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Validation of IPM Capsule for Leaf Miner Management in Groundnut

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Abstract

Field experiments were laid out in two locations one at Regional Research Station, Vriddhachalam and another farmers field at Neyveli of Cuddalore District with the Groundnut variety VRI 2 during 2020 - 2021. The following treatments T1- IPM module (Application of neem cake @ 250 kg/ha, Cumbu as intercrop (6:1) and cowpea as border crop, Installation of light trap @1/ha, Monitoring with pheromone trap @12/ha, *Metarhizium rileyi* @ 4g/lit (CFU 10^8 / ml, azadirachtin 1% @ 1.5 ml/lit and need based application of insecticide - Novaluron 10EC @ 2 ml / lit), T2- Farmers practice (quinolphos 25 EC @1400ml/ha), T3- Untreated control were imposed. the observations on the per cent leaf miner damage, mean larval population of leaf miner, coccinellid beetles were recorded at 15DAS, 30DAS and 45DAS in both the locations.IPM module recorded significantly lower percent of leaf miner damage and recorded higher yield than farmers practices.

Key words : *Groundnut, leafminer, IPM modules, cumbu, cowpea.*

Introduction

Groundnut (*Arachis hypogaea* L.) is one of the important oil seed crop in India and ranked sixth among oilseed crop in the world. Groundnut contains 50% of oil content and 28% of protein apart from dietary fiber, minerals and vitamins (1, 2, 3). More than 100 insect pests have been recorded on groundnut. Among them foliage feeders cause serious damage and significantly reduced the yield (4). Groundnut leafminer, *Aproaerema modicella* (Deventer) (Lepidoptera: Gelechiidae) is a major limiting factor for groundnut pod and haulm yield (5, 6). Though the synthetic insecticides have given good control, repeat and indiscriminate use of insecticides created imbalance in agro ecosystem and health hazard to humans (7, 8). Use of organic amendments, intercropping, installation of pheromone traps, botanical pesticides are the alternatives to the synthetic insecticides. Hence an attempt has been initiated to validate the IPM modules for the management of groundnut leaf minor.

Materials and Methods

Field experiments were laid out in two locations one at Regional Research Station, Vriddhachalam and another farmers field at Neyveli of Cuddalore District with the Groundnut variety VRI 2 during 2020 - 2021.The following treatments T1-IPM module (Application of neem cake @ 250 kg/ha, Cumbu as intercrop (6:1) and cowpea as border crop, Installation of light trap @1/ha, Monitoring with pheromone trap @12/ha, *Metarhizium rileyi* @ 4g/lit (CFU 108 / ml, azadirachtin 1% @ 1.5 ml/lit and need based application of insecticide - Novaluron 10EC @ 2 ml / lit), T2-Farmers practice (quinolphos 25 EC @1400ml/ha), T3-Untreated control were imposed. The observations on the per cent leaf miner damage, mean larval population of leaf miner, coccinellid beetles were recorded at 15DAS, 30DAS and 45DAS in both the locations. Finally yield of groundnut pods and haulm were recorded and all data were statistically analyzed.

Results and Discussion

RRS, Vriddhachalam : The results of the field trial at RRS, Vriddhachalam on the evaluation of IPM module against leaf miner of groundnut revealed that the mean per cent leaf miner damage at 15, 30 and 45 DAS was found significantly lower in T1-IPM module which registered 6.16, 9.25 and 7.08 respectively than the other treatments. Similar trend was observed with regard to the mean leaf miner larval population at 15, 30 and 45 DAS is 0.20, 0.31 and 0.30. In T2 farmers practices mean percent leaf damage was recorded as 6.82, 9.55 and 7.87. The mean per cent reduction of leaf miner damage was found high in T1-IPM module (31.84) followed by T2-Farmer practice (26.47).While in untreated control percent leaf damage is 10.60, 11.05 and 14.97 on 15, 30, 45 DAS respectively. Leaf miner larval population was recorded as 0.82, 0.48 and 0.45 on 15, 30 and 45 DAS respectively. IPM module recorded highest yield of 1150kg pod and 2430kg of haulm than farmers practice (890kg pod, 1240kg haulm). IPM module recorded 0.94 coccinelid/plant followed by untreated control (0.42). BC ratio was more in IPM module 2.20 followed by farmers practices 1.30. Pest defendor ratio was more in IPM module 1:1.47 followed by untreated control 1:1.22 (Table-1).

Farmers field, Neyveli : The results of the field trial at Neyveli on the evaluation of IPM module against leaf miner of groundnut revealed that the mean per cent

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Table-1 : Efficacy of IPM module against leaf miner of groundnut-RRS, Vridhachalam.

Treatment	PTC		15DAS		30DAS		45 DAS		Pooled mean		% reduction over control	Yield (Kg/ha)		Cocci-nellid beetle No./pl**	BC ratio	PD ratio
	Leaf miner		Leaf miner		Leaf miner		Leaf miner		Leaf miner			Pod**	Haulm*			
	Damage (%)*	larva/pl **	Damage (%)*	larva/pl **	Damage (%)*	larva/pl **	Damage (%)*	larva/pl **	Damage (%)*	larva/pl **						
T_1-IPM module	7.40 (15.78)[a]	0.48 (0.64)[a]	6.16 (14.37)[a]	0.20 (0.44)[a]	9.25 (16.64)[a]	0.31 (0.32)[a]	7.08 (15.43)[a]	0.30 (0.54)[a]	7.16	0.29	31.84	1150 (31.36)	2430 (49.52)	0.94 (0.96)[a]	2.20	1:1.47
T_2-Farmer practice	8.21 (16.65)[a]	0.54 (0.73)[b]	6.82 (15.13)[b]	0.27 (0.51)[b]	9.55 (18.00)[b]	0.43 (0.3)[b]	7.87 (16.29)[b]	0.37 (0.60)[b]	8.08	0.35	26.47	890 (26.20)	1240 (34.26)	0.42 (0.59)[a]	1.30	1:1.10
T_3-Control	9.87 (18.31)[a]	0.67 (0.81)[c]	10.60 (19.00)[c]	0.82 (0.95)[c]	11.05 (19.41)[c]	0.48 (0.69)[c]	14.97 (22.76)[c]	0.45 (0.67)[c]	10.99	0.58	-	580 (21.32)	880 (29.20)	0.35 (0.54)[a]	1.10	1:1.22
SEd	0.22	0.05	0.04	0.11	0.02	0.01	0.05	0.01	-	-	-	0.01	0.01	0.01	-	-
CD at 5%	0.04	0.12	0.10	0.24	0.04	0.02	0.12	0.02	-	-	-	0.02	0.02	0.02	-	-

In a column means followed by a common alphabet are not significantly different by 5% DMRT.
* Figures in parentheses are arcsine transformed values
** Figures in parentheses are square root transformed values.
PTC: Pre treatment count, DAS: Days after sowing.

Table-2 : Efficacy of IPM module against leaf miner of groundnut-Neyveli.

Treatment	PTC		15DAS		30DAS		45 DAS		Pooled mean		% reduction over control	Yield (Kg/ha)		Cocci-nellid beetle No./pl**	BC ratio	PD ratio
	Leaf miner		Leaf miner		Leaf miner		Leaf miner		Leaf miner			Pod**	Haulm*			
	Damage (%)*	larva/pl **	Damage (%)*	larva/pl **	Damage (%)*	larva/pl **	Damage (%)*	larva/pl **	Damage (%)*	larva/pl **						
T_1-IPM module	7.40 (15.78)[a]	0.48 (0.64)[a]	6.16 (14.37)[a]	0.20 (0.44)[a]	9.25 (16.64)[a]	0.31 (0.32)[a]	7.08 (15.43)[a]	0.30 (0.54)[a]	7.16	0.29	31.84	1150 (31.36)	2430 (49.52)	0.94 (0.96)[a]	2.20	1:1.47
T1-IPM module	6.30 (14.53)[a]	0.37 (0.60)[a]	5.10 (13.05)[a]	0.31 (0.55)[a]	7.30 (15.67)[a]	0.30 (0.54)[a]	6.60 (14.88)[a]	0.22 (0.46)[a]	6.33	0.27	41.06	1220 (33.46)	2660 (51.57)	0.61 (0.78)[a]	2.1	1:1.64
T2-Farmer practice	7.01 (15.35)[a]	0.48 (0.69)[b]	6.10 (14.29)[b]	0.29 (0.53)[b]	6.20 (14.41)[b]	0.51 (0.71)[b]	7.20 (15.56)[b]	0.30 (0.54)[b]	6.50	0.36	39.47	930 (28.80)	1330 (36.46)	0.30 (0.54)[a]	1.4	1:1.23
T3-Control	8.07 (16.50)[a]	0.61 (0.78)[c]	9.83 (18.22)[c]	0.72 (0.84)[c]	10.10 (18.53)[c]	0.43 (0.65)[c]	12.30 (20.53)[c]	0.51 (0.71)[c]	10.74	0.55	-	650 (25.49)	980 (31.30)	0.28 (0.52)[a]	1.1	1:1.34
SEd	0.02	0.06	0.05	0.09	0.04	0.02	0.05	0.04	-	-	-	0.01	0.01	0.05	-	-
CD at 5%	0.04	0.14	0.12	0.21	0.08	0.05	0.11	0.09	-	-	-	0.02	0.02	0.11	-	-

In a column means followed by a common alphabet are not significantly different by 5 % DMRT.
* Figures in parentheses are arcsine transformed values
** Figures in parentheses are square root transformed values.
PTC: Pre treatment count, DAS: Days after sowing

leafminer damage at 15,30 and 45 DAS was found significantly lower in T1-IPM module which registered 5.10,7.30 and 6.60 respectively than the other treatments. Similar trend was observed with regard to the mean leaf miner larval population at 15, 30 and 45 DAS is 0.31, 0.30 and 0.22. In T2-farmers practice mean percent leaf damage was recorded as 6.10, 6.20 and 7.20 on 15, 30 and 45 days respectively. The mean per cent reduction of leaf miner damage was found high in T1-IPM module (41.06) followed by T2-Farmer practice (39.47). T1-IPM module has registered significantly higher pod yield (1220 kg/ha) and haulm yield (2660 kg/ha) with highest BC ratio of 2.1 and PDR of 1: 1.64.The population of coccinellid beetle ranged from 0.28 to 0.61 (Table-2).

In both the locations IPM module recorded minimum leaf miner damage, minimum number of leaf miner larvae and more pod and haulm yield. This is due to the cumulative effect of IPM components such as application of neem cake, cumbu as intercrop (6:1) and cowpea as border crop, installation of light trap, pheromone trap, spraying of *Metarhizium rileyi*, azadirachtin and need based application of insecticide (Novaluron 10EC @ 2 ml / lit).Validation of IPM modules includes spraying of azadirachtin, collection of larvae and egg masses of defoliators and installation of pheromones traps, yellow sticky traps, Soybean and Castor as a trap crop recorded more pod yield supports present findings (9). Sunflower grown as trap crop in groundnut reduced the defoliation by *Spodoptera litura* (10) support present findings. Castor as trap crop in groundnut reduced pest population in groundnut (11). IPM module consist of cowpea as border crop, and spraying of *Lecanicillium lecanii*, *Beauveria bassiana* and SI NPV recorded 8.00 thrips per terminal bud and 2.20 hoppers per sweep is in line with present findings (12, 13).

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