

Study on Bio-Efficacy of Certain Acaricides Alone and in Combination with Propiconazole against Rice Panicle Mite, *Stenotarsonemus Spinki* Smiley

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Abstract

Four acaricides (Diafenthiuron, Propargite, Dicofol and Profenophos) and in combination with fungicide (Propiconazole) were evaluated for their efficacy against rice panicle mite for the management of grain damage during field trials conducted at Regional Agricultural Research Station, Acharya N.G. Ranga Agricultural University, Warangal, A.P for three consecutive *kharif* seasons of 2010, 2011 and 2012. Among all the treatments, Dicofol 18.5 EC + Propiconazole 25 EC @ 5 ml+1 ml/l was found to be the most effective treatment followed by Diafenthiuron 50 WP + Propiconazole @ 1.5 g + 1 ml/l and Profenophos 50 EC + Propiconazole 25 EC @ 2 ml+1ml/l. Among all the treatments, acaricides in combination with fungicide gave higher efficacy when compared to acaricides alone.

Key words: Rice, panicle mite, acaricide, fungicide, bio-efficacy.

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Rice, the staple food of nearly half of the humanity is mainly grown and consumed in Asian countries. India is number one in area and it ranks second in rice production, but per hectare yield or productivity is low.

Traditionally insect pests, diseases and weeds are the triple evils responsible for lower yields of rice in India. Of late, mites are assuming major status in rice crop in India as well as in Andhra Pradesh. Among different species of mites associated with rice crop, the rice panicle mite or sheath mite is most important. The rice panicle mite or sheath mite, (*Stenotarsonemus spinki*) alone and in association with sheath rot fungus, (*Acrocylindrium oryzae*) causes grain discoloration, ill-filled, chaffy grains and often cause heavy losses. It has been reported that this mite caused yield losses ranging from 4.9% to 23.7% (Natalie *et al.*, 2009). Several studies were conducted to test the efficacy of insecticides alone against panicle mite (Bhanu *et al.*, 2006; Laxmi *et al.*, 2008). However, adequate

information is not available on the efficacy of acaricides alone and in combination with fungicides. Therefore, the present study was conducted to evaluate the efficacy of different acaricides alone and in combination with fungicide, propiconazole against rice panicle mite under field conditions.

Materials and Methods

Field trials were conducted at Regional Agricultural Research Station, Warangal, Andhra Pradesh for three years i.e., 2010, 2011 and 2012 *Kharif* seasons to evaluate the efficacy of certain acaricides alone and in combination with fungicide-Propiconazole against panicle mite. The trials were laid in a Randomized Block Design (RBD) with nine treatments and three replications with a plot size of 20 m². The popular rice variety, BPT-5204 which is susceptible to panicle mite was chosen. All the recommended package of practices were implemented in all the treatments except treatment sprayings. Three sprayings of chemicals were given at panicle initiation stage, boot leaf stage and at 50 per cent panicle emergence using knapsack sprayer with a spray fluid volume of 500 l/ha. Observations were recorded on number of healthy grains, number of discolored grains, number of chaffy grains per panicle, grain yield per

plot and the data was expressed as per cent discolored grains+ chaffy grains and per cent reduction of discolored grains + chaffy grains over control and grain yield per hectare.

Results and Discussion

The pooled data for three years in respect of per cent discolored grains + chaffy grains, per cent reduction over control and grain yield/ha is depicted in Table 1. The results indicated that among all the treatments, Dicofol 18.5 EC + Propiconazole 25 EC @ 5 ml + 1 ml/l was significantly highly effective, where in the per cent grain discoloration + chaffy grains was the lowest (8.3%) and per cent reduction of grain discoloration + chaffy grains was the highest (60.8%) with highest grain yield of 7049 kg/ha. The next best treatments were: Diafenthiuron 50 WP + Propiconazole 25 EC @ 1.5 g + 1 ml/l (9.8%, 53.8% respectively) and Profenophos 50 EC + Propiconazole 25 EC @ 2 ml + 1 ml/l (10.1%, 52.4% respectively) and were found to be on par with each other in efficacy and grain yield (6768 and 6698 kg/ha respectively). The lowest efficacy was recorded with Propargite 57 EC + Propiconazole 25 EC @ 1.5 ml + 1 ml/t where in, the per cent grain discoloration + chaffy grain was the highest (13.8%) and the per cent reduction

over control was lowest (33.8%). Among the treatments, all the acaricide treatments alone have shown significantly lower efficacy by showing highest grain discoloration + chaffiness and lowest per cent reduction over control compared to combination of acaricides with propiconazole. Among all the treatments, significantly lowest efficacy was noticed with Prothiofos 57 EC @ 1.5 ml/l (15.3% and 27.8% respectively) followed by Diafenthiuron 50 WP @ 1.5 g/l (14.3%, 32.5%, respectively) and Dicofol 18.5 EC @ 5 ml (13.9%, 34.4%, respectively) which were found on par with each other. Among the acaricides alone treatments, Profenophos 50 EC @ 2 ml/l was found to be the best treatment by showing relatively lower percent grain discoloration + grain chaffiness (12.2%) and relatively higher percent reduction (34.4%) over control.

With respect to grain yield, significantly highest yield was observed with Dicofol 18.5 EC + Propiconazole 25 EC @ 5 ml + 1 ml/l (7049 kg/ha) followed by Diafenthiuron 50 WP + Propiconazole 25 EC @ 1.5 g + 1 ml (6768 kg/ha). The lowest grain yield was recorded in Prothiofos 57 EC @ 1.5 ml/l (6358 kg/ha) but significantly superior over untreated control (5667 kg/ha).

The present finding on superior efficacy of acaricides in combination with fungicides compared to acaricides alone was in conformity with findings of Suresh *et al.* (2013). Bhanu *et al.* (2006) and Loet *et al.* (1981) also reported superior efficacy of acaricides like Dicofol and Profenophos against panicle mite in rice. In India, grains infested with *S.spinki* were described as being discolored and pathogenic fungi were isolated from mite (Rao and Prakash, 2003). Chen *et al.* (1979) found that *S.spinki* carried spores of *Acrocyldrium Oryzae* on their body and attributed the plant symptoms to a combination of *S.spinki* damage and disease. Miticides that have been tested under laboratory conditions reported to cause more than 95 per cent mortality of adult *S.spinki*. Field trials conducted in India reported up to 90 per cent mortality following treatments with certain acaricides (Bhanu *et al.*, 2006 and Ghosh *et al.*, 1998). The present findings clearly indicate that apart from panicle mite, several pathogens especially sheath rot fungus, *Acrocyldrium oryzae* was responsible for grain damage. Hence, invariably an effective fungicide in combination with effective acaricide may be recommended to the farmers for reducing grain damage associated with panicle mite and pathogens. Based on overall performance, Dicofol 18.5 EC +

Propiconazole 25 EC @ 5 ml + 1 ml/l followed by Diafenthiuron 50 WP + Propiconazole 25 EC 1.5 g + 1 ml and Profenophos 50 EC + Propiconazole 25 EC @ 2 ml + 1 ml/l may be suggested to the farmers for managing grain damage due to panicle mite in association with pathogens.

References

- Bhanu, V., Reddy, S.P. and Zaheeruddin, S.M. 2006. Evaluation of some acaricides against leaf mite and sheath mite in rice. *Indian Journal of Plant Protection* 34: 132-133.
- Chen, C.N., Cheng, C.C. and Hsiano, K.C. 1979. Bionomics of *Stenotarsonemus spinki* attacking rice plants in Taiwan. *Plant Protection Bulletin* 22(1): 31-39.
- Ghosh, S.K., Prakash, A. and Rao, J. 1998. Efficacy of some chemical pesticides against rice tarsonemid mite *Stenotarsonemus spinki* Smiley. (Acari: Tarsonemidae) under controlled conditions. *Environmental Ecology* 16:913-915.
- Laxmi, V.J., Krishnaiyah, N.V., Pasalu, I.C. and Katti, G. 2008. Bio-ecology and management of rice mites. A review. *Agricultural Reviews* 29(1): 31-39.
- Lo, K.C., Ho, C.C. and Lin, K.C. 1984. Screening of chemicals for the control of rice tarsonemid mite, *Stenotarsonemus spinki*. *Journal of Agricultural Research, China* 30(3): 303-307.
- Natalie, A. Hummel., Boris A. Castro., Eric M. McDonald., Miguel A. Pellerano and Ronald Ochoa. 2009. The panicle rice mite, *Stenotarsonemus Spinki* Smiley, a re-discovered pest of rice in the United States. *Crop Protection* 1-14.
- Rao, J. and Prakash, A. 2003. Panicle mites causing sterility in farmers' fields in India. *Journal of Applied Zoology Research* 14:212-217.
- Suresh, D., Bhushan, V.S., Ramgopal Varma, N and Ramesh, B. 2013. Efficacy of Acaricides alone and in combination with propiconazole against rice panicle mite / sheath mite, *Stenotarsonemus spinki*. *Journal of Agricultural Science and Technology B* 36: 107-110.

Table 1. Efficacy of acaricides alone and in combination with fungicide in the management of grain damage due to rice panicle mite

Treatments	Dose/l	% discolored grains + Chaffy grains				% Reduction of discolored grains + chaffy grains over control				Grain yield (kg/ha)			
		2010	2011	2012	Pooled	2010	2011	2012	Pooled	2010	2011	2012	Pooled
Diafenthiuron 50 WP + Propiconazole 25 EC	1.5g+1.0ml	11.3	10.7	7.5	9.8	19.3	64.0	62.1	53.8	7855	7575	4875	6768
Propargite 57 EC + Propiconazole 25 EC	1.5ml+1.0ml	11.3	17.0	13.1	13.8	19.3	42.8	33.8	34.9	7315	7426	4650	6500
Dicofol 18.5 EC+ Propiconazole 25 EC	5.0ml+1.0ml	8.0	9.9	6.9	8.3	42.9	66.7	65.2	60.8	7950	8182	5015	7049
Profenephos 50 EC+ Propiconazole 25 EC	2.0ml+1.0ml	12.3	12.8	5.3	10.1	12.1	56.9	73.2	52.4	7710	7236	5150	6698
Diafenthiuron 50 WP	1.5g	13.7	16.1	13.0	14.3	2.1	45.8	34.3	32.5	7470	7055	4580	6368
Propargite 57 EC	1.5ml	12.7	15.9	15.6	15.3	9.3	46.5	21.2	27.8	7475	7135	4465	6358
Dicofol 18.5 EC	5.0ml	15.0	14.5	12.1	13.9	7.1	51.2	38.8	34.4	7590	6575	4715	6793
Profenephos 50 EC	2.0ml	11.0	15.2	10.5	12.2	21.4	48.8	47.0	42.5	7530	7435	4890	6618
Untreated control	-	14.0	29.7	19.8	21.2	-	-	-	-	6375	6507	4120	5667
CD (0.05%)		3.2	2.5	2.7	2.8	2.5	5.1	4.8	4.5	355.0	215.7	175.5	248.9
SEm±		1.5	1.2	1.3	1.3	1.2	2.4	2.3	2.1	159.0	103.2	82.8	115.0