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Management of hawk moth of sesame with botanical and chemical agent

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Abstract: Management of hawk moth of sesame using zetpowder, neem kernel extract, neem oil and Dursban 20 EC alone and in combination was studied at Regional Agricultural Research Station, Bangladesh Agricultural Research Institute, Rahmatpur, Barisal during kharif-1 season of 2008 and 2009. The highest hawk moth was 4 per plant observed in the last week of April in 2008, 2009. Among the treatments Dursban 20 EC reduced the highest Hawk moth (98.89%) with the highest BCR (5.03) followed by Neem kernel extract + Biskatali dust extract (31.11%), Neem kernel extract+ Zet powder (28.337%) and Neem oil + Zet powder (26.67%) recorded at 15 days after spray over the pre-treatment count. Neem kernel extract +Zet powder gave the second highest BCR (4.41) followed by Neem kernel extract (4.17), Neem oil + Zetpowder (3.85) and Zetpowder (3.67).
Key words: Management, Practices, Botanical, Chemical, Control, Hawk Moth, Sesame.

Introduction

Bangladesh is principally an agricultural country and produces good number of oilseed crops like mustard, sesame, groundnut, linseed, niger, safflower, sunflower, soybean, castor, etc. Sesame is the second important oil seed crop in Bangladesh which is grown for oil and protein in both the kharif (Summer) and rabi (Winter) seasons. It is the major summer oil seed crop. The seed coat colour of existing varieties is black or brown. But white seed coat coloured grain of Sesame has been used in the confectionary. It covers an area of 74.94 thousand hectares with the total production of 42.69 tones (Khaleque and Begum, 1990). The average seed production of the crop is only 5702 kg/ha. It is reasonably drought tolerant and capable of withstanding a higher degree of soil moisture deficit than many other cultivated crops. It is, however, extremely susceptible to water logging. It is generally grown in early kharif season after aman rice harvest in the low lying areas including the coastal belt of Khulna, Patuakhali and Barisal districts. Sesame seeds contain 25% protein and 42-50% edible oil. Crushed seeds are used as important component of poultry feed as a source of protein. The yield of this crop in Bangladesh is found much lower than the other countries due to low yield potential of local varieties and its poor management practices. Oil seed Research Centre, Bangladesh Agricultural Research Institute (BARI) has already released four advanced promising varieties of Sesame like T-6, BARItil-2, BARItil-3 and BARItil-4 which possess the high yield potential and less susceptible to pest.

Thirty nine species of insect pests have been recorded at the different growth stages of sesame crop in Bangladesh. Of these eight species were recorded as the major pests and rests were of minor importance. The most damaging insects are Hawk moth, hairy catterpillar, leaf roller, common cutworm, pod borer, stem flies, bugs and white fly those are found to damage during vegetative, flowering and pod formation stages of the crop. One of the major constraints to the successful sesame production in Bangladesh is the damage caused due to insect pests. Practical experiences reveal that 15-20 percent of the total sesame production is lost directly or indirectly by the attack of insect and mite pests every year (Biswas and Das 2000). The insect pests of sesame in Bangladesh were recorded by several scientists (Kaul and Das, 1986; Begum, 1995).

About 90% sesame plants are infested by this pest in India (Singh, 1990). Although chemical insecticides are the effective control measures against these pests but the bad-effect of pesticides usage. Farmers spray insecticides in their field indiscriminately. So it causes resistance of the pest, destruction of beneficial organisms and environmental pollution. So it is necessary to find ecologically sound and environmentally safe methods for pest control. Botanicals are comparatively less toxic, naturally available materials, less expensive, less hazardous, biodegradable and also safe for beneficial organisms. Therefore, the present study was undertaken to find out the most effective plant materials with their integration for the management of Hawk moth of sesame.

Materials and Methods

The experiment was conducted in the field of the Oilseed Research Centre, Regional Agricultural Research station, Bangladesh Agricultural Research Institute (BARI), Rahmatpur, Barisal during two kharif-1 seasons of 2008 and 2009. It was laid out in a randomized complete block design (RCBD) with three replications. The unit plot size was 4 m X 3 m. The spacing maintained for sesame entries was 30 cm row to row and 10 cm seed to seed distances. The sesame variety BARI Till-3 were sown in 05 March, 08 and 09. Fertilizers were applied at the rate of 50:28:23:20:1.8:1.8 NPKSZn B kg/ha respectively (Anon, 2004). Half of N (as urea) and all others fertilizers were applied during final land preparation and the rest of half N was applied at 30 DAE. Intercultural operations, such as irrigation was given twice, weeding and mulching were done as and when necessary as per recommendation of Mondall and Wahhab (2000). Six treatments namely, Zet powder @5g/l, Neem kernal extract(2.5%), Neem kernal extract(2.5%) + Zet powder, Neem oil 5ml/l +Zet powder, Dursban 20 EC@ 2ml/l and untreated control were evaluated against Hawk moth of sesame under field condition. Three hundred fifty gram (350g) neem seed kernal and five hundred grams (500g) biskatali dust were crushed and added to 10 litre of water and kept over night and sieved with fine net. Then the solution was ready for spray. Four gram (4g) detergent powder (Zet powder) added to 1 litre of water stirring and sieved with fine net. Four (4) ml neem oil added to 1 litre of water with 4 g zet

powder stirring and sieved then the solution was ready for spray. Botanicals and insecticide were applied on April 10, 2008, 2009 at the vegetative and pod formation stage of the crop with the help of knapsack sprayer. Randomly 10 plants were selected per plot for counting hawk moth of sesame. Larvae of the hawk moth were counted bellow the leaf, shoot and pod of the plant before 5, 10 and 15 days after spray in all the treatments The crop was harvested on 08-06-08, 09. Seed yield of different treatments were recorded. Recorded data were compiled and analyzed in the computer package programmee MSTAT-C for Randomized Complete Block Design (RCBD) and mean value were separated by Duncan's Multiple Range Test (DMRT) (Gomez and Gomez, 1984). Benefit cost ratios (BCR) of different treatments were also calculated.

Results and Discussion

Initially hawk moth apeared on the sesame crop in the 1st week of April at the vegetative, flowering and pod formation stage of the crop and continued their infestation up to 2nd week of May at the maturity stage. Initially hawk moth was low at the early part of April but it increased gradually up to last week of April in 2008 and 2009. The highest hawk moth was 3 Larvae/plant observed in the last week of April in 2008 and 2009 and then declined gradually (Table 1). Almost similar information was made by Kaul and Das (1986) and Biswas and Das (2000) in this country.

Table 1. average incidence of hawk moth in sesame in 2008 and 2009 at Barisal

Duration (Date)	Hairy catterpillar/plant
1-7 April	1
8-14 April	1
15-21 April	2
22-28 April	3
29 April - 05 May	2
06-12 May	2
13-19 May	1

Before spray, the mean hawk moth per plant ranged 1 to 3. These variations in hawk moth were not significant indicating homogenous distribution of population. After spray the number of hawk moth decreased in the treated plots while in significantly increased in untreated plot. Untreated plot had the highest hawk moth (3 hawk moth larvae/plant) (Table 2).

Table 2. Efficacy of some plant materials against hawk moth in2008 and 2009 at Barisal

Treatment	Hairy catterpillar/plant			
	Before spray	5 DAS	10DAS	15 DAS
Zetpowder 4g/1	2b	1.7a	1.5b	1.4c
Neemkernel extract(2.5%)+ Zet powder	2b	1.6a	1.4c	1.3c
Neemkernel extract(2.5%)+ Biskatali dust extract	3a	2.5a	2.1b	1.6b
Neem oil+Zet powder	2b	1.7a	1.4c	1.3c
Dursban 20 EC 2ml/l	3a	0.1d	0d	0d
Untreated control	2b	2.2a	2.6a	3a

Data were recorded on average of 10 plants, Mean followed by the same letters in a column do not differ significantly at 5% level by DMRT, DAS= Days after spray

Table 3. Efficacy of some plant materials against hawk moth in 2008 and 2009 at Barisal

Entries	Percent population reduction over pretreated				
	5 DAS	10 DAS	15 DAS	Average	Yield (kg/ha)
Zetpowder 4g/1	15.00d	25.00d	30.00c	23.33	1080c
Neemkernel extract (2.5%)+Zet powder	20.00c	30.00c	35.00c	28.33	1150b
Neemkernel extract(2.5%) +Biskatali dust extract	16.66d	30.00c	46.67c	31.11	1180b
Neem oil+Zet powder	15.00d	30.00c	35.00c	26.67	1110b
Dursban 20 EC 2ml/l	96.67a	100.00a	100.00a	98.89	1350a
Untreated control	+10.00	+30.00	+50.00	+30.00	840e

Data were recorded on average of 10 plants, (+)Percent increase in hairy caterpillar, Mean followed by the same letters in a column do not differ significantly at 5% level by DMRT.

Neem products and Zetpowder significantly reduced the hairy catterpillar (2.00-3.00%) after 15 days of spray and then reappeared. But in Dursban 20 EC@ 2ml/l treated plot hawk moth did not reappeared up to 15 days after spray. As expected, Dursban 20 EC gave the highest reduction of hawk moth (96.67) followed by Neem kernel extract + Biskatali dust extract (Table 2). The significantly highest yield (1350 kg/ha) was obtained on the Dursban 20 EC treated plots followed by Neem kernel extract + Biskatali dust extract treated plots (1180 kg/ha).The significantly lowest seed yield (840 kg/ha) was obtained from untreated plots (Table 3). The highest BCR (5.03) was obtained from Dursban 20 EC treated plot followed by Neem kernel extract + Biskatali dust extract treated plot (4.41) (Table 4).

Table 4. Economics of different plant materials spraying hawk moth 2008 and 2009 at Barisal

Treatment	Yield (kg/ha)	Increased yield over untreated (kg/ha)	Cost of insecticides & spray (kg/ha)	Add. Income (Tk/ha)	Net income Tk./ha	BCR
Zet powder 4g/l	1080c	240	1800	8400	6600	3.67
Neem kernel extract(2.5%)+ Zet powder	1150b	310	2100	10850	8750	4.17
NKE+ Biskatali dust extract	1180b	340	2200	11900	9700	4.41
Neem oil +Zet powder	1110b	270	1950	9450	7500	3.85
Dursban 20 EC 2ml/l	1350a	510	2960	17850	14890	5.03
Untreated control	840e	-	-	-	-	-

Mean followed by the same letters in a column do not differ significantly at 5% level by DMRT, BCR= Net income/ Management cost, Price of sesame seed =35Tk./kg, cost of neem oil=200 Tk./litre, Cost of neem seed kernel= 50Tk./Kg, cost of Dursban 20 EC =590Tk./litre, Cost of labour=120Tk./labour day. Three labours and 1litre of Ripcod 10EC @ 2ml/l being required for 1hectare of crop field spryed in one time. One machine spray volume= 10 litre required 200 sqm field spraying in one time. Other variable costs were same in all the treatment.

This result revealed that neem formations and Zetpowder are effective in checking the hawk moth in sesame only up to 10-15 days after spray. Their performance was inferior to Perfacthion 50 EC treated plots. Morde and Blackwell (1993) reported that antifeedant and insect growth regulatory effect are present in azadirachtin and neem product which can be used for insect management. Result revealed that although botanicals fail to reduce 100% hawk moth but it safe for natural enemies and also safe for environmental pollution.

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