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Evaluation of botanicals against sucking insect pests of *Arachis hypogea* L

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Abstract
Field tests on the relative effectiveness of 10 different biocides against groundnut pest sucking insects were done. Neem seed kernel extract (NSKE) @ 5% and Vanguard 0.15% EC @ 0.0006% were shown to be very efficient against groundnut-infesting aphid, jassid, and thrips. While Gronim 0.30% EC @ 0.0006% was more effective against jassid and thrips on groundnut, Neemazal-T/S 1% @ 0.0006% was reported beneficial against aphid.

Keywords: *Arachis hypogea*, sucking insects, botanicals, and pod yield

Introduction
The annual legume crop known as groundnut (*Arachis hypogaea* Linnaeus) is a member of the Leguminoseae family. It is the fourth-most significant oilseed crop in the world and the greatest source of edible oil in the globe (Ramanathan, 2001) [5]. It also ranks 13th among food crops. It is cultivated in temperate nations' continental interiors and in tropical and subtropical climates. According to Mehta (2002) [3], the seed's kernels contain up to 50% of a non-drying oil, 40–50% fat, 20–50% protein, and 10–20% carbohydrates. Groundnut alone accounts for 48% of the oilseeds area and 60% of total output in India of all the oilseed crops (Singh *et al*., 2009) [7]. The 500 species of arthropods that damage the crop most often. Aphids (*Aphis craccivora* Koch), jassids (*Empoasca kerri* Pruthi), and thrips (*Scritothrips dorsalis* Lindman) are the main insect pests that harm groundnut crops.

Materials and Methods
The field experiment used a Randomized Block Design to determine the most cost-effective biocides (Table 1) against groundnut pest sucking insects. Groundnut GG-20 was seeded in 2010 with a spacing of 60 x 15 cm during the second weeks of February and July. Gross and net plot sizes were respectively 4.05 x 3.00 m and 3.45 x 1.80 m. Three copies of each treatment were performed.

On the arrival of the sucking insect pests, the first spraying of the appropriate biocides was done. With the aid of a manually operated knapsack sprayer equipped with a duromist nozzle, the second spray was sprayed 15 days following the first spray. Ipomoea fistulosa leaf extract was created by using a grinder to ground enough leaves. Neem seed kernels needed for the preparation of neem seed extract were weighed (250 g) on an electric balance and ground in an electric grinder. The powder was placed in a muslin cloth bag and soaked in 2 liters of water overnight. The bag was then continuously pressed until the fluid that emerged was light brownish in color. Finally, water was added to provide the necessary amount (5 liter). Just before spraying, freshly made extract was diluted with water. Five plants were chosen at random and tagged in each net plot area for the purpose of documenting observations. On three randomly chosen branches of each plant, the population of sucking insect pest nymphs (aphid, jassid, and thrips) was counted. The number of sucking insect pests was counted before each treatment as well as 3, 7, 10, and 15 days afterwards. When evaluating the effectiveness of various therapies, the yield is a crucial factor to consider. The crop of groundnuts was collected on schedule. From the net plot area, the pod and stover yield was calculated and expressed in kilograms per hectare.

Results and Discussion
The Neemazal-T/S treatment plots had the lowest (1.87) aphid population, and it outperformed NSKE (1.90) and Vanguard (2.12), according to findings from all periods and sprays combined (Table 1).

These three plants outperformed the other biocides substantially. 3.26 and 3.30 aphid per three branches for Gronim, NFLE, and V. lecani, respectively. Plots treated with M. anisopliae had the largest (3.66) aphid population, followed by neem oil and karanj oil. The lower (0.78) jassid population was seen in plots treated with NSKE, and it was comparable to Vanguard (0.92) and Gronim (1.06), according to data from all periods and sprays (Table 2). These three biocides outperformed the other biocides in terms of effectiveness. The jassid population in Neemazal-T/S, NFLE, and V. lecani treated plots ranged from 2.22 to 2.29 per 3 branches. The plots treated with M. anisopliae had the largest (2.63) jassid population, followed by neem oil and karanj oil.

The findings from all the periods and sprays combined (Table 3) revealed that the plots treated with NSKE had the lowest thrips population (0.62), which was comparable to Vanguard's (0.82) and Gronim's (0.99) populations. Between 2.06 and 2.16 thrips per 3 branches were treated with NFLE, neem oil, and Neemazal-T/S. Plots treated with M. anisopliae had the largest (2.26) thrips population, followed by plots treated with V. lecani and karanj oil. The plots treated with NSKE 5%, Vanguard 0.15% EC @ 0.0006 per cent were shown to be more successful in reducing sucking insect pests (jassid and thrips) on groundnut, according to the findings of two season studies. In contrast to Gronim's 0.30% @ 0.0006% effectiveness against jassid and thrips, Vanguard was more effective against A. craccivora. Patil *et al*. (2003) [4] demonstrated the efficiency of NSKE 5% against jassid and thrips infesting groundnut. Neemazal 1% was shown to be more efficient against groundnut aphid by Jaykumar *et al*. (2004) [2]. The NFLE is 5%, karanj oil is 3.3%, and neem oil is 3.3%. M. anisopliae and V. lecani were shown to be relatively less efficient against sucking insect pests (aphid, jassid, and thrips) at 40 g per 10 liters of water. In contrast to Neemazal-T/S, which has a 1% EC at 0.0006 percent against jassid and thrips, Gronim is somewhat ineffective against aphid. M. anisopliae @ 0.1% was shown to be less effective against jassid in Anitha's 2007 evaluation of seven biocides using one standard check. According to Sardana and Kumar (1989) [6], who investigated the efficiency of neem (0.5 to 2%) and karanj (0.5 to 2%) oil against jassids, the oil failed to significantly reduce the jassid population.

The treatment of NSKE had the highest net realization (27965 Rs/ha), followed by neemazal-T/S (18972 Rs/ha), Gronim (18535 Rs/ha), Vanguard (33824 Rs/ha), and neem oil (15270 Rs/ha). For the remaining treatments, the net realization ranged from 5570 to 10120 Rs/ha. The treatment of NSKE had the greatest (1: 32.28) result on the NICBR. Neemazal-T/S, Gronim, Karanj oil, and neem oil were used to determine the NICBR from 9 to 15. M. anisopliae, Vanguard, NFLE, and V. lecani all had NICBRs that were, respectively, 1: 00.97, 1: 04.40, 1: 04.78, and 1: 06.90. Vanguard, Neemazal-T/S, Gronim, and NSKE had NICBRs of 1: 04.40, 1: 13.35, 1: 13.85, and 1: 32.28 for effective biocides, respectively.

Table 1: Bioefficacy of biocides against aphids infesting on *kharif* groundnut

Biocides	Conc. (%)	No. of aphids/ 3 branches days after spray												
		First spray						Second spray						Pooled over sprays
		Before spray	3	7	10	15	Pooled	Before Spray	3	7	10	15	Pooled	
NSKE	5	2.22 (4.43)	1.74 (2.53)	1.56 (1.93)	1.47 (1.66)	1.39 (1.43)	1.54 (1.87)	2.16 (4.17)	1.75 (2.56)	1.60 (2.06)	1.49 (1.72)	1.34 (1.30)	1.55 (1.90)	1.55 (1.90)
Neem oil	0.3	2.25 (4.56)	2.15 (4.12)	2.04 (3.66)	1.96 (3.34)	1.95 (3.30)	2.03 (3.62)	2.15 (4.12)	2.06 (3.74)	1.88 (3.03)	1.88 (3.03)	1.89 (3.07)	1.93 (3.22)	1.99 (3.46)
Karanj oil	0.3	2.21 (4.38)	2.13 (4.04)	1.98 (3.42)	1.89 (3.07)	1.96 (3.34)	1.99 (3.46)	2.21 (4.38)	2.00 (3.50)	1.99 (3.46)	1.99 (3.46)	1.90 (3.11)	1.97 (3.38)	1.97 (3.38)
NFLE	5	2.22 (4.42)	2.17 (4.20)	2.03 (3.62)	1.90 (3.11)	1.90 (3.11)	2.00 (3.50)	2.05 (3.70)	1.97 (3.38)	1.91 (3.14)	1.85 (2.92)	1.84 (2.88)	1.89 (3.07)	1.95 (3.30)
Vanguard 0.15% EC	0.0006	2.18 (4.25)	1.83 (2.85)	1.66 (2.26)	1.50 (1.75)	1.46 (1.63)	1.61 (2.09)	2.20 (4.34)	1.94 (3.26)	1.68 (2.32)	1.60 (2.06)	1.37 (1.38)	1.64 (2.19)	1.62 (2.12)
Gronim 0.30% EC	0.0006	2.18 (4.25)	2.05 (3.70)	2.03 (3.62)	1.98 (3.42)	1.98 (3.42)	2.01 (3.54)	2.20 (4.34)	1.96 (3.34)	1.90 (3.11)	1.67 (2.29)	1.95 (3.30)	1.87 (3.00)	1.94 (3.26)
Neemazal T/S 1% EC	0.0006	2.19 (4.30)	1.80 (2.74)	1.64 (2.19)	1.48 (1.69)	1.43 (1.54)	1.58 (2.00)	2.10 (3.91)	1.72 (2.46)	1.53 (1.84)	1.38 (1.40)	1.35 (1.32)	1.50 (1.75)	1.54 (1.87)
Verticillium lecani	0.4	2.21 (4.38)	1.94 (3.26)	2.08 (3.83)	1.95 (3.30)	1.91 (3.15)	1.97 (3.38)	2.13 (4.04)	1.88 (3.03)	2.04 (3.66)	1.87 (3.00)	1.96 (3.34)	1.94 (3.26)	1.95 (3.30)
Metarhizium anisopliae	0.4	2.23 (4.47)	2.09 (3.87)	2.09 (3.87)	2.09 (3.87)	2.05 (3.70)	2.08 (3.83)	2.11 (3.95)	2.07 (3.78)	2.03 (3.62)	1.94 (3.26)	1.94 (3.26)	2.00 (3.50)	2.04 (3.66)
Control		2.14 (4.08)	2.90 (7.91)	3.33 (10.59)	3.38 (10.92)	3.56 (12.17)	3.29 (10.32)	2.40 (5.26)	2.73 (6.95)	2.90 (7.91)	3.15 (9.42)	3.47 (11.54)	3.06 (8.86)	3.17 (9.55)
S. Em. ±	-	0.15	0.12	0.15	0.13	0.13	0.07	0.10	0.19	0.13	0.12	0.12	0.07	0.08
C. D. at 5%	-	NS	0.36	0.46	0.40	0.38	0.19	NS	0.56	0.39	0.35	0.37	0.21	0.23
C. V. %	-	11.59	10.12	13.08	11.81	11.22	11.60	8.14	15.99	11.76	10.80	11.23	12.73	13.81

Figures in the parentheses are retransformed values, those outside are values

Table 2: Bioefficacy of biocides against jassids infesting *kharif* groundnut

Biocides	Conc. (%)	No. of jassids/ 3 branches days after spray												
		First spray						Second spray						Pooled over sprays
		Before spray	3	7	10	15	Pooled	Before spray	3	7	10	15	Pooled	
NSKE	5	1.95 (3.30)	1.43 (1.54)	1.19 (0.92)	1.07 (0.64)	0.95 (0.40)	1.16 (0.85)	1.85 (2.92)	1.40 (1.46)	1.16 (0.85)	0.94 (0.38)	0.90 (0.31)	1.10 (0.71)	1.13 (0.78)
Neem oil	0.3	2.02 (3.58)	1.91 (3.15)	1.78 (2.67)	1.68 (2.32)	1.68 (2.32)	1.76 (2.60)	1.90 (3.11)	1.79 (2.70)	1.59 (2.03)	1.70 (2.39)	1.61 (2.09)	1.67 (2.29)	1.71 (2.42)
Karanj oil	0.3	1.97 (3.38)	1.89 (3.07)	1.71 (2.42)	1.60 (2.06)	1.68 (2.32)	1.72 (2.46)	1.97 (1.97)	1.73 (2.49)	1.74 (2.53)	1.61 (2.09)	1.61 (2.09)	1.68 (2.32)	1.70 (2.39)
NFLE	5	1.97 (3.38)	1.92 (3.18)	1.77 (2.63)	1.61 (2.09)	1.61 (2.09)	1.73 (2.49)	1.78 (2.66)	1.71 (2.39)	1.63 (2.15)	1.55 (1.90)	1.55 (1.90)	1.61 (2.09)	1.67 (2.28)
Vanguard 0.15% EC	0.0006	1.98 (3.42)	1.50 (1.75)	1.30 (1.19)	1.09 (0.69)	1.00 (0.50)	1.22 (0.99)	1.91 (3.15)	1.44 (1.57)	1.25 (1.06)	1.10 (0.71)	0.88 (0.27)	1.17 (0.87)	1.19 (0.92)
Gronim 0.30% EC	0.0006	1.94 (3.26)	1.52 (1.75)	1.30 (1.19)	1.12 (0.75)	1.05 (0.60)	1.25 (1.06)	1.96 (3.34)	1.55 (1.90)	1.35 (1.32)	1.19 (0.92)	0.92 (0.35)	1.25 (1.06)	1.25 (1.06)
Neemazal T/S 1% EC	0.0006	1.94 (3.26)	1.79 (2.70)	1.77 (2.63)	1.71 (2.42)	1.71 (2.42)	1.74 (2.53)	1.96 (1.34)	1.69 (2.36)	1.62 (2.12)	1.30 (1.19)	1.67 (2.29)	1.57 (1.96)	1.65 (2.22)
Verticillium lecani	0.4	1.97 (3.38)	1.65 (2.22)	1.82 (2.81)	1.67 (2.29)	1.63 (2.16)	1.69 (2.36)	1.88 (3.03)	1.59 (2.03)	1.78 (2.67)	1.58 (2.00)	1.68 (2.32)	1.66 (2.26)	1.67 (2.29)
Metarhizium anisopliae	0.4	2.00 (3.50)	1.84 (2.89)	1.84 (2.89)	1.83 (2.85)	1.79 (2.70)	1.82 (2.81)	1.86 (2.96)	1.82 (2.81)	1.77 (2.63)	1.66 (2.26)	1.66 (2.26)	1.72 (2.46)	1.77 (2.63)
Control		1.85 (2.92)	2.72 (6.90)	3.17 (9.55)	3.29 (10.32)	3.40 (11.06)	3.15 (9.42)	2.17 (4.21)	2.62 (6.36)	2.73 (6.95)	2.98 (8.38)	3.33 (10.59)	2.91 (7.97)	3.03 (8.68)
S. Em. ±	-	0.13	0.14	0.17	0.13	0.15	0.07	0.11	0.10	0.14	0.14	0.15	0.09	0.10
C. D. at 5%	-	NS	0.41	0.50	0.37	0.44	0.21	NS	0.30	0.43	0.42	0.43	0.26	0.31
C. V. %	-	11.69	13.23	16.63	13.05	15.68	14.74	10.31	9.99	15.03	15.85	15.98	14.27	14.99

Figures in the parentheses are retransformed values, those outside are values

Table 3: Bioefficacy of biocides against thrips infesting on *kharif* groundnut

Biocides	Conc. (%)	No. of thrips/ 3 branches days after spray												
		First spray						Second spray						Pooled over sprays
		Before spray	3	7	10	15	Pooled	Before spray	3	7	10	15	Pooled	
NSKE	5	1.99 (3.46)	1.43 (1.54)	1.28 (1.14)	0.96 (0.42)	0.86 (0.24)	1.13 (0.78)	1.48 (1.69)	1.33 (1.27)	1.01 (0.52)	0.85 (0.22)	0.81 (0.16)	1.00 (0.50)	1.06 (0.62)
Neem oïl	0.3	1.61 (2.09)	1.64 (2.19)	1.70 (2.39)	1.53 (1.84)	1.61 (2.09)	1.62 (2.12)	1.68 (2.32)	1.71 (2.42)	1.54 (1.87)	1.60 (2.06)	1.48 (1.69)	1.58 (2.00)	1.60 (2.06)
Karanj oil	0.3	1.96 (3.34)	1.89 (3.07)	1.76 (2.60)	1.60 (2.06)	1.60 (2.06)	1.71 (2.42)	1.64 (2.19)	1.67 (2.29)	1.53 (1.84)	1.45 (1.60)	1.44 (1.57)	1.53 (1.84)	1.64 (2.19)
NFLE	5	2.00 (3.50)	1.91 (3.14)	1.59 (2.02)	1.66 (2.25)	1.67 (2.28)	1.71 (2.42)	1.68 (2.32)	1.63 (2.15)	1.53 (1.84)	1.44 (1.57)	1.38 (1.40)	1.50 (1.75)	1.60 (2.06)
Vanguard 0.15% EC	0.0006	2.01 (3.54)	1.53 (1.84)	1.39 (1.43)	1.11 (0.73)	0.90 (0.31)	1.23 (1.01)	1.70 (2.39)	1.38 (1.40)	1.07 (0.64)	0.97 (0.44)	0.86 (0.24)	1.07 (0.64)	1.15 (0.82)
Gronim 0.30% EC	0.0006	1.96 (3.34)	1.56 (1.93)	1.50 (1.75)	1.15 (0.82)	0.99 (0.48)	1.30 (1.19)	1.71 (2.42)	1.41 (1.49)	1.15 (0.82)	0.99 (0.48)	1.02 (0.54)	1.14 (0.80)	1.22 (0.99)
Neemazal T/S 1% EC	0.0006	2.00 (3.50)	1.68 (2.32)	1.78 (2.67)	1.49 (1.72)	1.75 (2.56)	1.67 (2.29)	1.38 (1.40)	1.61 (2.09)	1.53 (1.84)	1.52 (1.81)	1.63 (2.16)	1.58 (2.00)	1.63 (2.16)
Verticillium lecani	0.4	2.04 (3.66)	1.83 (2.85)	1.86 (2.96)	1.77 (2.63)	1.80 (2.74)	1.82 (2.81)	1.86 (2.96)	1.60 (2.06)	1.42 (1.52)	1.47 (1.66)	1.39 (1.43)	1.47 (1.66)	1.64 (2.19)
Metarhizium anisopliae	0.4	2.00 (3.50)	1.84 (2.89)	1.64 (2.19)	1.72 (2.46)	1.77 (2.63)	1.74 (2.53)	1.84 (2.89)	1.61 (2.09)	1.47 (1.66)	1.58 (2.00)	1.58 (2.00)	1.56 (1.93)	1.66 (2.26)
Control		2.11 (3.95)	2.93 (8.08)	3.10 (9.11)	3.44 (11.33)	3.57 (12.24)	3.26 (10.13)	1.97 (3.38)	2.80 (7.34)	3.09 (9.05)	3.44 (11.33)	2.79 (7.28)	3.03 (8.68)	3.14 (9.36)
S. Em. ±	-	0.20	0.12	0.14	0.14	0.11	0.27	0.14	0.13	0.14	0.11	0.12	0.18	0.09
C. D. at 5%	-	NS	0.35	0.41	0.41	0.33	0.09	NS	0.38	0.42	0.34	0.35	0.06	0.25
C. V. %	-	17.50	11.43	13.65	14.51	11.55	12.82	14.60	13.05	15.85	12.91	14.08	14.04	12.55

Figures in the parentheses are retransformed values, those outside are values

Table 4: Economics of various biocides used for the control sucking insect pests of *kharif* groundnut

Biocides	Conc. (%)	Qty. of botanicals for two sprays (l or kg/ha)	Total cost of treatment for two sprays (Rs/ha)	Yield (q/ha)		Gross realization (Rs/ha)	Net realization (Rs/ha)	Net profit (Rs/ha)	ICBR	NICBR
				Pod	Stover					
NSKE	5	40.00	840.0	29.16	46.42	90932	27956	27116.6	1:32.28	1:32.28
Neem oil	0.3	2.40	893.40	25.35	36.33	78246	15270	14376.6	1:16.09	1:15.09
Karanj oil	0.3	2.40	893.40	23.67	33.67	73010	10034	9140.6	1:10.23	1:09.23
NFLE	5	40.00	833.40	22.28	31.22	68628	5652	4818.6	1:05.78	1:04.78
Vanguard	0.0006	6.40	2748.00	25.60	44.45	80570	17594	14846.0	1:05.40	1:04.40
Gronim	0.0006	3.20	1169.40	25.97	43.93	81502	18535	17365.6	1:14.85	1:13.85
Neemazal-T/S	0.0006	0.80	1233.40	26.74	35.23	81918	18942	17708.6	1:14.35	1:13.35
V. lecani	0.4	3.20	1136.00	23.72	33.40	73096	10120	8984.0	1:07.90	1:06.90
M. anisopliae	0.4	3.20	1872.00	22.14	32.77	68546	5570	3698.0	1:01.97	1:00.97
Control	-	-	-	20.27	31.10	62976	-	-	-	-

Labour charge: 160 Rs/labour/day $\sqrt{X+0.5}$ Market price of groundnut pod and Stover 2800 and 200 Rs/q, respectively

Conclusion

In the nut shell, plant originated insecticides used in early stage can be found effective to lower the initial population build up of sucking pests. This will also be helpful in reducing the plant protection costs. Initial spray of botanicals will also be helpful to maintain the population of natural enemies which in combination with other tactics can be found economical to delay the spray of synthetic chemicals and ultimately the cost of production.

References

1. Anitha KR. Seasonal incidence and management of sucking insect pests of okra. M.Sc (Agri.) thesis submitted to University of Agricultural Science, Dharwad (unpublished); c2007.
2. Jayakumar M, Raja N, Ignacimuthu S. Evaluation of plant extracts for the management of groundnut pests. J. Ent. Res. 2004;28(4):321-327.
3. Mehta J. Phenotypic Stability in Spanish bunch groundnut, M.Sc. (Agri.) thesis submitted to G.A.U., Sardarkrushinagar; c2002. p. 56.
4. Patil BV, Kalegore NK, Kamble SK, Shinde SV, More SN, Dalvi ST. Efficacy of different neem products against major pests of kharif groundnut. J Soils Crops. 2003;13(2):267-270.
5. Ramanathan T. Genetic Improvement of groundnut, Associated Publishing Company, New Delhi; c2001. p. 9.
6. Sardana HR, Krishna Kumar NK. Effectiveness of plant oils against leaf hopper and shoot and fruit borer of okra. Indian J Ent. 1989;51(2):167-171.
7. Singh C, Singh P, Singh R. Modern Techniques of Raising Field Crops. By Publishing IBH Co. Pvt. Ltd. S-155 Panchsheel Park, New Delhi; c2009. p. 295.