



Integrated Management of Jassid in Groundnut

M. A. Monim¹, M. N. Haque², G. M. Bari³, M. S. Rahaman⁴ and M. Z. Rahman¹

¹Regional Agricultural Research Station,

Bangladesh Agricultural Research Institute, Rahmatpur Barisal

²Agricultural Research Station, Bangladesh Agricultural Research Institute, Comilla

³Regional Agricultural Research Station, Bangladesh Agricultural Research Institute, Jessor

⁴Senior Scientific Executive, McDonald Bangladesh (Pvt.) Ltd. Dhaka.

Abstract

Management of Jassid (*Empoasca terminalis*) of groundnut using botanical and chemical insecticide viz. zet powder, neem kernel extract, biskatali dust extract and neem oil, Tafgar 20 EC and their integration was studied at Regional Agricultural Research Station, Bangladesh Agricultural Research Institute, Rahmatpur, Barisal during rabi season of 2008-2009 and 2009-2010. The infestation of Jassid (*Empoasca terminalis*) was noticed during 1st week of March and the highest infestation of Jassid (*Empoasca terminalis*) was 345 per plant observed in the last week of April in 2009, 2010. Among the treatments as expected Tafgar 20 EC reduced the highest Jassid (*Empoasca terminalis*) (99.55%) with the highest BCR (5.65) followed by Neem kernel extract + Zet powder (56.32%), Neem oil + Zet powder (55.13%). Neem kernel extract (2.5%) + Biskatali dust extract (54.31) and Zet powder (48.33%) recorded at 15 days after spray over the pre-treatment count. Neem kernel extract + Zet powder gave the second highest BCR (4.76) followed by Neem oil + Zet powder (4.29), Neem kernel extract (2.5%) + Biskatali dust extract (3.88) and Zet powder 4g/l of water (3.32).

Key words: Integrated, Management, Jassid, Groundnut

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. The first three are considered as the major oil crops. Groundnut (*Arachis hypogaea*) is the third most important legume oilseed crop in Bangladesh (Annon, 2008) which is grown in 27073 ha with a production of 34240 metric tons in 2002-2003 (BBS, 2005). It seed content 48-50% oil and 22-29% protein and used edible oil, to make cake, biscuit and other confectionary purpose. Recently, the area of groundnut is being decreased due to the competition with rabi crops like wheat, potato, boro rice and mustard (Biswas *et al.*, 1997). Moreover, most of the char areas of Bangladesh become inundated in the kharif season which causes decline of groundnut area. In kharif season, only some high lands are used for groundnut cultivation. So far, a number of high yielding varieties have been developed. research program is going on to develop more varieties with high yield potential, insect and diseases resistant varieties. Recently, a few number of groundnut lines have been collected from ICRISAT. Some of them are performing good under Bangladesh condition. But yield of groundnut is very low due to poor management practices under field conditions, such as improper practices can increase the productivity of groundnut up to a considerable extent. There is bright prospect for expansion of groundnut cultivation because it can be grown in both rabi and kharif seasons. Jassid (*Empoasca terminalis*), thrips (*Scirtothrips spp.*), Shoot miner (*Stomopteryx nerteria*) and leaf roller (*Anarsia ephippias*) are major insect pests of groundnut and limiting factors in successful

cultivation of the crop. Leaf roller (*Anarsia ephippias*) is also serious in India, Pakistan, USA and many other countries of the world. The larvae of leaf roller feed on shoots, and web the top of the leaves. They make shot holes in the leaves, and webs the growing points. About 90% groundnut 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 are well known. The breeding of insect resistant varieties is an important non chemical management technique which is ecologically sound and socially acceptable for the farmers. 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. Ahmed, (1984) listed 2121 plant species possessing pest control properties. Researchers isolated and identified several chemical compounds from leaves and seeds of many plants and screened and identified out for insect deterrents and growth inhibitors. Neem seed kernel extracts containing azadiractin, salanin and meliontriol have extensively been studied and demonstrated for insect pest control efficacy (Sexena *et al.*, 1981; Haque and Islam, 1988). These neem products are distasteful or repelled to the insect and may reduce the insect infestation. Information using botanicals for the control of Leaf roller in Bangladesh is scanty. Therefore, the present study was

undertaken to find out the most effective plant materials with their integration for the management of jassid of groundnut.

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 rabi seasons of 2008-2009 and 2009-2010. The experiment was laid out in a randomized complete block design (RCBD) with three replications. The unit plot size was 6 m X 4 m. Fertilizers were applied at the rate of 25-160-85-300-5-10 kg/ha of urea, triple super phosphate, muriate of potash, gypsum, zinc sulphate and borax respectively, as recommended for Bangladesh (Anon, 2004). One half amount of urea and full dose of all other fertilizers were incorporated into the soil at the time of final land preparation. The remaining urea was top dressed in two equal installments at 35 and 65 days after sowing. During land preparation, cowdung was applied at 10 ton/ha. The seeds were sown at the spacing maintained for groundnut was 30 cm row to row and 15 cm seed to seed distances. The groundnut variety BARI chinabadam-7 were sown in 10 December, 08 and 09. 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 @4g/l of water, Neem kernal extract (2.5%) + Biskatali dust extract, neem kernal extract+ Zet powder, Neem oil 5ml/l of water +Zet powder, Tafgar 20EC@ 1ml/l of water and untreated control were evaluated against Jassid of groundnut under field condition. Three hundred fifty gram (350g) neem seed kernal was crushed and added to 10 litre of water and keep to 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 chemical insecticide were applied on March 10, 2009, 2010 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 Jassid of groundnut. Jassid were counted on leaf and shoot of the plant before 5, 10 and 15 days after spray in all the treatments. The crop was harvested on 25-05-2009, 2010. Seed yield of different treatments were recorded. Recorded data were compiled and analyzed in the computer package program 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 Jassid appeared on the groundnut crop in the 1st week of March at the vegetative, flowering and pod formation stage of the crop and continued their infestation up to last week of May at the maturity stage. Initially Jassid was low at the early part of March but it increased gradually up to last week of April in 2009 and 2010. The highest Jassid population was 345 Jassid /plant observed in the last week of April in 2009 and 2010 and then declined gradually (Table 1). Almost similar observation was reported by Kaul and Das, (1986) and Biswas and Das, (2000) in Bangladesh.

Table 1. Incidence of Jassid (*Empoasca terminalis*) in groundnut 08-09 and 09-10 at Barisal

Duration (Date)	Jassid population /plant
07 March	55
22 March	195
06 April	255
21 April	345
06 May	255
21 May	70

Before spray, the mean Jassid per plant ranged 280 to 298. These variations in Jassid were not significant indicating homogenous distribution of population. After spray the number of Jassid decreased in the treated plots while in significantly increased in untreated plot. Untreated plot had the highest Jassid (398 Jassid /plant) (Table 2). Neem and biskatali products and Zetpowder significantly reduced the Jassid (48.33-56.32%) after 15 days of spray and then reappeared. But in Tafgar 20 EC treated plot Jassid did not reappeared up to 15 days after spray. As expected, Tafgar 20 EC gave the highest reduction of Jassid (99.55%) followed by Neem kernel extract + Zetpowder(56.32%), Neem oil+Zet powder (55.13%), Neem kernel extract (2.5%) + Biskatali dust extract (54.31%) (Table 3). The significantly highest yield (2112 kg/ha) was obtained on the Tafgar 20 EC treated plots followed by Neem kernel extract + Zetpowder (1870 kg/ha).The significantly lowest seed yield (1380 kg/ha) was obtained from untreated plots (Table 3). The highest BCR (5.65) was obtained from Tafgar 20 EC treated plot followed by Neem kernel extract (2.5%) +Zet powder treated plot (4.76) (Table 4). This result revealed that neem formations and Zetpowder are effective in checking the Jassid in groundnut only up to 10-15 days after spray. Their performance was inferior to Tafgar 20 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. Islam et al. (2006) reported that about 50% mortality of *Spilarctia oblique* occurred in jute plant when applied 5% concentration of neem oil in Bangladesh. Result revealed that although botanicals fail to reduce 100% Jassid but it safe for natural enemies and also safe for environmental pollution.

Table 2. Efficacy of some plant materials against Jassid (*Empoasca terminalis*) of groundnut 2008-2009 and 2009-2010 at Barisal

Treatment	Jassid population/plant			
	Before spray	5 DAS	10 DAS	15 DAS
Zet powder 4g/l of water	280	180	135	119
Neem kernel extract(2.5%) + Biskatali dust extract	286	159	124	109
Neem kernel extract(2.5%)+Zet powder	290	171	117	92
Neem oil+Zet powder	289	161	126	102
Tafgar 20 EC 1ml/l of water	298	4	0	0
Untreated control	292	316	358	398
CV (%)	1.95	2.10	1.95	1.87
LSD (0.05)	22.25	25.22	15.20	30.22

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 Jassid of groundnut (*Empoasca terminalis*) 2008-2009 and 2009-2010 at Barisal

Entries	Percent population reduction over pretreated				
	5 DAS	10 DAS	15 DAS	Average	Yield(kg/ha)
Zetpowder 4g/l	35.71	51.79	57.5	48.33	1650
Neem kernel extract(2.5%) + Biskatali dust extract	44.41	56.64	61.88	54.31	1770
Neem kernel extract(2.5%)+Zet powder	41.03	59.66	68.28	56.32	1870
Neem oil+Zet powder	44.29	56.40	64.71	55.13	1810
Tafgar 20EC 2ml/l	98.66	100.00	100.00	99.55	2112
Untreated control	+08.22	+22.60	+26.63	+19.15	1380
CV (%)	1.75	1.85	1.95	-	1.85
LSD (0.05)	18.62	17.45	10.15	-	155.20

Data were recorded on average of 10 plants

(+)Percent increase in Jassid (*Empoasca terminalis*)

Mean followed by the same letters in a column do not differ significantly at 5% level by DMRT.

DAS= Days After Spray

Table 4. Economics of different plant materials spraying against Jassid (*Empoasca terminalis*) of groundnut 2008-2009 and 2009-2010 at Barisal

Treatment	Yield (kg/ha)	Increased yield over untreated (kg/ha)	Cost of insecticides & spray (Tk./ha)	Addition. Income (Tk./ha)	Net income (Tk./ha)	BCR
Zet powder 4g/l	1650	270	2500	10800	8300	3.32
Neem kernel extract(2.5%) + Biskatali dust extract	1770	390	3200	15600	12400	3.88
NKE+Zet powder	1870	490	3400	19600	16200	4.76
Neem oil +Zet powder	1810	430	3250	17200	13950	4.29
Tafgar 20EC 1ml/l	2112	732	4400	29280	24880	5.65
Untreated control	1380	-	-	-	-	-
CV (%)	1.85	-	-	-	-	-
LSD (0.05)	155.20	-	-	-	-	-

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 groundnut seed =40Tk./kg, cost of neem oil=200 Tk./litre

Cost of neem seed kernel= 50Tk./kg, cost of Tafgar 20EC =490Tk./litre

Cost of biskatali dust extract=50Tk./kg Cost of zet powder=50Tk/kg

Cost of labour=220Tk./labour day. Three labours and 1litre of Tafgar 20EC @ 2ml/l being required for 1hectare of crop field sprayed 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.

Conclusions

Result to be concluded that neem formations and Zetpowder are effective in checking the Jassid in groundnut only up to 10-15 days after spray. Their performance was inferior to Tafgar 20 EC treated

plots. Although botanicals insecticides fail to reduce 100% Jassid but it safe for natural enemies and also safe for environmental pollution.

References

- Ahmed, 1984. Some promising plant species for use as pest control against under traditional farming system. In: Proceeding of 2nd neem Conference, Rauschol Zhuson, FRG, 24-28 May 1984. pp.565-580.
- Anonymous, 2004. Annual Report 2003-04. Oil Seed Research Centre (ORC), BARI, Joydebpur, Gazipur.
- Anonymous, 2008. Annual Report 2007-08. Oil Seed Research Centre (ORC), BARI, Joydebpur, Gazipur.
- BBS (Bangladesh Bureau of Statistics). 2005. Statistical Year Book of Bangladesh, Sta. Div., Minis. Plan. Govt. People's Repub. Bangladesh, Dhaka.
- Begum, S. 1995. Insect pests of oilseed crops of Bangladesh. *Bangladesh J. Zool.* 23(2): 153-158.
- Biswas, G.C.; Begum, S. and Mian, M.Y. 2000. Leaf infestation and yield loss caused by jassid and thrips in groundnut. *J. Asiat. Soc. Bangladesh Sci.* 26(2): 253-258.
- Biswas, M.; Alom, M.S.; Mondal, M.R.I.; Sadeque, M.A. and Asaduzzaman, S.M. 1997. Potential of intercropping groundnut with sunflower. *Bangladesh J. Agril. Sci.* 24(1): 21-25.
- Gomez, K.A. and Gomez, A.A. 1984. Statistical procedures for Agricultural Research. Int. Rice Res. Inst., John Wiley & Sons, NY.
- Haque, M.A. and Islam, B.N. 1988. Effect of Mettanolic Neem and chinaberry seeds extract on Rice green leaf hopper, *Nephotettix nigropictus*. *Bangladesh J. of Agril.* 13(10): 53-57).
- Kaul, A.K. and Das, M.L. 1986. Oil seeds in Bangladesh. Bangladesh Canada Agriculture sector Team. Ministry of Agriculture, Govt. of the people's Republic of Bangladesh, Dhaka, pp.324.
- Mondal, M.R.I. and Wahhab, M.A. 2001. Production technology of oilcrops. Oilseed research centre, Bari, Joydebpur, Gazipur.
- Morde, A.J. and Blackwell, K. 1993. Azadiractin: an update *J. Insect Physiol.* 39(11); 903-924.
- Prasad, S.K. 1995. Screening of various groundnut cultivars for resistance to leafhopper. *Indian J. Ent.* 51: 411-413.
- Sexena, R.C.; Lioquido, N.J. and Justo, H.D. 1981. Neem seed oil, a potential antifeedant for the control of the rice brown plant hopper.
- Singh, S.R. 1990. Insect Pest of Tropical Food Legumes. John Willy and Sons. Inc. New York, USA. pp.451.