Appraisal of Postharvest Treatments for Control the Sesame Seed Bug Elasmolomus sordidus (Hemiptera: Lygaidae) at Sheikan Locality, North Kordofan State,Sudan

Abdelmanan Elzein Hassan Elamin[1*], Omer Rahama Mohmed Rahama[1], Ahmed Yousif Mohmed Khair[1] ;Tarig Abdalla Mohamed ELblaa[2] and Elsadig Bleilo Ibrahim Musa[3]

[1]*Department of Plant Protection Science, Faculty of Natural Resources and Environmental Studies, University of Kordofan,Elobeid, 51111, Sudan.*

[2]*Dean ofFaculty of Community Development. West Kordofan University, El Nohoud, Sudan.*

[3]*Department of Crop Science, Peace University Elfula, Sudan.*

Abstract: This study was conducted in Sheikan locality at North Kordofan State, Sudan in season 2016/2017 to assess post harvest treatments for the control sesame seed bug a harmful pest on sesame crop. Two experiments were done. In the first experiment three treatments were used on sesame at harvest time when sesame crop stacked in bundles to dry and infestation with sesame bug built up in the field, in the first treatment three bundles of sesame crop were put on the ground, in the second treatment three bundles of sesame put on the ground surrounded by Wood Ash and, in the third treatment three bundles of the sesame crop surrounded by pesticide beside the control which kept away from infestation. In the second experiment 5 treatments were used in the first one the sesame crop bundles were put on the ground (Zero level) and in the treatments from second to the fourth Wooden benches (Rakoopa) with four levels of height were used 25 Cm; 50 Cm, 75 Cm and 100 Cm and the control was kept away from infestation. The experiments were executed using Randomized Complete Design (RCD) with 4 replicates. After infestation one kilogram of sesame seed was collected weekly for a month and then transferred to the lab and 1000 seed weight obtained then loss in seed weight Percentage calculated. Results showed that when infestation of the bug built up in the field the seeds stored on the ground surrounded by Wood ash had been affected significantly (P< 0.05) with obvious reduction in weight of 1000 seeds while the seeds surrounded with pesticide showed no reduction in weight in comparison with the control in the first experiment period and, in the second experiment no significant loss in weight observed during the examination period in wooden benches (Rakoopa) with different levels in comparison with the control and loss in seed weight of 1000 sesame seeds reached 13.7% by the end of the month when bundles left on the ground (zero level) and significantly differed (P < 0.05) from the control and the wooden benches (Rakoopa) treatments. It is clear use of wooden benches (Rakoopa) treatments kept the crop save from the sesame seed bug damage even in low height (25 Cm) although, use of pesticide gave the same result but the expected hazard of chemical residues upraise the use of wooden benches (Rakoopa) and might be alternative method to control the sesame seed bug in the field and its'use is highly recommended.

Key words: kordofan,, postharvest, treatments, the sesame bug, wooden -bench, rakoopa,

I. INTRODUCTION

Sesame (Sesame indicum L.) belongs to the Order Lamiales and Family Pedaliaceae and is considered as one of the major cash crops for export and domestic use in Sudan, and the country is one of the world's largest producers and exporters [1] and [2] . [3] and [4] and [5] reported that Sesame in Sudan is mainly produced under semi-mechanized and traditional farming systems, it is grown entirely under rain fed conditions (300- 800 up to 1000 mm), with little or no use of machinery or modern inputs . The major sesame growing areas in the Sudan are located in the Kordofan, Sinnar, Kassala, and Blue Nile States. The average production is 295,250 tones/year and the cultivated area is 1,404,586 ha, with a mean yield of 132.7-210 kg/ha [5]. [6] sesame is considered as one of the important oil seed crops besides being food for human being whether directly as seeds or oil and used in sweet and soap industries , medicine , and its cake use as food for animals .its oil contents varying between 40% and 60% according to crop variety while [7] and [8] mentioned sesame seeds contain approximately 52 to 57% oil and 25% protein and [9] recorded four sesame varieties each contained about 50% oil average and 100 seed weight ranged 0.27 to 0.32 gram . In tradional sector three types are cultivated Hareery early ripe, Gabrook medium,tradional and Gabaly (late ripe) and approved ones are kenana k3,bromo k, Ziraa seven and Zirra nine [1] and [10].

Many factors affected sesame production in the Sudan in Kordofan States, of these is the sesame seed bug Elasmolomus sordidus (F.) which reduce quantity and

quality of sesame and groundnut. The sesame seed bug sucks the seed content; particularly the oil, reducing the quantity and the quality of the oil. Also, the effect of the bug resulted in loss of seeds weight [9]; [11]; [12], [13] and [1] . [2] and earlier [1] mentioned that some varieties of sesame loss in weight after two months of infestation may reach 13.5%. Regarding chemical control [5] mentioned Cyper Ruimoo 0.25% DP (cypermethrin) at the dose rate of 100 g product/ m2 gave excellent for the control of sesame seed bug, E. sordidus (El kauak) on sesame to be applied on soil as dust before stacking and [1] mentioned that many types of pesticides were used to control this pest and re-infestation resulted after few day of spraying and the farmers were forced to use chemical repeatedly. Although there are many reports about the problem, the knowledge regarding this serious insect pest of oilseed crops control has remained very much the same and the approach of control by chemicals has many hazards especially the residues. So, attempts under way to bridge the gaps at different levels and this research search for possible post harvest treatments to control this pest. The general objective of the study is to reduce losses due to sesame seed bug infestation and assess the post harvest treatments used by the farmers for this purpose and the specific objectives are:

l. To determine the best method for the control the sesame seed bug.

2. To find out alternate tool to control the sesame seed bug E. sordidus to indiscriminate use of pesticides.

II. MATERIALS AND METHODS

2.1. Study area:

The study area was in north Kordofan State, Sheikan locality (Lat. 12°.25 '-130.25'N: and Lon. 29°.35'- 30°. 13' E) where 2 Feddan of sesame was cultivated in season 2017/2018.

2-1.1. Data source:

2-1-1.1 Cultivation of Sesame crop

Two Feddan of sesame were sown in a farm in Sheikan locality near University of Kordofan to obtain data for the study. The area was rain fed; the soil was prepared very well for cultivation in June 2017and standard agricultural practices for sesame was carried out. Then seeds of sesame (variety Bromo K) obtained from Seed Company and were sown on the third week of July 2017 in rows. Cleaning the area from weeds was made regularly throughout the season.

2-1.1-2. Experimental field work

Assessment of the damage of sesame seed bug in the field at harvest time was studied by two experiments .The sesame crop was hand harvested by cutting mature plants with sickle, bundling and stacking the bundles upright to dry then natural infestation allowed to build up.

2-1-1.2.1. First experiment:

In this trial three treatments were used for sesame by putting the bundles on the ground in the first, Wood ash surrounding the bundles in the second and pesticide surround the bundles in the third beside the control. The trial was executed using Randomized Complete Design (RCD) with 4 replicates.

Treatments:

Three bundles of sesame with about 30cm diameter stacked upright together (unit) on the ground in the field and replicate four times with distance of two meter (A).

- Three bundles of sesame with about 30cm diameter stacked upright together (unit) replicate four times with distance of two meter and one kg of Wood Ash put surround each unit twice a week at evening (B).

Three bundles of sesame with about 30cm diameter stacked upright together (unit) replicates four times with distance of two meter and 100g of Thipermethrin (Elfaris) 0.25% DP (Pyrethroid compound) surrounded each unit twice a week (C).

Three bundles of sesame with about 30cm diameter were kept away from infestation used as Control.

2-1-1.2.2. Second Experiment:

In this trial 5 treatments were used by putting sesame bundles on four Wooden bench (Rakoopa) with four levels of height and also putting the bundles on the ground besides the control. The trial was executed using Randomized Complete Design (RCD) with 4 replicates (.Figure 1)

1. Three bundles of sesame with about 30 cm diameter were put on wooden bench(Rakoopa) with height of 25 cm above the ground replicates four times with distance of two meter. (A)

2- Three bundles of sesame with about 30 cm diameter were put on wooden bench Rakoopa with height of 50 cm above the ground replicates four times with distance of two meter.(B)

3. Three bundles of sesame with about 30 cm diameter were put on wooden bench(Rakoopa) with high of 75 cm above the ground replicates four times with distance of two meter. (C)

4- Three bundles of sesame with about 30 cm diameter were put on Rakoopa with high of 100 cm above the ground replicates four times with distance of two meter.(D)

5- Three bundles of sesame with about 30cm diameter stacked upright together (unit) on the ground in the field and replicate four times with distance of two meter.(E)

6- Three bundles with about 30cm diameter kept away from infestation (control).

Fig. 1 Sesame crop on wooden bench (Rakoopa) as treatment to control the sesame seed bug at sheikan locality

2.*1.1.2.3. Loss in weight of sesame seeds*

At harvest time after sesame stacked to dry and infestation build up in the field naturally four random samples were taken every week for a month, replicated four times. One kilogram of sesame was taken every time then transferred to the lab for examination. Thousand seeds of each treatment were weighed by a sensitive electric balance after moisture equilibrium was achieved by sun drying to obtain loss every week. The percent weight loss was calculated by using the following formula for the seeds obtained from the two trials:

% loss in weight = Initial weight-Final weight x 100 Initial weight 2.1.1.2.4. Data analyses

The data on weight loss parameter was statistically analyzed using one way ANOVA mean comparisons were conducted using LSD test and P value was set at 5% level.

III. RESULTS

3.1. Cultivation of sesame:

Sesame promo k variety was sown at Sheikan locality for one season on the third week of July 2017 the growing period of about three months and the harvest was on the third week of October 2017. The harvest was done by hand. The harvest plants bundled and stacked upright to dry. Natural population of sesame seed bug was allowed to build up then samples were collected for the study.

3.2 Losses in weight of sesame seeds under field conditions

In the field, the seeds stored on the ground surrounded by wood ash had significant (P< 0.05) reduction in weight of 1000 seeds while the seeds surrounded with pesticide showed no reduction in weight comparing with the control table (1) due to natural infestation by the sesame seed bug. Table (2) shows bundles of sesame were put on wooden bench (Rakoopa) with 4 levels of height as treatments used in the field to avoid infestation by the seed bug and in one treatment used the sesame bundles were put upright on the ground and infestation allowed and significant loss in weight of1000 sesame seeds resulted.

Table 1. Percentage loss weight of 1000 sesame seeds caused by the infestation of sesame seed bug in the field by using wood ash and pesticide treatments at Sheikan locality site in season 2017/2018.

Treatments	First week	Second week	Third Week	Fourth week
	Mean weight of 1000 sesame seeds (initial			
Control	3.2	3.2	3.2	3.2
Bundles of sesame on the	3.13 (2%)	3.12 * (2.5%)	2.97* (7%)	2.76* (13.7%)
Bundles of sesame surrounded with wood ash	3.14 (1.8%)	3.11* (2.8%)	2.95 * (7.8%)	2.79* (12.8%)
Bundle of sesame surrounded with insecticide(Thipermethrin)	3.2	3.2	3.2	3.2

* The mean difference is significant at the 0.05 level ( ) the number in brackets is weight loss percentage.

Table 2. Percentage loss weight of 1000 sesame seeds caused by the infestation of the sesame seed bug in the field by using wooden benches (Rakoopa) with four levels of height treatments at Sheikan locality site in season 2017/2018.

Treatments	First week	Second Week	Third week	Fourth Week
	Mean weight of 1000 sesame seeds /gram (initial weight 3.2 gram)			
Control	3.2	3.2	3.2	3.2
A-high of 25 Cm	3.2	3.2	3.2	3.2
B- high of 50 Cm	3.2	3.2	3.2	3.2
C-high of 75 Cm	3.2	3.2	3.2	3.2
D- high of 100 Cm	3.2	3.2	3.2	3.2
E- on the	3.13 (2%)	3.1* (3%)	2.97* (7%)	2.76* (13.7%)

The mean difference is significant at the 0.05 level. ( ) the number in brackets is weight loss percentage

IV. DISCUSSION

The sesame seed bug Elasmolomus sordidus (F.) has been known as one of harmful insect pests which cause considerable quantitative and qualitative loss to oilseeds crops particularly, sesame, as reported by many authors [1, 2 , 11 ,.13 ; 12] and they mentioned this pest usually control by insecticides. In this research we search for alternative method to combat the sesame seed bug and wooden benches method were suggested for the purpose and field infestation allowed at harvest time and loss in sesame seeds used as factor for the assessment the method in comparison with other treatments. The results about weight loss percentage in 1000 infested sesame seeds (Table 1) showed that significant difference ($P < 0.05$) between the treatments in which sesame bundles put on the ground and that surrounded by wood ash and the control and also the treatment in which Thipermethrin (Insecticide) used . The loss in weight caused when infestation built up after sesame stacked for drying was 2%; 2.5%,7% and 13.7% in the treatment when sesame on the ground and it was 1.8%,2.8%,7.8% and 12.8% when stacked bundles surrounded by wood ash during the first, the second, the third and the fourth week of the experiment respectively, this result is similar as that mentioned by [1]considerable loss happened and the weight of sesame seeds decreased when time of harvest prolonged and delaying harvest after sesame crop dry Also, [9] recorded that the bug caused losses in weight for four varieties of sesame: Local, Kenana1, Zira 9 and Zira 7 and the loss represented 2.1, 1. 8, 2.2 and 1.9 % percent respectively within 15 days and the loss reached 13.2 within two months. On the other hand when wooden benches (Rakoopa) were used with four levels of height 25cm, 50cm, 75cm and 100 cm, no loss in weight observed during the examination period . The weight of 1000 sesame seeds loss was 2%, 3%,7% and 13.7 in the first week , the second week , the third week and the fourth week respectively when bundles left on the ground and significant ($P < 0.05$)loss in wheigt noticed in comparison with the control and the wooden benches(Rakoopa) treatments (Table 2), consequently, use of the wooden benches (Rakoopa) is highly recommended as method for control the sesame seed bug towards reducing insecticides usage to control pest on sesame crop because sesame is one of the most important export crops in the Sudan, for this reason chemical control measures must be applied with care [1], bearing in mind that misuse of commercial insecticides by farmers is a common problem, and they use non recommended chemicals.

V. CONCLUSION

The wooden benches (Rakoopa) method as postharvest treatment is effective to reduce the damage of the bug. The method in the direction of reduction insecticide usage if we know the farmers repeating use of pesticides when re-infestation of the pest happened within a few days after spray , though, efforts have to be directed to the field management to control the sesame seed bug to save sesame crop and to keep the environment friendly .

VI. RECOMMENDATIONS

In the future more research is needed to improve wooden benches method as postharvest treatment by using metal instead of woods to confrontation the expected expanding of oilseeds cultivation as cash crops and to reduce pesticide use to control the sesame seed bug . Also the assessment of natural enemies may be possible potential within an integrated program.

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AUTHORS PROFILE

First author Abdelmanan Elzein Hassan Elamin has received his PhD degree in Entomology in the year 2010. Now he is Associate professor at Faculty of Natural Resources and Environmental Studies, University of Kordofan.

Second author Omer Rahama Mohmed Rahama has received his PhD degree in Entomology in the year 2014 U of Khrtoum .Now he is Assistance Professor and Head Department of Plant Protection Science Faculty of Natural Resources and Environmental Studies, University of Kordofan. Third author Ahmed Yousif Mohmed Khair has received his PhD degree in (Agric. Extension) in the year 2011 U of Kordofan. Now he is Associate Professor, Faculty of Natural Resources and Environmental Studies, University of Kordofan.

FourthAuthor Tarig Abdalla Mohamed ELblaa2 has received his PhD degree (Entomology) in year 2015 University of Kordofan.Now he is Dean of Faculty of Community Development U.of West kordofan .Elnhood. .

Fifth Author Elsadig Bleilo Ibrahim Musa has received his PhD degree (Agronomy) in year 2009.Now he is Associate professor, Department of Crop Science, Faculty of Natural Resources and Environmental Studies, Peace University. Dean of the Faculty.