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Pyraclostrobin: a new quinone outside inhibitors fungicides for Cercospora leaf spot of Groundnut

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Early and late leaf spot disease caused by *Cercospora arachidicola* Hori and *Cercosporidium personatum* (Berk. and Curtis) Deighton are major foliar diseases of groundnut. The field experiment on effect of the pyraclostrobin 20% WG against leaf spot of groundnut was conducted during the *rabi* season of 2016-17 and 2017-18. The level of disease control provided by all the treatments was significantly higher than nontreated plots in both years. Considering both year together, at the end of disease assessment i.e. fifteen days after the fourth spray the lowest disease severity was recorded in T₃ (41.11%) followed by T₅ (42.03%) which are statistically at par. Disease incidence was also statistically at par in treatment T₄ and T₅. The highest pod yield was also recorded in T₃ followed by T₅. Any phytotoxicity was not noticed in all the treatments using pyraclostrobin.

Key words: Groundnut, leaf spot, management, pyraclostrobin

INTRODUCTION

Groundnut (*Arachis hypogaea* L.) is one of the most popular oil seed crop grown throughout the world. Early leaf spot caused by *Cercospora arachidicola* and late leaf spot caused by *Cercosporidium personatum*, stem rot caused by *Sclerotium rolfsii*, are the most important and destructive diseases causing qualitative and quantitative losses in India.

Late leaf spot are one of the most destructive diseases of groundnut in India and caused economic loss up to 70% depending upon the severity of the disease (Dey *et al.* 2015). Disease management in groundnut is primarily based on the development of resistance varieties and fungicides application (Pande *et al.* 2002). Spraying of fungicide preferably protectant is initiated approximately 50 days after sowing and subsequent applications are made at 15 days interval depending upon the intensity of disease. The chlorothalonil, broad spectrum protectant fungicide with no curative activity, has been used intensively as spray prior to infection in order to ensure maximum control of the late leaf spot disease.

Chlorothalonil may also be applied in alternating spray or in tank mixed spray with others to prevent the late season or secondary infection or to reduce the risk of developing resistance in *C. personatum* (Jash and Sarkar, 2017). Systemic fungicides such as tebuconazole and azoxystrobin are extensively used for controlling leaf spot and as well as stem rot diseases. Four consecutive spraying of tebuconazole at 14 days interval along with three spraying of chlorothalonil gave excellent control (Kemerait *et al.* 2005). Pyraclostrobin, a quinone outside inhibitor fungicide, is recently used for management of leaf spot and stem rot disease (caused by *Sclerotium rolfsii*) in groundnut. The objective of this study is to compare the efficacy of candidate and marketed product of pyraclostrobin fungicides in different dosages for controlling leaf spot disease in groundnut.

MATERIALS AND METHODS

The field experiment on effect of the candidate product of pyraclostrobin 20% WG against leaf spot of groundnut caused by *Cercosporidium personatum* was conducted during the *rabi* season of 2016-17 and 2017-18 in randomized block design with four replications in subtropical climatic condition of West Bengal at Regional Research Station (RRS), Jhargram under Bidhan

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Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal. The variety, TAG-24 was used as test crop. The well decomposed FYM at the rate of 10 ton /ha was applied during land preparation. The recommended fertilizer dose i.e. 8:24:32 kg as N, P₂O₅ and K₂O/ acre, respectively, was applied as a basal. In this experiment, 8kg N/acre was top-dressed at the time of earthing up. Gypsum @ 100kg/acre was applied after first earthing up. The treatment schedule used against leaf spot disease in this experiment is mentioned in Table 1. The spray schedule was started next day of first appearance of disease symptoms. The observation on disease intensity was recorded from 10 plants in each replicated plot at 15 days after each spraying. Per cent disease index of leaf spot was calculated on the basis of 1-10 scale (Culbreath *et al.* 1992).

$$PDI = \frac{\text{Sum of all numerical rating}}{\text{Total number of observation X Maximum rating}} \times 100$$

RESULTS AND DISCUSSION

The first symptoms with slightly pale area usually appear on upper surface of the older leaves. The late leaf spot produces numerous small circular spot which are 2-4mm diameter and dark brown to black dead spots. The brown spots are not surrounded by yellow halo in early stages. The lower surface of the spot is carbon black in colour. Disease incidence and severity was measured in each plot after 15 days of spraying.

During the initial disease assessment before any spray, all the plots did show more or less uniform disease intensity. When disease severity was

assessed at fifteen days after first spraying it was found that only 23.05 % disease intensity in T₃ as compared to 42.77% in untreated T₁ (Table 2). Disease incidence was significant in all the treatments after first spraying. Lowest disease incidence was observed in T₃. Disease severity in all the treatments was increased with the crop maturity. At the end of disease assessment i.e. fifteen days after the fourth spray the lowest disease severity was recorded in T₃ (41.11%) followed by T₅ (42.03%) which are statistically at par. Disease incidence was also statistically at par in treatment T₄ and T₅. The highest pod yield was also recorded in T₃ followed by T₅. Any phytotoxicity was not noticed in all the treatments using pyraclostrobin.

There are many reports of application of fungicides for managing leaf spot of groundnut (Jash and Sarkar, 2017; Woodward and Brenneman, 2008). Culbreath *et al.* (2006) reported that delayed initial application of pyraclostrobin at 60 days after planting provided levels of leaf spot control equivalent to control by the chlorothalonil or tebuconazole spraying at 30 days after planting. Jash and Sarkar (2017) reported that three sprays of chlorothalonil @ 2g/l (1th, 3rd, 5th) alternated with three sprays of pyraclostrobin @ 1gm/l at 2nd, 4th and 6th spray reduced the highest disease severity (40.74%) as compared to seven spraying of chlorothalonil at 10 days interval (60.00%). The flexibility of delaying initial application of pyraclostrobin without compromising leaf spot control allow farmer to reduce the number of fungicides application and associated cost. Application of candidate product pyraclostrobin 20%WG @ 1000g/500lit of water gave best result in controlling Cercospora leaf spot of groundnut

Table 1 : Treatments details used in the field experiments

Treatment	Particulars	Product Name	Dosage/ Ha (a.i.)	Dosage/Ha (Forml.)	Water/Ha(L)
T ₁	Untreated check	-----	----	----	500L
T ₂	Pyraclostrobin 20% WG	Candidate Product	100g	500g	500L
T ₃	Pyraclostrobin 20% WG	Candidate Product	200g	1000g	500L
T ₄	Pyraclostrobin 20% WG	Marketed Product	100g	500g	500L
T ₅	Pyraclostrobin 20% WG	Marketed Product	200g	1000g	500L

Table 2: Effect of different treatments on incidence, severity of late leaf spot in groundnut

Treatments	Disease development [®] After first spray		After second spray		After third spray		After fourth spray		Yield (Kg/plot)
	DI [*]	DS [#]	DI	DS	DI	DS	DI	DS	
T ₁	33.50 (35.34) ^a	42.77 (40.82)	49.50 (44.70)	52.78	78.50 (62.78)	76.94 (62.50)	83.75 (66.25)	89.44 (71.37)	4.45
T ₂	19.00 (25.77)	27.78 (31.74)	24.50 (29.64)	37.50	40.50 (39.50)	40.50 (39.50)	44.75 (41.96)	43.42 (41.20)	5.25
T ₃	18.00 (25.06)	23.05 (28.64)	23.00 (28.62)	36.11	34.50 (36.00)	34.50 (36.00)	42.00 (40.37)	41.11 (39.86)	5.75
T ₄	19.50 (26.17)	28.64 (31.11)	26 (30.61)	38.89	46.75 (43.12)	46.75 (43.12)	45.25 (42.25)	43.61 (41.31)	5.10
T ₅	18.75 (25.64)	23.61 (29.02)	21.50 (27.60)	33.61	36.75 (37.30)	36.75 (37.30)	44.50 (41.82)	42.03 (40.39)	5.65
SEM (±)	0.64	0.91	0.68	1.08	0.84	0.78	0.82	0.84	0.21
CD at 5%	1.40	1.99	1.48	2.35	1.83	1.70	1.79	1.83	0.46

[®]Two year pooled data ^{*}DI: Disease incidence in percentage, [#]DS: Disease severity in percentage, ^aValues in the parenthesis indicate the arc sine transformed values.

as well as produced highest pod yield in this experiment.

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