)^{a}	5.20 (13.18)^{a}	79.65	6.56 (14.84)^{a}	71.31	6.60
5	Tricyclozole 75 WP @ 0.8	1.30	5.70 (13.81)^{b}	8.05 (16.48)^{b}	68.50	8.56 (17.01)^{b}	62.73	5.50
6	Propiconazole 25 EC @ 1.0	1.26	13.23 (21.33)^{d}	22.00 (27.97)^{d}	13.92	20.00 (26.57)^{d}	12.54	4.23
7	Tebuconazole 50% + Trifloxystrobin 25% WG @ 0.4	1.36	9.40 (17.85)^{c}	12.75 (20.92)^{c}	50.11	11.70 (20.00)^{c}	48.84	5.60
8	Kitazine 48 EC @ 2.0	1.30	9.33 (17.79)^{c}	12.20 (20.44)^{c}	52.26	10.93 (19.31)^{c}	52.20	5.20
	CD(p=0.05)	NS	0.96	1.07		1.03	-	0.30

* Mean of three replications, **PTO-** Pre Treatment Observation, **PDI**- Per cent Disease Index. Data followed by the same letter in a column are not significantly different from each other according to Duncan's multiple range test at $P = 0.05$.Values in parentheses are arcsine transformed values.

Table 2: Efficacy of Filia 52.5 SE against Blast and grain yield in Rice: II season

S. No.	Treatments (ml/lit)	Leaf blast (PDI)*				Neck blast (PDI)*		Grain Yield (t/ha)
		PTO	15 days after I spray	15 days after II spray	% control over untreated check	25 days after II spray	% control over untreated check	
1	Untreated Check	3.30	19.37 (26.11)^{e}	28.20 (32.08)^{e}	-	26.10 (30.72)^{e}	-	3.80
2	Filia 52.5 SE @ 1.0	3.17	5.93 (14.09)^{b}	7.67 (16.08)^{b}	72.80	7.33 (15.71)^{b}	71.91	6.56
3	Filia 52.5 SE @ 1.25	3.20	4.70 (12.52)^{a}	5.90 (14.06)^{a}	79.07	4.23 (11.87)^{a}	83.79	7.12
4	Filia 52.5 SE @ 1.5	3.33	4.47 (12.21)^{a}	5.67 (13.78)^{a}	79.89	4.10 (11.68)^{a}	84.29	7.15
5	Tricyclozole 75 WP @ 0.8	3.27	6.07 (14.26)^{b}	8.17 (16.61)^{b}	71.02	7.80 (16.22)^{b}	70.11	6.00
6	Propiconazole 25 EC @ 1.0	3.17	15.77 (23.40)^{d}	25.33 (30.22)^{d}	10.17	23.50 (29.00)^{d}	9.96	4.90
7	Tebuconazole 50% + Trifloxystrobin 25% WG @ 0.4	3.30	10.20 (18.63)^{c}	13.23 (21.33)^{c}	53.08	10.00 (18.43)^{c}	61.68	6.10
8	Kitazine 48 EC @ 2.0	3.20	10.13 (18.56)^{c}	13.00 (21.13)^{c}	53.90	9.13 (17.59)^{c}	65.01	5.70
	CD(0.05)	NS	1.04	1.13	-	1.17	-	0.41

* Mean of three replications, PTO- Pre Treatment Observation, PDI- Per cent Disease Index. Data followed by the same letter in a column are not significantly different from each other according to Duncan's multiple range test at $P = 0.05$.Values in parentheses are arcsine transformed

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