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Studies on the Effect of Some Botanical and Petroleum Oils For the Control of Onion Thrips (*Thrips Tabaci* Lind.; Thysanoptera: Thripidae) And Onion Yield

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Abstract: *Two field experiments were carried out in two successive seasons in two sites in Gezira State. The experiments aimed at studying the efficacy of some botanical oils including sesame, cotton, groundnut, sunflower and petroleum oil on thrips, Thrips tabaci (Lind.) population compared to the standard commercial insecticide Karate 5% EC (lambda–cyhalothrin). The results indicated that all oil treatments were apparently very effective against the onion thrips compared to the untreated control. Significant differences in the number of insects were encountered on onion plant in both sites in season 2006/07. However, during season 2007/08 highly significant differences were found in the onion thrips population in both sites. Sesame oil was found to be more effective in controlling the pest followed by groundnut oil, petroleum oil, cotton oil and sunflower oil, respectively. The oil treatments decreased thrips population within 2-7days.*

The yield data showed highly significant differences between treatments in the two testing seasons with exception to site two in 2007/08 season. However, a remarkable yield increase was recorded from Karate treatment throughout the course of the study and in both seasons. Generally, the control treatment scored the lowest yield throughout the test period which explains the importance of the pest damage if left unchecked.

1. INTRODUCTION

Onion (*Allium cepa* L.) is one of the most important vegetable crops worldwide, used by all people for its nutritional and medicinal values. T Rahad Schemes (Elhassan, 1994). Onion is the main vegetable crop in the Gezira State, which represents about 42% of the total vegetables area grown in the Gezira Scheme and 28% of the whole area grown in the Scheme.

The crop suffers from the attack of many insect pests and diseases, which significantly affect the yield quantitatively and qualitatively. In the field, the crop is attacked by various insect pests but onion thrips (*Thrips tabaci*) is considered as one of the most important limiting factors affecting both productivity and quality of onion and caused tremendous losses to the crop if not well managed (Bakheit, 1993).

Onion is normally transplanted during October when the thrips population is negligible under Gezira conditions. Transplanting afterwards renders the crop under severe thrips attack. Early transplanted onion can produce higher yields because they are usually well established, before the onset of infestation which later becomes severe. However, late transplanted onion attracts thrips which rapidly multiplies, increase the extent of damage and produces lower yield.

Chemical insecticide application is the most commonly used control measure and intensively adopted by farmers. Large-scale usage of pesticides has become a source of great concern because of its possible effects on human health and on non target components of the environment (Elzorgani and Abbadi, 1978).

Integrated pest management (IPM) strategies were directed towards implementation of various control practices, such as cultural, biological, chemical measures and resistant cultivars inorder to judiciously managing the pests and diseases without disturbance to the biological equilibrium and intoxication to the environment. Thus minimizing the number of sprays and reducing the cost of crop production (Abdelrahman *et al.*, 1992). Obviously, the research needed is to find alternative methods of control, complementary and not antagonistic to chemical control.This paper reported on the efficacy of some edible and Petroleum oils in comparison to the conventional standard insecticide application for the control of onion thrips.

2. MATERIALS AND METHODS

The study was carried out in two sites for two seasons (2006/2007 and 2007/2008), at the Gezira state; the first site at the Western Blue Nile Bank (Arbaji village) and the other in the Gezira Scheme, Massalamia Group, Nidiana block. In each season the experimental area was prepared according to the standard recommended land preparation procedures adopted by farmers for successful onion production (Kannan and Mohmed 2004).

The efficacy of some botanical oils; including cotton oil, sesame for ease of being obtained by vegetable growers later on. Oils were diluted with water and applied as aqueous solutions mixed with few drops of liquid soap and Molass (as an anti UV light). The onion variety used was Saggai

obtained from a known source at the vegetables central market, Wad Medani , Sudan .In both sites and during both seasons each experiment was arranged in a Randomized Complete Block design (RCBD) with three replications. The experimental fields in both sites consisted of 15 treatments. Botanical oils were evaluated at 3 different rates. The treatments and their dosage rates were as follows:

1-Sesame oil at the rate of 1.5% concentration (Ses. 1.5%)
2- Sesame oil at the rate of 2.5% concentration (Ses. 2.5%)
3-Sesame oil at the rate of 5% concentration (Ses.5.0 %)
4-Cotton seed oil at the rate of 1.5% concentration (Cott. 1.5%)
5-Cotton seed oil at the rate of 2.5% concentration (Cott. 2.5%)
6-Cotton seed oil at the rate of 5% concentration (Cott. 5.0 %)
7-Groundnut oil at the rate of 1.5% concentration (G/N. 1.5%)
8-Groundnut oil at the rate of 2.5% concentration (G/N. 2.5%)
9-Groundnut oil at the rate of 5% concentration (G/N. 5.0%)
10-Sunflower oil at the rate of 1.5% concentration (S/F. 1.5%)
11-Sunflower oil at the rate of 2.5% concentration (S/F. 2.5%)
12-Sunflower oil at the rate of 5% concentration (S/F. 5.0%)
13-Petroleum oil at the rate of 0.625 % product /Litre water (pet.)
14-Karate 5% EC (lambda–cyhalothrin) at the rate of 150 ml /fed.(7 .5% g a.i / fed.)
15- Untreated Control (UTC).

The experimental data had been attained through regular periodical surveys, usually, effected early in the morning. Five plants were randomly sampled from the inner rows for assessing thrips population of both adults and nymphs per subplot for the various treatments. Each plant was thoroughly examined for insect population using hand lens. Application of oils or insecticide was done when sprayable level of 5-7 insects/ plant was attained. Spraying was performed through knapsack sprayer emitting spray volume of 20 gallons / feddan. Efficacy of the tested products was evaluated against thrips at pre and post- spray counts at regular intervals of 2,4,7,10,14 and 21 days after spraying.

Bulb weight was taken and recorded. Bulb yields were estimated from the central area in each subplot where three-square meters were randomly estimated in the subplot.

The data were subjected to the Analysis of Variance (ANOVA) after transformation, if needed, and the values of the grand mean, standard error and coefficient of variation were calculated. Duncan's Multiple Range Test (DMRT) was used to separate means among treatment.

3. RESULTS AND DISCUSSION

Data presented in Table 1 showed that highly significant differences between treatments were observed during the 1st post spray count. Karate, the standard treatment , and the Petroleum oil treated plots hosted significantly less number of thrips compared to all treatments. Also, the post- spray count of the first spray showed that, both sesame and cotton oils at the highest rates gave a significant reduction in the pest population. During the second count of the first spray the lowest numbers of thrips were obtained from karate and Petroleum oil treatments compared to the untreated control. From table 1 it could be observed that, in all treatments the most effective dose of the different tested oils was the highest dose (5%) followed by the second (2.5%) and the first dose (1.5%), respectively in all oils treatments. But both first, second and third counts of the second spray showed that no significant differences between treatments were established. Moreover, the post – spray counts of the third spray showed that Karate and sesame oil at second and third rates gave a significant reduction in the pest population. Similarly, the second and third counts

for the third spray showed no significant differences between treatments. In the post fourth spray, a significant reduction in the pest population was recorded (Table 1).

Table (1): Effect of some oils and Karate on thrips population (First site season 2006/07).
Mean No. of thrips / 5 plants (actual figures in parenthesis).

Treatments	Pre1st spray	1st Post1st spray √ x	2nd Post1st spray	Pre-2nd spray	1st Post 2nd spray	2nd Post 2nd spray	3rd Post 2nd spray	Pre 3rd spray	1st Post 3rd spray
1.Ses. 1.5%	(20.4) ab	(17.1) 4.1 cde	(18.3) c	(19.4) ab	(17.5) bcde	(18.3) b	(21.6) b	(21.6) a	(19.6) d
2.Ses.2.5%	(17.6) a	(10.1) 3.2 bc	(17.1) c	(24.0) ab	(15.6) bcd	(18.8) b	(19.9) b	(19.9) a	(12.1) bc
3.Ses. 5%	(18.9) ab	(12.2) 3.5 bcd	(10.9) ab	(25.7) ab	(14.8) bc	(18.8) b	(20.0) b	(20.0) a	(11.9) b
4.Cott.1.5%	(19.5) ab	(19.0) 4.4 de	(16.8) c	(30.5) b	(19.5) de	(18.2) b	(22.6) b	(22.6) a	(17.2) d
5.Cott.2.5%	(21.0)	(16.7) 4.1 cde	(17.2) c	(21.1) ab	(14.9) bc	(18.9) b	(20.8) b	(20.8) a	(15.7) bcd

	ab								
6.Cott.5%	(20.2) ab	(12.7) 3.5 bce	(10.1) ab	(17.8) a	(16.0) bcde	(17.4) b	(22.1) b	(22.1) a	(16.2) d
7.G/N.1.5%	(17.9) a	(17.8) 4.2 cde	(17.0) c	(25.9) ab	(18.5) cde	(19.1) b	(23.2) b	(23.2) a	(19.3) d
8.G/N.2.5%	(21.7) ab	(17.1) 4.1 cde	(14.2) bc	(21.9) ab	(15.8) bcde	(17.7) b	(22.0) b	(22.0) a	(17.5) d
9.G/N. 5%	(21.1) ab	(12.3) 3.5 bcd	(13.5) bc	(25.4) ab	(18.2) bcde	(17.4) b	(22.8) b	(22.8) a	(17.0) d
10. S/F.1.5%	(20.7) ab	(14.6) 3.8 cd	(17.0) c	(23.0) ab	(19.6) e	(18.3) b	(22.2) b	(22.2) a	(17.0) d
11. S/F.2.5%	(20.4) ab	(13.6) 3.7 cd	(14.1) bc	(20.1) ab	(14.6) b	(18.6) b	(22.0) b	(22.0) a	(15.8) cd
12. S/F. 5%	(22.1) b	(9.8) 3.1 bc	(13.3) bc	(22.6) ab	(16.2) bcde	(16.1) b	(19.9) b	(19.9) a	(16.6) d
13. Pet.839g/LEC	(20.1) ab	(6.8) 2.6 ab	(9.5) ab	(20.9) ab	(16.5) bcde	(19.0) b	(19.9) b	(19.9) a	(18.3) d
14. Karate 5%EC	(19.7) ab	(3.9) 1.9 a	(7.6) a	(19.4) ab	(6.2) a	(12.3) a	(13.6) a	(19.8) a	(5.6) a
15. UTC	(20.4) ab	(24.7) 4.9 e	(27.5) d	(20.9) ab	(24.2) f	(43.4) c	(28.9) c	(29.0) b	(41.9) e
SE±	1.2	0.31	1.5	3.7	1.1	1.2	1.2	1.1	1.2
CV%	10.4	14.8	17.1	28.4	11.8	10.3	9.6	8.5	11.8

Table (1) Cont.

Treatments	2nd Post 3rd spray	3rd Post 3rd spray	Pre 4th spray	1st Post 4th spray √ x	2nd Post 4th spray √ x	3rd Post 4th spray	4th Post 4th spray	5th Post 4th spray
1.Ses. 1.5%	(19.7) b	(23.4) bc	(23.4) bc	(4.8) 2.2 ab	(14.2) 3.9 cd	(4.3) ab	(3.6) ab	(3.3) cde
2.Ses. 2.5%	(19.8) b	(22.5) bc	(22.5) bc	(5.3) 2.3 abc	(12.8) 3.5 bcd	(4.8) ab	(3.2) a	(2.6) abcd
3.Ses. 5%	(19.4) b	(19.3) bc	(19.3) bc	(4.3) 2.0 ab	(9.6) 3.0 bc	(4.1) ab	(3.6) ab	(1.7) a
4. Cott.1.5%	(19.8) b	(23.7) bc	(23.7) bc	(9.4) 3.1 bcde	(12.7) 3.5 bcd	(4.6) ab	(3.4) ab	(3.7) de
5. Cott.2.5%	(19.7) b	(22.8) bc	(22.8) bc	(7.2) 2.7 bcd	(13.5) 3.7 bcd	(2.6) a	(3.4) ab	(2.8) abcd
6. Cott.5%	(19.8) b	(19.8) bc	(19.8) bc	(5.8) 2.1 abc	(11.5) 3.4 bcd	(4.0) ab	(4.4) ab	(2.7) abcd
7. G/N.1.5%	(19.4) b	(24.1) c	(24.1) c	(11.6) 3.4 cde	(17.1) 4.1 d	(3.6) a	(3.0) a	(4.5) e
8. G/N.2.5%	(19.5) b	(22.3) bc	(22.3) bc	(9.5) 3.0 bcde	(11.2) 3.4 bcd	(4.1) ab	(3.7) ab	(3.2) bcde
9. G/N. 5%	(18.1) b	(20.3) bc	(20.3) bc	(6.8) 2.4 bcd	(10.7) 3.3 bcd	(3.5) a	(3.9) ab	(2.2) abc
10. S/F.1.5%	(19.1) b	(21.8) bc	(21.8) bc	(11.7) 3.4 de	(11.7) 3.4 bcd	(3.2) a	(3.7) ab	(2.8) abcd
11. S/F.2.5%	(19.3) b	(18.8) b	(18.8) b	(6.2) 2.4 bcd	(8.9) 2.9 b	(3.3) a	(2.4) a	(2.7) abcd
12. S/F. 5%	(17.5) b	(19.3) bc	(19.3) bc	(5.7) 2.3 abc	(3.7) 1.9 a	(2.3) a	(3.1) a	(1.9) ab
13. Pet.839g/LEC	(19.3) b	(19.8) bc	(19.8) bc	(7.0) 2.6 bcd	(9.1) 3.0 b	(3.0) a	(3.1) a	(3.2) bcde
14.Karate5%EC	(9.3) a	(10.0) a	(14.0) a	(1.7) 1.3 a	(2.2) 1..4 a	(3.1) a	(2.8) a	(2.0) abc
15. UTC	(34.6) c	(38.4) d	(38.4) d	(15.3) 3.9 e	(9.3) 3.0 bc	(7.2) b	(5.6) b	(6.2) f
SE±	1.3	1.5	1.5	0.3	0.3	0.9	0.6	0.4
CV%	11.5	12.0	11.7	21.1	14.2	42.2	31.4	23.0

Table (2): Effect of some oils and Karate on thrips population (First site season 2007/08).
Mean No. of thrips / 5 plants (actual figures in parenthesis).

Treatments	Pre1st spray	1st Post1st spray √ x	Pre-2nd spray	1st Post 2nd spray √ x	Pre-3rd spray	1st Post 3rd spray	Pre-4th spray	1st Post 4th spray
1.Ses.1.5%	(21.3) ab	(6.3) 2.4 ab	(19.7) a	(11.3) 3.4 ab	(21.3) ab	(19.3) b	(21.3) a	(9.7) ab
2.Ses.2.5%	(19.7) a	(11.7) 3.4 bcd	(19.0) a	(8.3) 2.9 a	(21.3) ab	(15.0) ab	(21.0) a	(9.3) a

3.Ses.5%	(21.7) ab	(10.0) 3.1 bcde	(20.7) a	(11.0) 3.3 ab	(20.3) a	(14.3) ab	(20.0) a	(8.0) a
4. Cott.1.5%	(22.0) ab	(16.3) 4.0 ef	(21.3) a	(13.7) 3.7 bc	(22.0) abc	(18.7) b	(19.7) a	(11.0) ab
5. Cott.2.5%	(19.3) a	(13.7) 3.7 cdef	(20.0) a	(14.0) 3.7 bc	(21.7) abc	(14.3) ab	(20.7) a	(11.7) ab
6. Cott. 5%	(24.0) b	(9.0) 2.9 abcd	(21.7) a	(12.3) 3.5 bc	(20.7) a	(12.7) a	(20.7) a	(8.0) a
7. G/N.1.5%	(20.3) b	(10.7) 3.2 bcde	(20.7) a	(14.3) 3.8 bc	(23.3) bc	(16.0) ab	(21.7) a	(10.0) ab
8. G/N.2.5%	(19.3) a	(7.7) 2.8 abc	(23.3) a	(15.0) 3.9 bc	(21.0) ab	(16.7) ab	(20.7) a	(11.7) ab
9. G/N. 5%	(21.3) ab	(11.3) 3.3 bcde	(19.7) a	(11.3) 3.3 ab	(21.0) ab	(16.0) ab	(20.7) a	(8.7) a
10.S/F.1.5%	(21.3) ab	(13.3) 3.7 cdef	(21.3) a	(14.7) 3.8 bc	(22.0) abc	(18.0) b	(21.0) a	(12.0) ab
11.S/F.2.5%	(22.0) ab	(12.3) 3.5 cde	(20.3) a	(16.3) 4.0 c	(22.7) abc	(16.3) ab	(20.3) a	(10.7) ab
12.S/F. 5%	(20.7) ab	(15.7) 3.9 def	(21.0) a	(14.0) 3.7 bc	(21.3) ab	(14.3) ab	(20.7) a	(8.0) a
13. Pet.839 g/LEC	(19.7) a	(10.7) 3.2 bcde	(21.7) a	(11.7) 3.4 abc	(24.0) c	(15.0) ab	(19.3) a	(13.7) b
14. Karate5%EC	(20.7) ab	(4.7) 2.1 a	(19.7) a	(8.0) 2.8 a	(20.7) a	(11.7) a	(18.7) a	(11.3) ab
15. UTC	(20.7) ab	(21.7) 4.6 f	(23.3) a	(29.7) 5.4 d	(42.0) d	(57.0) c	(61.7) b	(37.3) c
SE±	1.0	0.3	1.3	0.2	0.8	1.6	1.3	1.2
CV%	8.1	15.9	11.1	8.7	5.6	14.9	9.6	17.2

Table (3): Effect of some oils and Karate on thrips population (Second site season 2006/07).
Mean No. of thrips / 5 plants (actual figures in parenthesis).

Treatments	Pre1st spray	1st Post1st spray √ x	2nd Post1st spray √ x+1	3rd Post1st spray √ x	4th Post1st spray	5th Post1st spray	Pre-2nd spray	1st Post 2nd spray √ x	2nd Post 2nd spray	3rd Post 2nd spray
1.Ses.1.5%	(22.8) a	(14.0) 3.7 b	(8.1) 3.0 b	(17.3) 4.2 d	(23.2) cd	(23.2) cd	(23.2) a	(11.1) 3.3 a	(18.3) b	(22.9) cd
2.Ses.2.5%	(21.7) a	(11.5) 3.3 b	(9.3) 3.2 bc	(17.5) 4.2 d	(20.8) bc	(20.8) abc	(20.8) a	(8.8) 2.9 a	(19.5) b	(23.2) cd
3.Ses. 5%	(21.2) a	(9.8) 3.1 b	(7.9) 2.9 b	(14.4) 3.8 cd	(18.7) bc	(18.7) a	(18.7) a	(6.6) 2.7 a	(18.6) b	(19.4) bcd
4.Cott1.5%	(19.9) a	(14.6) 3.7 b	(10.3) 3.3 bc	(19.3) 4.4 de	(23.1) bc	(23.1) cd	(23.1) a	(11.6) 3.3 a	(21.1) b	(23.0) cd
5.Cott.2.5%	(22.4) a	(12.6) 3.5 b	(14.2) 3.9 bc	(19.7) 4.4 de	(18.7) bc	(18.7) a	(18.7) a	(9.1) 3.0 a	(20.3) b	(17.1) bc
6.Cott. 5%	(18.5) a	(9.2) 3.0 b	(12.4) 3.6 bc	(14.3) 3.8 cd	(19.3) bc	(19.3) ab	(19.3) a	(12.4) 3.4 a	(20.9) b	(14.4) b
7.G/N 1.5%	(19.1) a	(8.9) 2.9 b	(10.2) 3.3 bc	(17.7) 4.2 d	(22.6) cd	(22.6) bc	(22.6) a	(8.0) 2.8 a	(22.8) b	(25.1) d
8. G/N2.5%	(19.1) a	(7.1) 2.6 a	(15.6) 4.1 bc	(17.3) 4.2 d	(21.3) bc	(21.3) abc	(21.3) a	(6.6) 2.5 a	(20.9) b	(19.2) bcd
9. G/N 5%	(22.5) a	(11.0) 3.2 b	(8.9) 3.1 bc	(9.3) 3.1 b	(19.3) bc	(19.3) ab	(19.1) a	(6.4) 2.5 a	(18.4) b	(20.8) bcd
10.S/F.1.5%	(19.6) a	(11.8) 3.4 b	(9.6) 3.2 bc	(17.0) 4.1 d	(26.4) d	(26.4) d	(26.4) a	(8.3) 2.9 a	(20.9) b	(23.6) d
11.S/F.2.5%	(20.5) a	(7.9) 2.7 ab	(9.6) 3.2 bc	(12.0) 3.3 bc	(19.9) bc	(19.9) abc	(19.9) a	(6.7) 2.6 a	(20.1) b	(19.5) bcd
12.S/F. 5%	(21.2) a	(9.5) 3.1 b	(13.5) 3.8 bc	(9.4) 3.0 b	(22.0) bcd	(22.0) abc	(22.0) a	(7.5) 2.7 a	(19.1) b	(20.3) bcd
13. Pet.839g/LEC	(21.7) a	(8.4) 2.9 b	(9.7) 3.3 a	(10.4) 3.2 bc	(17.8) b	(19.1) ab	(22.8) a	(7.8) 2.8 a	(18.1) b	(18.4) bcd
14.Karate 5%EC	(20.0) a	(1.9) 1.4 a	(1.3) 1.4 a	(4.5) 2.3 a	(12.6) a	(18.7) a	(20.3) a	(13.5) 3.5 a	(11.8) a	(6.4) a
15. UTC	(20.3) a	(10.4) 3.2 b	(16.7) 4.2 c	(24.8) 4.2 e	(32.3) e	(32.3) d	(32.3) b	(9.3) 3.0 a	(39.4) c	(33.0) e
SE±	1.9	0.5	0.3	0.2	1.3	1.1	1.2	0.4	1.4	2.1
CV%	15.9	26.5	16.9	9.5	10.7	8.5	9.0	23.2	12.0	8.8

Table (3) Cont.

Treatments	Pre 3rd spray	1st Post 3rd spray	2nd Post 3rd spray	Pre 4th spray	1st Post 4th spray	2nd Post 4th spray √ x	3rd Post	4th Post 4th	5th Post 4th

							4th spray	spray	Spray √ x+1
1.Ses1.5	(22.9) a	(16.7) cd	(24.8) e	(24.8) b	(7.0) abcd	(12.2) 3.5 defg	(4.6) a	(3.7) ab	(2.3) 1.7 ab
2.Ses.2.5	(23.2) a	(14.0) cd	(22.9) de	(22.9) b	(4.5) abc	(10.0) 3.2 bcde	(3.6) a	(3.1) ab	(2.3) 1.8 abc
3.Ses.5%	(19.4) a	(9.6) ab	(15.3) bcde	(20.7) b	(3.2) a	(7.5) 4.2 b	(3.5) a	(3.4) ab	(1.8) 1.7 ab
4.Cott.1.5 %	(23.0) a	(16.2) cd	(24.6) bcde	(24.6) b	(7.0) abcd	(10.1) 3.2 bcde	(4.4) a	(4.2) abc	(2.9) 1.9 bc
5.Cott.2.5%	(32.7) a	(15.9) cd	(18.9) bc	(20.1) b	(6.4) abc	(11.9) 3.4 defg	(3.7) a	(3.9) abc	(2.2) 1.7 ab
6.Cott 5%	(22.8) a	(13.0) bc	(15.3) cde	(23.1) b	(8.5) cd	(9.0) 3.0 bcd	(3.2) a	(3.9) abc	(2.3) 1.8 abc
7.G/N1.%	(25.0) a	(17.9) d	(21.3) cde	(21.3) b	(5.2) abc	(14.7) 3.8 fg	(4.7) a	(4.0) abc	(2.8) 2.0 bc
8.G/N2.%	(19.2) a	(17.1) d	(21.2) bcde	(21.2) b	(5.7) abc	(10.5) 3.2 bcdef	(4.0) a	(4.7) bc	(2.0)1.7 ab
9. G/N %	(20.8) a	(14.7) cd	(20.5) bcde	(20.5) b	(4.3) ab	(9.4) 3.1 bcde	(4.9) a	(3.0) ab	(2.0) 1.7 ab
10.S/F. %	(23.6) a	(17.5) d	(20.7) de	(20.7) b	(7.3) bcd	(11.4) 3.4 cdef	(4.4) a	(2.9) ab	(2.7) 1.9 bc
11.S/F. %	(19.5) a	(14.4) cd	(23.4) bcd	(23.4) b	(6.6) abcd	(13.3) 3.6 efg	(4.7) a	(3.8) ab	(1.8) 1.7 ab
12.S/F%	(20.3) a	(14.6) cd	(18.4) de	(24.5) b	(6.0) abc	(7.2) 2.7 b	(3.6) a	(3.5) ab	(2.0) 1.7 ab
13.Pet.839gEC	(18.4) a	(15.7) cd	(20.3) bcd	(20.3) b	(7.1) abcd	(7.8) 2.8 bc	(4.2) a	(2.1) a	(2.4) 1.9 abc
14Karate 5%EC	(21.9) a	(6.5) a	(8.5) bcd	(14.5) a	(3.1) a	(4.3) 2.1 a	(3.5) a	(2.4) a	(1.0) 1.4 a
15. UTC	(33.0) b	(46.8) e	(33.2) a	(33.2) c	(10.6)	(16.1) g	(7.3) b	(6.0) c	(4.3) 2.3 c
SE±	2.1	1.1	1.7	1.8	1.2	0.2	0.6	0.6	0.1
CV%	16.5	12.0	14.5	13.6	33.1	9.8	25.4	29.4	13.6

Table (4): Effect of some oils and Karate on thrips population (Second site season 2007/08).
Mean No. of thrips / 5 plants (actual figures in parenthesis).

Treatments	Pre1st spray	1st Post1st spray √ x	Pre-2nd spray	1st Post 2nd spray √x	Pre-3rd spray	1st Post 3rd spray	Pre-4th spray	1st Post 4th spray √ x
1. Ses.1.5%	(20.3) a	(11.0) 3.3 bc	(19.7) abc	(11.7) 3.4 ab	(21.3) ab	(17.0) b	(21.3) b	(11.3) 3.4 bcd
2. Ses.2.5%	(21.3) a	(9.3) 3.1 b	(21.7) bc	(8.0) 2.8 ab	(21.0) ab	(18.0) b	(20.3) ab	(11.3) 3.4 bcd
3. Ses. 5%	(22.3) a	(11.3) 3.4 bc	(19.7) abc	(9.7) 3.1 ab	(21.0) ab	(17.7) b	(20.3) ab	(7.0) 2.6 a
4. Cott.1.5%	(23.0) a	(17.3) 4.2 bc	(20.0) abc	(12.0) 3.5 ab	(21.3) ab	(17.3) b	(20.3) ab	(13.0) 3.6 cd
5. Cott.2.5%	(21.7) a	(13.7) 3.7 bc	(22.0) c	(14.0) 3.7 ab	(19.3) a	(17.3) b	(21.0) ab	(10.7) 3.3 bcd
6. Cott. 5%	(22.3) a	(10.7) 3.2 b	(20.7) abc	(17.3) 3.8 b	(20.3) ab	(16.7) b	(20.7) ab	(8.0) 2.8 ab

7. G/N1.5%	(21.3) a	(10.3) 3.1 b	(21.3) abc	(14.3) 3.8 b	(21.3) ab	(17.0) b	(20.7) ab	(12.7) 3.6 cd
8. G/N2.5%	(23.3) a	(9.7) 3.1 b	(21.7) bc	(13.3) 3.6 ab	(20.7) ab	(17.0) b	(20.7) ab	(14.0) 3.7 d
9. G/N 5%	(21.7) a	(12.3) 3.4 bc	(20.7) abc	(13.0) 3.6 ab	(23.3) b	(15.7) b	(21.0) ab	(11.0) 3.3 bcd
10.S/F.1.5%	(22.3) a	(11.0) 3.3 bc	(21.3) abc	(15.0) 3.9 b	(21.7) ab	(18.3) b	(21.0) ab	(12.0) 3.5 bcd
11.S/F.2.5%	(20.3) a	(12.3) 3.5 bc	(19.3) abc	(16.0) 4.0 b	(21.7) ab	(17.7) b	(22.3) b	(12.7) 3.6 cd
12.S/F.5%	(19.0) a	(15.3) 3.9 bc	(20.0) abc	(9.7) 3.1 ab	(21.0) ab	(18.0) b	(21.3) b	(9.3) 3.0 abc
13. Petrol.839g/LEC	(20.7) a	(17.3) 4.1 bc	(20.7) abc	(9.3) 3.0 ab	(21.0) ab	(14.0) b	(19.0) a	(15.0) 3.9 d
14. Karate5%EC	(22.7) a	(3.3) 1.8 a	(19.0) a	(6.3) 2.5 a	(20.3) ab	(9.7) a	(20.3) b	(13.0) 3.6 cd
15 . UTC	(22.0) a	(19.7) 4.4 c	(24.7) d	(32.3) 4.4 c	(35.7) c	(52.0) c	(60.0) c	(47.7) 6.9 e
SE±	1.6	0.4	0.78	0.36	1.2	1.4	0.6	0.2
CV%	12.6	18.5	6.5	17.3	9.1	13.0	4.7	9.6

The population of the onion thrips encountered in all oil treatments for site one, season 2007/2008 is presented in Table 2, The significant variations between treatments in the mean number of thrips indicated that Karate treatment during the first spray harboured the lowest number of thrips (4.7) followed by the highest rate of sesame oil, groundnut oil at rate 2.5% , cotton oil at 5% and sesame oil at 1.5%, treatments. Data of the second spray showed that the lowest population of onion thrips was recorded on Karate treatment (8.0) while the highest numbers were recorded on the untreated control treatment (29.7) followed by sunflower oil 2.5%(16.3) groundnut oil 2.5% (15.0) and sunflower oil 1.5%(14.7) treatments. This indicated that the Karate and Petroleum oil treatments were the best treatments, which significantly suppressed the natural build up of the pest. However, the post- spray count of the second spray showed that the number of thrips was invariably low in all tested products. Good control of thrips was shown by the Karate treatment (11.7) and by the highest rate of sesame oil (11.0), groundnut oil (11.3), cotton oil (12.3) and sunflower oil (14.o) treatments. Apparently, the rapid increase in thrips population in the untreated control revealed that thrips constituted a real threat to successful onion production if not well managed. This was evidently clear by the low pest population when control measures were promptly adopted. All oil treatments gave a significant reduction in the pest population compared to the untreated control, which harboured the highest number of thrips population (57.0) in the 1st post third spray count. Additionally, the post- spray count of the fourth spray showed that cotton oil 5% (8.0), sunflower oil 5% (8.0), sesame oil 5% (8.0) and groundnut oil 1.5% (8.7) treatments , hosted significantly less number of thrips population compared to the untreated control (37.3), followed by sesame oil 2.5% (9.3), sesame oil 1.5% (9.7), Karate(11.3) and Petroleum oil (13.7) treatments.

Data presented in Table 3 manifest the mean number of onion thrips population as affected by different oil treatments recorded during 2006/ 07 season in the second site of the trial. It is apparent from this result that the different treatments harboured almost variable populations of onion thrips and highly significant differences between the treatments were observed. It was noticed that Karate(1.9), and Petroleum oil (8.4) treatments hosted significantly less number of thrips compared to the untreated control (10.4) and all treatments during the first spray count followed by groundnut oil 0.5% (8.9) , cotton oil 5% (9.2), sunflower oil 5% (9.5), sesame oil 5% (9.8) and groundnut oil 5% (11.0). During the subsequent post spray counts, Karate treatment had less number of thrips population followed by sesame oil 5% (7.9) , sesame oil 1.5% (8.1), groundnut oil 1.5% (8.9) , sesame oil 2.5% (9.3), sunflower oil 2.5% (9.6) compared to the untreated control treatment which harboured the highest number of thrips population (16.7). The same results were obtained from the third and the fourth count of the first spray. Generally, it was observed that Karate and Petroleum oil treatments hosted significantly less number of thrips population compared to all treatments. Moreover, the post-spray count of the second spray showed that Karate, Petroleum oil, sesame oil, cotton oil, groundnut oil and sunflower oil at the highest rates gave a significant reduction in the pest population.

Regardless of the different times of spray, the data in Table 4 clearly indicated that the Karate treatment always hosted significantly less number of thrips compared to all treatments. The level of thrips population decreased significantly after application of the tested products compared to the untreated control.

The post- spray counts of the first spray showed that Karate (3.3) and all oil treatments at the higher rates gave a significant reduction in the pest population .Again and during the second count of the first spray lowest number of thrips was obtained from the Karate (6.3) and Petroleum oil treatments(9.7) .Similarly, the post – spray counts of the third spray showed that Karate (9.7) gave a significant reduction in the pest population followed by Petroleum oil treatment(14.0).There were no significant differences between the botanical oil treatments. The post- spray counts of the fourth spray showed significant differences between all treatments. The sesame oil treatment at the highest rate harboured the lowest number of onion thrips (7.0) followed by cotton oil 5% (8.0) ,sunflower oil 5% (9.3) and groundnut oil 5% (11.0) treatments, while Karate harboured the highest number (13.0) followed by petroleum oil (15.0) and the untreated control (47.7).

Assessment of onion yield:

The bulb yield results are shown in Tables 5, 6 for the two seasons 2006 / 07 and 2oo7 / 08 The data presented in Table 5 revealed that Karate displayed an outstanding performance for the control of onion thrips. Besides, it gave a remarkable yield increase in the two testing sites (i.e, 8.5, 9.0 T/Fed Respectively) followed by the sesame 5% (7.9, 8.8 T/Fed Respectively). Table 5 showed that highly significant differences were found between treatments in both sites Meanwhile, some of the oil treatments attained bulb yields which did not differ significantly when compared to the untreated control (Cott.1.5%).

The data presented in Table 6 also revealed that Karate displayed an outstanding performance for the control of onion thrips. Besides, it gave a remarkable yield increase in the two testing sites (i.e, 7.5, 7.5 T/Fed Respectively) followed by the seasame5%(8.3, 7.7 T/Fed Respectively) and groundnut at highest rate (8.1, 7.5 throughout the test period which explains the importance of the pest damage if left unchecked.

Table (5): Mean onion bulb yield (T/ Fed.). Season 2006/07.

Site two	Site 0ne	Treatments
(5.3) cdef	(5.7) bcdefg	1. Ses.1.5%
(7.1) bc	(6.5) bcdef	2. Ses.2.5%
(8.8) ab	(7.9) b	3. Ses. 5%
(3.7) f	(4.4) efg	4. Cott.1.5%
(6.5) cde	(6.8) bcdef	5. Cott.2.5%
(7.2) bc	(7.4) bc	6. Cott. 5%
(6.7) bcd	(6.6) bcde	7. G/N.1.5%
(6.7) bcd	(6.7) bcde	8. G/N.2.5%
(7.1) bc	(7.1) bcd	9. G/N. 5%
(4.9) def	(4.1) fg	10. S/F.1.5%
(5.9) cdef	(4.6) defg	11. S/F.2.5%
(4.6) ef	(5.0) cdefg	12. S/F. 5%
(4.9) def	(7.4) bc	13. Pet. 839 g/L EC
(9.0) a	(8.5) a	14. Karate 5% EC
(3.7) f	(3.3) g	15. UTC
0.6	0.7	SE±
17.1	19.2	CV%

T/Fed. = Ton/ Fedda

Table (6): Mean onion bulb yield (T/ Fed.). Season 2007/08.

Site two	Site 0ne	Treatments
(6.2) a	(6.1) bc	1. Ses.1.5%
(7.2)a	(6.8) bc	2. Ses.2.5%
(7.7) a	(8.3) b	3. Ses. 5%
(7.5)a	(6.1) bc	4. Cott.1.5%
(7.0)a	(6.7) bc	5. Cott.2.5%
(7.3)a	(7.3) bc	6. Cott. 5%
(8.4)a	(6.0) bc	7. G/N.1.5%
(7.4)a	(7.3) bc	8. G/N.2.5%
(7.5)a	(8.1) b	9. G/N. 5%
(5.2)a	(5.4) bc	10. S/F.1.5%
(6.9)a	(7.7) b	11. S/F.2.5%
(7.9)a	(7.0) bc	12. S/F. 5%
(7.1)a	(7.1) bc	13. Pet. 839 g/L EC
(7.5)a	(7.5) bc	14. Karate 5% EC
(6.0)a	(4.7) c	15. UTC
1.0	0.8	SE±
23.3	19.1	CV%

T/Fed. = Ton/ Feddan

4. CONCLUSION

This study may help to launch the development of a sound integrated pest management approach through the use of some edible and Petroleum oils in comparison to the conventional standard insecticide application for the control of onion thrips and onion yield. However, these tested oils were refined ones for the sake of their availability to the vegetable grower from the local market. Crude oils could have been more potent as reported by Jacobson (1953) for groundnut and cottonseed oils. However, the use of sesame oil to control whitefly on tomato in Sudan was recommended by Yassin *et.al. (*1982). Again, Elamin(1995) reported that sesame oil (refined) at 2 – 3 % as oil water emulsion + Agaral (or liquid soap) led to significant decrease in TYLCV and significant increase in yield. It should be mentioned that the type of oil, as reported by Cranshaw (1999) can greatly affect its activity. This could possibly be explained in terms of botanical origin i.e. plant sp. as well as the treatment the oil receives. Accordingly further experimentation with crude

botanical oils for the control of thrips on onion could lead to more positive results.

The results of this study demonstrated the effectiveness of the botanical oils such as sesame oil, cotton seed oil, groundnut oil and sunflower oil as well as Petroleum oil for the control of onion thrips. From the results obtained it can be concluded that :

1- There was a considerable variation between the insecticide Karate and oils treatments as to thrips control.
2- Oil treatments potential of efficacy was only expressed at the higher concentration rates (5.0 %) followed by the second dose (2.5%) and the first dose (0.5%) respectively.
3- During this study, it was noticed that sesame oil was more effective in controlling onion thrips.
4- It was important to note that the Karate treatment could be regarded as the best of the treatments tested followed by sesame oil 5%, cotton oil 5%, groundnut oil 5%, cotton oil 2.5%, groundnut oil 2.5%, Petroleum oil, and sunflower oil 5% respectively.

These results demonstrated that the oil sprays decreased the onion thrips population density for two weeks after spray. So, it is suggested that this protection period could be increased if the oils spray is supplemented by chemical such as Karate used with low dosage rate. The emulsion oil / water / insecticide such as Karate with low dose must be applied when weather conditions are suitable It is well known that pesticides in general are extremely hazardous and very expensive particularly in developing countries. It is therefore, possible to mitigate the pest menace and reduce damage through disseminating the culture and adoption of the use of non – chemical measures to combat these pests, particularly in food crops.

This study laid a base line information of using such oils and other products of plant origin to control insect pests on other vegetable and edible crops.

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