Website : www.asthafoundation.in
Progressive Research : An International Journal
Vol 18 (2) : 117-121 (July-2023), Print ISSN : 0973-6417, Online ISSN : 2454-6003
Society for Scientific Development in Agriculture and Technology, Meerut (U.P.) India

Effect of Different Management Strategies against Thrips in Groundnut

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Abstract

The field experiment was conducted at Zonal Agricultural and Horticultural Research station, Hiriyur, Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga, Karnataka during *Kharif*, season for three consecutive years from 2019 to 2021 for the management of thrips through Natural, Eco-friendly and chemical insecticides in groundnut. The treatments were organic pesticides neemastra @250 lit/acre, azadirachtin 1 EC @ 2ml/L and chemical pesticides *viz*., Imidacloprid 17.8 SL at 250ml/ha and 300ml/ha were imposed at different dosages. Results of pooled averages data revealed that imidacloprid 17.8 SL at 250ml/ha and 300 ml/ha (3.06 and 2.70 thrips/three leaves/ plant, respectively) found effective in reducing thrips population. Whereas, azadirachtin 1 EC @ 2ml/L was next best pesticides followed by neemastra @250 lit/acre (3.86 and 4.31 thrips/three leaves/ plant, respectively). The treatments were differed significantly with each other in their efficiency. Therefore, Imidacloprid 17.8 SL at 250ml/ha and Imidacloprid 17.8 SL at 300ml/ha were found to be effective against thrips population. Thus the use of Imidacloprid 17.8 SL may include individually or incorporation in an integrated pest management programme for management thrips and also by organic pesticides *viz*., neemastra and azadirachtin can be prepared by using local available inputs may help to get rid from pest damage but also, protect us from the hilarious side effects of chemical methods. In turn Plant protection cost will be reduced and this may prove as economically viable with less effect on natural enemies in groundnut eco-system during *Kharif* seasons.

Key words : *Organic, pesticides, chemical, neemastra, thrips, groundnut.*

Introduction

Groundnut (*Arachis hypogaea* L.) is an important oil seed crop of tropical and sub-tropical regions of the world. In India, it has the largest share among the oil seeds with regard to area and production (1). Though India ranks first in area under groundnut cultivation, the productivity is quite low compared to that of USA, China, Argentina and Indonesia (2). In India, groundnut (*Arachis hypogea*) is cultivated during *Kharif, Rabi* and summer seasons on an area over 4.91 million hectares with an annual production of 9.18 million tonnes. The major growing states are Gujarat, Andhra Pradesh, Tamil Nadu, Madhya Pradesh, Karnataka, Maharashtra and Rajasthan constituting and contributing around 80% of area and production, respectively (3).

The low groundnut productivity is attributed to several production constraints. Biotic factors such as insects and diseases play an important role in affecting the productivity and quality. However, this crop is attacked by about 100 different insect pests among them major pests are leafminer, tobacco caterpillar, gram pod borer, thrips, aphids, leafhoppers, white grub and termite. Besides, nematode diseases like, Kalahasti and root knot are also reported on groundnut. (4). Moreover, the sucking insect pest complex comprising thrips, aphid and leaf hoppers (Empoasca kerri) are the major pests of importance on groundnut crop specially when raised under summer conditions and bunch varieties are severely infested. Whereas in the recent years incidence of thrips on groundnut crop is increasing and known to cause yield loss to the tune of 14 to 40 per cent and also Leafhoppers place a major role in groundnut damage (5). Similarly, (6) whose result shows that imidacloprid 17.8 SL was most effective for controlling of sucking insect pests on groundnut. Whereas, by using biopesticide (7) reported neem oil was more effective to manage the population of leafhoppers and thrips in cowpea. While (8) who reported that dimethoate 30 EC found effective against thrips in groundnut by registering maximum reduction of pest population.

Use of chemical pesticides to control these pests has led to several environmental problems, serious health hazards to human-being and animals, development of resistance to pesticides in some insect pests and disease causing agents and destruction of beneficial insects like parasites and predators and pesticide residues. Growing awareness of the environment has made it imperative to search for alternatives to the synthetic chemicals (9). After witnessing the harmful effects of chemical farming, newly

Received : June-2023; Revised : June-2023; Accepted : July-2023

introduced agriculture technique among farmers is zero budget natural farming (ZBNF), also known as zero budget spiritual farming (ZBSF). It has attained wide success in southern India especially Karnataka where it was firstly evolved. Now it is spreading all over India, so rapidly. Zero budget natural farming. It is widely agreed that ZBNF has been mostly adopted in Maharashtra, Karnataka and Andhra Pradesh.

While number of natural fungicides for disease control and pesticides to control insects pests made from locally sourced ingredients like neem leaves, chilies, garlic, tobacco, sour buttermilk, etc. (7). Above mentioned ZBNF formulae and ingredients works effective against pests such as Leaf Roller, Stem Borer, Fruit borer, Pod borers, all the sucking pests and rodents (10). However, bramhastra which control the pests like leaf roller, stream borer, fruit borer, pod borer, sucking pests and mealy bug etc. All these ingredients are localy available inputs like cow dung, cow urine, green chillies, neem pulp, neem leaves which are always available in farmers' farm free of cost (11).

In general these both sucking pests showed certain levels of behavioral resistance to different class of insecticides, hence successful control of these pests is some extent difficult. Therefore, keeping this in view the present study was undertaken to test the effectiveness of ZBNF concept in sucking pests control in groundnut.

Materials and Methods

The experiment was carried out under field condition during Kharif 2019 to 2021 at the Zonal Agricultural and Horticultural Research Station (ZAHRS), Hiriyur, University of Agricultural and Horticultural Sciences, Shivamogga, Karnataka. The field trial was conducted to evaluate effect of ecofriendly organic and chemical pesticides against thrips in Kharif Groundnut with four treatments and five replications. The sowing was done during first fortnight of July, 2019 and second fortnight of 2020 and 2021 in all the treatments at a time. Treatments were implemented on one acre area with TMV-2 groundnut variety with spacing of 10x 30 cm.

The different farming methods as following : T_1:NF (Natural Farming): Ghanajeevamrutha 400 kg/ac-Beejamrutha (Seed treatment) + Jeevamrutha 200 L/ac/month). T_2: Organic Farming: Recommended dose of FYM + N equivalent basis of FYM. T_3: Recommended Package of practice: FYM 3 t/ ac, NPK 40:20:10 kg/ac and Azotobactar 150 g/ ac + PSB 400 g/ ac (Seed treatment). T_4: Farmers Practice : FYM 2 t/ ac, NPK - 76:20:18 kg/ac. In order to know the efficiency of different pesticides the following treatments as follows: T_1: NF (Natural Farming): Neemastra @ 250l/acre. T_2: Organic Farming: Azadirachtin 1 EC @2ml/L. T_3: Recommended Package of practice: Imidacloprid 17.8 SL @ 250ml/ha. T_4: Farmer's practice: Imidacloprid 17.8 SL@ 300ml/ha against thrips in groundnut. The experiment was laid out in a Randomized Block Design with five replications having 20 m x10 m plot size of each replication during *Kharif* season, 2019 and 2020.

Method of preparation and application : Spray application of respective pesticides was given on the initiation of the pest and subsequently one another spray was given after 30 days interval using battery operated knapsack sprayer. To prepare neemastra, the ingredients like, 200 liter water, 10 liter Cow Urine, 10Kg desi cow dung, 10 Kg neem Leaves can be taken. Prepared by Adding the Cow's Urine of 10 Litres with 200 Litres of Water and Crushed 10Kgs of neem Leaves. Allow this solution to ferment for 24 hours and stir the mixture twice a day by using a wooden stick. Later kept for 24 hrs and then filtered the extract. This can be stored in bottles for 6 months.

Method of recording observations : For recording the observations, five plants were selected randomly in each net plot. The population thrips was counted from three leaves (upper, middle and lower leaves) from the same selected plants. The observations on sucking pests population were recorded prior to one day of first and second spray as well as one week and two weeks after each spray.

Results and Discussion

Efficiency of different pesticides on thrips during *Kharif*, 2019 : The population of thrips during *Kharif*, 2019 at day before spraying was showed significantly higher population in all the treatments which ranged from 4.40 to 7.79 thrips/3 leaves/plant as indicated in Table-1 showed non-significant differences between treatments. Whereas significantly low population of thrips (2.94 thrips/3 leaves/plant) was recorded in the treatment of farmers practice at three days after spray followed by recommended package of practice was also found next effective treatment in their order in reduction of thrips population (3.38 thrips/3 leaves/plant). While organic farming treatment was recorded next best treatment in thrips population reduction (4.30 thrips/3 leaves/plant) against natural farming practice (5.12 thrips/3 leaves/plant) was recorded.

Similarly imidacloprid 17.8 SL at 300 ml/lit (1.70 thrips/3 leaves/plant) was most effective as compared to other treatments in reducing the population of thrips at seven days after spray. The treatment with Imidacloprid 17.8 SL @ 250 ml/lit (1.78 thrips/3 leaves/plant) was the next best effective treatment, followed by azadirachtin 1

Table-1 : Effect of different farming practices on management of thrips on groundnut at ZAHRS, Hiriyur during *Kharif*, 2019, 2020 and 2021.

Treatments	*Kharif*, 2019						Kharif, 2020						Kharif, 2021						Pooled mean
	Average. No. of thrips/3 leaves/plant						Average. No. of thrips/3 leaves/plant						Average. No. of thrips/3 leaves/plant						
	DBS	3DAS	7DAS	10DAS	14DAS	Mean	DBS	3DAS	7DAS	10DAS	14DAS	Mean	DBS	3DAS	7DAS	10DAS	14DAS	Mean	
T_1 : NF (Natural Farming): Neemastra @ 250l/acre	5.62 (1.84)	5.12 (2.26)^{b}	3.14 (1.74)^{b}	2.47 (1.54)^{c}	1.66 (1.27)^{c}	3.60	11.28 (3.3)	8.12 (2.93)	7.72 (2.57)^{b}	3.46 (1.87)^{b}	2.92 (1.72)^{c}	6.70	4.30 (1.64)	3.41 (1.86)^{b}	2.37 (1.49)^{c}	1.84 (1.31)^{c}	1.28 (1.22)^{c}	2.64	4.31
T_2 : Organic Farming: Azadirachtin 1 EC @2ml/L	7.79 (1.74)	4.30 (2.06)^{b}	2.74 (1.65)^{b}	1.87 (1.33)^{b}	1.24 (1.11)^{b}	3.59	9.29 (3.03)	8.25 (2.95)	4.70 (2.05)^{b}	3.10 (1.806)^{ab}	2.12 (1.44)^{bc}	5.49	5.21 (1.57)	2.92 (1.73)^{ab}	1.95 (1.36)^{bc}	1.39 (1.12)^{bc}	0.97 (1.10)^{bc}	2.49	3.86
T_3 : Recommended Package of practice : Imidacloprid 17.8 SL @ 250ml/ha	5.38 (1.82)	3.38 (1.78)^{ab}	1.78 (1.31)^{a}	1.17 (1.08)^{ab}	0.91 (0.51)^{ab}	2.52	10.09 (3.13)	8.07 (2.92)	3.54 (1.85)^{b}	1.62 (1.43)^{a}	1.06 (0.93)^{ab}	4.88	3.76 (1.60)	2.23 (1.51)^{ab}	1.40 (1.06)^{ab}	0.91 (0.94)^{ab}	0.64 (0.72)^{ab}	1.79	3.06
T_4 : Farmer's practice: Imidacloprid 17.8 SL@300ml/ha	4.40 (1.92)	2.94 (1.66)^{a}	1.70 (1.31)^{a}	1.04 (0.99)^{a}	0.32 (0.53)^{a}	2.08	9.84 (3.12)	8.32 (2.96)	3.04 (1.63)^{a}	0.66 (1.03)^{a}	0.52 (0.64)^{a}	4.48	3.69 (1.67)	1.74 (1.32)^{a}	1.26 (0.86)^{a}	0.70 (0.78)^{a}	0.28 (0.60)^{a}	1.53	2.70
SEm±	2.24	0.49	0.30	0.26	0.14	0.69	0.79	0.24	0.95	0.59	0.45	0.60	1.55	0.39	0.27	0.22	0.15	0.52	0.60
CD(P=0.05)	NS	1.51*	0.92*	0.80*	0.44*	-	NS	NS	2.92*	1.83*	1.37*	-	NS	1.19*	0.82*	0.68*	0.47*	-	

Figures in the parentheses are $\sqrt{x \quad 0.5}$ transformed value, DBS- Day before spraying, DAS- Days after Spraying, *- Significant at p<0.05; NS-Not Significant, Pooled mean-Pooled mean of 2019, 2020 and 2021.

EC @2ml/L (2.74 thrips/3 leaves/plant). Whereas maximum thrips population (3.14 thrips/3leaves/plant) was recorded in neemastra @250 lit/acre treatment.

Whereas Imidacloprid 17.8 SL at 300 ml/lit (1.04 thrips/3 leaves/plant) was most effective as compared to other treatments in reducing the population of thrips at ten days after spray followed by treatment with Imidacloprid 17.8 SL @250 ml/lit (1.17 thrips/3 leaves/plant) was the next best effective treatment and treatment azadirachtin 1 EC @2ml/L was recorded 1.87 thrips/3 leaves/plant. Maximum thrips population (2.47 thrips/3leaves/ plant) was recorded in neemastra @250 lit/acre treatment.

Similarly imidacloprid 17.8 SL at 300 ml/lit (0.32 thrips/3 leaves/plant) was most effective as compared to other treatments in reducing the population of thrips at fourteen days after spray. The treatment with Imidacloprid 17.8 SL @250 ml/lit (0.91 thrips/3 leaves/plant) was the next best effective treatment, followed by Azadirachtin 1 EC @2ml/L (1.24 thrips/3 leaves/plant). Whereas maximum thrips population (1.66 thrips/3leaves/plant) was recorded in neemastra @250 lit/acre treatment.

Efficiency of different pesticides on thrips during *Kharif*, 2020 : The population of thrips during *Kharif*, 2020 at day before spraying was showed significantly higher population in all the treatments which ranged from 9.29 to 11.28 thrips/3 leaves/plant as indicated in Table-1. Whereas day before spraying and three days after spraying observed non-significant differences between treatments.

Treatment with imidacloprid 17.8 SL at 300 ml/lit (3.04 thrips/3 leaves/plant) was most effective as compared to other treatments in reducing the population of thrips at seven days after spray. The treatment with Imidacloprid 17.8 SL @ 250 ml/lit (3.54 thrips/3 leaves/plant) was the next best effective treatment, followed by azadirachtin 1 EC @2ml/L (4.70 thrips/3 leaves/plant). Whereas maximum thrips population (7.72 thrips/3leaves/plant) was recorded in neemastra @250 lit/acre treatment.

Whereas Imidacloprid 17.8 SL at 300 ml/lit (0.66 thrips/3 leaves/plant) was most effective as compared to other treatments in reducing the population of thrips at ten days after spray followed by treatment with Imidacloprid 17.8 SL @250 ml/lit

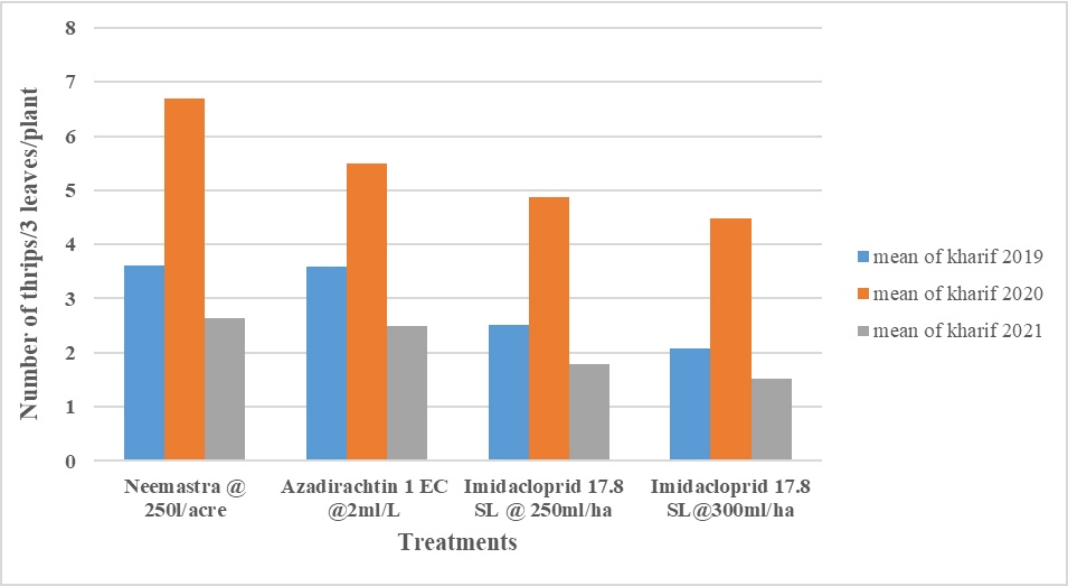

Figure-1 : Effect of Natural and Ecofriendly pesticides against thrips in *Kharif* 2019, 2020 and 2021.

(1.62 thrips/3 leaves/plant) was the next best effective treatment and treatment azadirachtin 1 EC @2ml/L was recorded 3.10 thrips/3 leaves/plant. Maximum thrips population (3.46 thrips/3leaves/ plant) was recorded in neemastra @250 lit/acre treatment.

Similarly imidacloprid 17.8 SL at 300 ml/lit (0.52 thrips/3 leaves/plant) was most effective as compared to other treatments in reducing the population of thrips at fourteen days after spray. The treatment with Imidacloprid 17.8 SL @250 ml/lit (1.06 thrips/3 leaves/plant) was the next best effective treatment, followed by azadirachtin 1 EC @2ml/L (2.12 thrips/3 leaves/plant). Whereas maximum thrips population (2.92 thrips/3leaves/ plant) was recorded in neemastra @250 lit/acre treatment

Efficiency of different pesticides on thrips during *Kharif*, 2021 : The population of thrips during *Kharif*, 2021 at day before spraying was showed significantly higher population in all the treatments which ranged from 3.69 to 5.21 thrips/3 leaves/plant as indicated in Table-1 showed non-significant differences between treatments. Whereas significantly low population of thrips (1.74 thrips/3 leaves/plant) was recorded in the treatment of farmers practice at three days after spray followed by recommended package of practice was also found next effective treatment in their order in reduction of thrips population (2.23 thrips/3 leaves/plant). While organic farming treatment was recorded next best treatment in thrips population reduction (2.92 thrips/3 leaves/plant) against natural farming practice (3.41 thrips/3 leaves/ plant) was recorded.

Similarly imidacloprid 17.8 SL at 300 ml/lit (1.26 thrips/3 leaves/plant) was most effective as compared to other treatments in reducing the population of thrips at seven days after spray. The treatment with Imidacloprid 17.8 SL @ 250 ml/lit (1.40 thrips/3 leaves/plant) was the next best effective treatment, followed by azadirachtin 1 EC @2ml/L (1.95 thrips/3 leaves/plant). Whereas maximum thrips population (2.37 thrips/3leaves/ plant) was recorded in neemastra @250 lit/acre treatment.

Whereas Imidacloprid 17.8 SL at 300 ml/lit (0.70 thrips/3 leaves/plant) was most effective as compared to other treatments in reducing the population of thrips at ten days after spray followed by treatment with Imidacloprid 17.8 SL @250 ml/lit (0.91 thrips/3 leaves/plant) was the next best effective treatment and treatment azadirachtin 1 EC @2ml/L was recorded 1.39 thrips/3 leaves/plant. Maximum thrips population (1.84 thrips/3leaves/plant) was recorded in neemastra @250 lit/acre treatment.

Similarly imidacloprid 17.8 SL at 300 ml/lit (0.28 thrips/3 leaves/plant) was most effective as compared to other treatments in reducing the population of thrips at fourteen days after spray. The treatment with Imidacloprid 17.8 SL @250 ml/lit (0.64 thrips/3 leaves/plant) was the next best effective treatment, followed by Azadirachtin 1 EC @2ml/L (0.97 thrips/3 leaves/plant). Whereas maximum thrips population (1.28 thrips/3leaves/ plant) was recorded in neemastra @250 lit/acre treatment.

Whereas mean data of *Kharif*, 2019, 2020 and 2021 showed less population in farmer's practice followed by recommended package of practice and next best treatment was organic farming against natural farming.

However pooled mean data observed that treatment with Imidacloprid 17.8 SL@300ml/ha (2.70 thrips/3 leaves/plant) in farmers practice and Imidacloprid 17.8 SL@250ml/ha (3.06 thrips/3 leaves/plant) in

recommended package of practice was recorded less thrips population compare to neemastra @ 250l/acre treatment (4.31 thrips/3 leaves/plant) in natural farming practice against groundnut thrips.

The Imidacloprid 17.8 SL @300 ml/l and 250 ml/lit was found most effective in management thrips population. The next effective treatments were Azadirachtin 1 EC @2ml/L and followed by Neemastra @250 lit/acre. The treatments were differed significantly with each other in their efficacy. The results are further conformity with those of (12, 13) whose result shows that imidacloprid 17.8 SL was most effective for controlling of sucking insect pests on groundnut. Further (12) reported that for the suppression of leafhopper and thrips on groundnut the treatment of imidacloprid (0.003%) was most effective, followed by thiamethoxam (0.005%). (14) was found imidachloprid 17.8 SL and thaimethoxam 25 WG effective in reducing population of thrips. These investigations are in agreement with (8) who reported that dimethoate 30 EC found effective against thrips in groundnut by registering maximum reduction of pest population. Further the present findings are in confirmation with the results of (7). Neem oil was more effective to manage the population of leafhoppers and thrips in cowpea. Whereas Jat and Jeyakumar in 2006 reported that the higher effectiveness of neem oil and NSKE against leafhoppers was mentioned in cotton earlier. While (15) observed effectiveness of NSKE was reported against leafhoppers infesting soybean crop. While natural pesticides to control insects pests made from locally sourced ingredients like neem leaves, chilies, garlic, tobacco, sour buttermilk, *etc* (7). Above mentioned formulae and ingredients works effective against pests such as Leaf Roller, Stem Borer, Fruit borer, Pod borers, all the sucking pests and rodents (10). However bramhastra which control the pests like leaf roller, stream borer, fruit borer, pod borer, sucking pests and mealy bug etc. All these ingredients are local available inputs like cow dung, cow urine, green chillies, neem pulp, neem leaves which are always available in farmers' farm free of cost (11).

Management of thrips in groundnut can be managed by neemastra and its preparations will be done by using local available inputs may help to get rid from pest damage ecofriendly but also, protect us from the side effects of chemical practices, such as pollution, carcinogenic elements food poisoning and other human ill effects. By this Plant protection cost will be reduced and this can be prepared by the farmer himself and used either as prophylactic or as curative measure for control of crop pests. Whereas suggested if the economic injury to crops due to pests is less than five percent, it should be deemed to be 'return to nature' and no plant protection measures should be taken.

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