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EFFICACY OF NEW INSECTICIDE IMIDACLOPRID FS 480 AS SEED DRESSER AGAINST THRIPS INCIDENCE ON GROUNDNUT

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ABSTRACT

Field experiment was conducted to evaluate "the efficacy of new insecticides as seed dresser against thrips incidence on groundnut" at farm, Agricultural Research Station, Kadiri, Andhra Pradesh during *kharif* 2010 in randomized block design with six treatments and four replications. Among 5 treatments, Imidacloprid 480 FS @ 1.0 ml kg^{-1} seed was found to be more effective in reduction of the thrips damage and also incidence of PSND/PBND followed by Imidacloprid 17.8 SL @2.0 ml kg^{-1}, Thiamethoxam 25 WG @2.0 g kg^{-1} seed as seed dresser than untreated control. However, the highest pod yield (245.8 kg ha^{-1}) was recorded in Imidacloprid 17.8 SL @ 2.0 ml kg^{-1} followed by Imidaclopri 480 FS @ 1.0 ml kg^{-1} seed.

KEY WORDS: Groundnut, Insecticides, Imidacloprid, Seed treatment, Sucking pests,

INTRODUCTION

Groundnut is one of the major oil seed crops, grown in a varied climatic condition in different states in India. The productivity of groundnut is quite low (1000 kg ha^{-1}) compared to that of USA (3000 kg ha^{-1}), China (2600 kg ha^{-1}), Argentina (2100 kg ha^{-1}) and Indonesia (1550 kg ha^{-1}) (National Research Center for Groundnut, 2005). The major groundnut growing regions in Andhra Pradesh are Rayalaseema region with 14.74 lakh ha (82-83%) and major area is grown under rainfed cultivation (95%) followed by Telangana region with 2.06 lakh ha (10%) and Andhra region with 1.15 lakh ha (6%).The average yields are very low in groundnut. The reason for low productivity of groundnut is due to biotic and abiotic stresses during crop growth period. Pests and diseases are the major biotic stresses affecting yield. Also among biotic stresses, viral diseases Peanut stem necrosis disease (PSND) and peanut bud necrosis disease (PBND) are causing major concern to the groundnut production.

In India, *Tobacco Streak Virus* (TSV) was first identified during 2000 on sunflower (Prasada Rao *et al.*, 2000). Subsequently, TSV caused an epidemic on groundnut in the year 2000 and the loss was estimated to the tune of Rs. 300 crore (Reddy *et al*., 2002). Later the disease was named as peanut stem necrosis disease (PSND). The causal agent of peanut bud necrosis disease (PBND) in India was initially described as *Tomato spotted wilt virus* (TSWV) (Ghanekar *et al*., 1979). Subsequently, based on serological, physiochemical and thrips transmission studies, the causal organism of bud necrosis disease in India was identified as *Groundnut bud necrosis virus* (Reddy *et al*., 1992). During 1993, GBNV caused 70-90 % loss of groundnut yield at Mainpuri, India (Singh, 1995) and based on severity of bud necrosis disease, few hot spot locations have been identified in India *viz*., Latur (Maharashtra), Rajendranagar (Andhra Pradesh), Palem (Andhra Pradesh) and Raichur (Karnataka) (Basu, 1995). At Agricultural Research Station, Kadiri, incidence of PBND ranged from 10.0-20.0 % in *rabi* season (Directorate of Groundnut Research reports, 2005 - 2011).

Tospoviruses are vectored by several species of thrips (Thysanoptera: Thripidae) (Amin *et al*., 1981; Cho *et al*., 1988). The abundance of thrips in diverse cropping systems along with the broad host range of the Tospoviruses and lack of natural plant resistance to Tospoviruses have made their management extremely difficult (German *et al*., 1992). So far, 12 thrips species have been recorded as vectors of tospoviruses worldwide and *Frankliniella schultzei*, *Scirtothrips dorsalis*, *Thrips tabaci* and *Thrips palmi* are responsible for their spread and causing severe epidemics in Asia. Of these, *Thrips palmi* is the predominant vector species. It has been reported as the main vector of GBNV in India (Vijaya Lakshmi, 1994). Seed treatment with imidacloprid and thiamethoxam, protected cotton seedlings from thrips for at least 6 weeks from the onset of seed planting. Imidacloprid had a better efficiency against this sap

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sucking pest than thiamethoxam (Jehan and Nour El-Hoda, 2013). Singh *et al.* (2014) reported that among the seed treatments, imidacloprid @ 3 g kg^{-1} was most effective and provided maximum reduction in population of sucking pests, which was significantly equal to thiomethoxam and acetamiprid on Okra. The efficacy of different insecticidal seed treatments were tested against aphid, *Aphis craccivora* Koch, leafhopper, *Empoasca kerri* Pruthi, defoliator, *Spodoptera litura* (Fab.) and pod borer, *Helicoverpa armigera* (Hub.) on black gram (GailceLeo Justin *et al.,* 2015).

MATERIAL AND METHODS

A field experiment was conducted to evaluate the relative "efficacy of insecticides as seed dressers against thrips incidence on groundnut" at farm, Agricultural Research Station, Kadiri, Andhra Pradesh during *kharif* 2010 in randomized block design with six treatments of four replications. The groundnut variety K- 6 was used as test variety which is susceptible to the insect pests. The groundnut seed was treated with insecticides *viz.*,Imidacloprid 17.8 SL @ 2.0 ml kg^{-1} seed, Acetamipride 20 SP @ 2.0 g kg^{-1} seed, Fipronil 5 SC @ 4.0 ml kg^{-1} seed, Imidacloprid 480 FS @ 1.0 ml kg^{-1} seed (+ 5ml water), Thiamethoxam 25 WG @ 2.0 g kg^{-1} seed and untreated control 12.00 hours before sowing the seed and kept aside overnight. Imidacloprid 480 FS (Flowable Suspension) formulation is semi solid liquid. For uniform covering of 1 kg seed, 5.0 ml of water was added to 1.0 ml of Imidacloprid 480 FS formulation. The plot size was 5 x 4 m, plant to plant 10 cm distance and distance row to row 30 cm. Treated seed were dibbled in soil. All recommended package of practices were followed to raise good crop. Five plants were randomly selected from each plot for recording the observations. The incidence of thrips damage was recorded at 20, 30, 40, 50 and 60 days after sowing and incidence of PSND was recorded at 45, 65 days and before harvest of the crop.The per cent incidence of thrips damage in each treatment was calculated by using the formula and the data were analyzed statistically. Data on per cent damage were subjected to angular transformation before statistical analysis. The yield of groundnut was recorded from each plot and converted into yield per hectare.

RESULTS AND DISCUSSION

The early stage of groundnut crop is more vulnerable to viral infection of PSND / PBND through insect vector *i.e* thrips. Seed treatment with insecticides provide protection to crop upto 30 day from sucking insect damage and also protection from incidence of PSND in early stage. The data revealed that among five insecticidal seed treatments, Imidacloprid 480 FS @ 1.0 ml kg^{-1} seed was found to be more effective in reduction of thrips damage and also incidence of PSND/PBND (Table 1 and 2) followed by Imidacloprid 17.8 SL @ 2.0 ml kg^{-1}, Thiamethoxam 25 WG @ 2.0 g kg^{-1} seed as seed dresser against untreated control. The per cent damage of thrips was initially low (Table 1) as compared to untreated control later the incidence gradually increased. In general the incidence of PSND is more prevalent in the early stages of crop through insect vector than later stages. These results are corroborative with Singh *et al.* (2014) who reported that imidacloprid @ 3 g kg^{-1} was most effective and provided maximum reduction in population of sucking pests, seed germination %, numbers of fruit $plant^{-1}$, plant height, fruit damage and fruit yield, which was significantly equal to thiomethoxam and acetamiprid. Iqbal *et al.* (2013), studied the combination of seed-treatment with imidacloprid spray with detergent and insecticides spray. Seed treatment and spray with detergent did not show distinctive effect on the pests' population. While Imidacloprid and Thiomethoxam spray resulted maximum mortality of the jassid, followed by acetamiprid. Acephate resulted in the maximum control of thrips and was found the most effective insecticide followed by acetamiprid. Gailce Leo Justin *et al.* (2015), reported that the seed treatment with thiamethoxam 25 WG @ 3 g kg^{-1} of seed + spray with thiamethoxam 25 WG @ 0.4 g l^{-1} recorded the lowest population of aphids (1.60, 1.45 no. $plant^{-1}$) and leafhoppers (2.36, 2.12 no. $plant^{-1}$) followed by spraying of imidacloprid 17.8 SL @ 0.4 ml l^{-1} with 83.96, 87.45 and 66.13, 71.61 per cent reduction over control. Harish Kumar Netam *et al.* (2013) evaluated the bio-efficacy of Imidacloprid 600 FS. When applied as seed treatment at the rate of 0.75 g a.i kg^{-1} seed, it was most effective against the sucking pests upto four week of seed germination with least 6.71 insect $plant^{-1}$. It was followed by Imidacloprid 600 FS @ 0.60 g a.i. kg^{-1} seed and Thiamethoxam 70 WS @ 2.1 g a.i. kg^{-1} seed with 9.66 and 11.02 sucking pests $plant^{-1}$. PSND incidences was low in early stage of the crop and later on gradually increased (Table 2) and again decrease at before harvest of the crop. Highest pod yield (245.8 kg ha^{-1}) was recorded in Imidacloprid 17.8 SL @ 2.0 ml kg^{-1} seed followed by Imidacloprid 480 FS @ 1.0 ml kg^{-1} seed table (Table 2).

Table 1. Effect of new insecticides as seed treatment against thrips in Groundnut during *kharif* 2010

Treatments	% thrips damage				
	20 DAS	30 DAS	40 DAS	50 DAS	60 DAS
T_1 : Imidacloprid 17.8 SL @ 2.0 ml kg^{-1} seed	32.2 (34.5)	65.9 (55.7)	79.1 (62.9)	68.5 (56.2)	82.3 (65.2)
T_2 : Acetamipride 20 SP @ 2.0 g kg^{-1} seed	43.2 (41.1)	67.1 (55.2)	80.6 (64.0)	69.1 (56.3)	82.0 (65.1)
T_3 : Fipronil 5 SC @ 4.0 ml kg^{-1} seed	37.5 (34.8)	64.9 (54.3)	84.6 (67.0)	69.9 (56.8)	81.2 (64.3)
T_4 : Imidacloprid 480 FS @1.0 ml kg^{-1} seed (+ 5 ml water)	26.4 (30.9)	58.9 (50.1)	77.0 (61.7)	67.2 (55.1)	82.9 (65.7)
T_5 : Thiamethoxam 25 WG @ 2.0 g kg^{-1} seed	39.7 (39.0)	63.9 (53.6)	79.9 (63.4)	71.7 (58.1)	83.0 (65.9)
T_6 : Untreated Control	43.5 (41.3)	70.9 (57.9)	84.8 (67.1)	74.6 (59.8)	81.1 (64.3)
SED ±	1.50	4.20	2.41	2.53	2.46
CD at 5%	3.20	8.93	5.15	5.40	5.26
CV	5.68	10.88	5.31	6.28	5.36

*Figures in parentheses are arc sin transformed values
DAS – Days After Sowing

Table 2. Effect of new insecticides as seed treatment against PSND in Groundnut during *kharif* 2010

Treatment	% incidence of PSND			Pod yield kg ha^{-1}
	45 DAS	65 DAS	95 DAS	
T_1 : Imidacloprid 17.8 SL @ 2.0 ml kg^{-1} seed	8.9 (17.3)	20.3 (26.2)	13.0 (21.1)	245.8
T_2 : Acetamipride 20 SP @ 2.0 g kg^{-1} seed	7.4 (15.7)	18.3 (25.1)	15.0 (22.4)	227.7
T_3 : Fipronil 5 SC @ 4.0 ml kg^{-1} seed	11.3 (19.2)	25.0 (29.3)	14.1 (22.0)	230.0
T_4 : Imidacloprid 480 FS @1.0 ml kg^{-1} seed (+ 5 ml water)	9.2 (17.6)	16.7 (23.8)	10.1 (18.5)	240.0
T_5 : Thiamethoxam 25 WG @ 2.0 g kg^{-1} seed	7.9 (16.3)	41.8 (40.2)	15.1 (22.8)	231.8
T_6 : Untreated Control	15.4 (22.2)	42.9 (40.8)	19.1 (25.6)	212.5
SED ±	1.96	4.73	2.34	29.88
CD at 5%	4.19	10.08	4.99	63.69
CV	16.80	21.64	15.01	18.27

*Figures in parentheses are arc sin transformed values
DAS – Days After Sowing

CONCLUSION

Among five insecticidal seed treatments, Imidacloprid 480 FS @ 1.0 ml kg^{-1} (+5 ml water) seed was found to be more effective in reduction of the thrips damage and also incidence of PSND/PBND followed by Imidacloprid 17.8 SL @ 2.0 ml kg^{-1}, Thiamethoxam 25 WG @ 2.0 g seed as seed dresser against untreated control. However, the highest pod yield (245.8 kg ha^{-1}) was recorded in Imidacloprid 17.8 SL @ 2.0 ml kg^{-1} followed by Imidaclopri 480 FS @ 1.0 ml kg^{-1} seed.

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