J. Sher-e-Bangla Agric. Univ., 7(2): 36-39, July 2013 ISSN 1997-6038

BIO-EFFICACY OF CARBOFURAN 5G AGAINST BRINJAL SHOOT AND FRUIT BORER APPLIED AT DIFFERENT ROW COMBINATIONS

M. Moniruzzaman [1], G. K. M. M. Rahman [2] and K. H. Kabir [3]

ABSTRACT

An experiment was undertaken to determine the suitable pattern of carbofuran application for brinjal cultivation and minimize the application of carbofuran for maximum protection against brinjal shoot and fruit borer (BSFB). The experiment was conducted at the research field of Soil Science Department, Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU), Gazipur during the period from September 2008 to March 2009. The experiment was laid out in RCBD with 4 treatments and 3 replications. Considering 6m x 5m plot size for each treatment and 60 cm x 75 cm plant spacing with 40 days old brinjal seedlings. The lowest percent of shoot infestation (1.24%) was recorded where carbofuran 30 kg/ha (furataf 5G used @ 90g/ 30 m^2; T_1) was applied in every plant of every row. It was followed by carbofuran 15 kg/ha (furataf 5G used @ 45g/ 30 m^2; T_2) was applied in every plant of every alternate row. But there was no significant difference of percent shoot infestation between where carbofuran was applied in every plant of every row and in every plant of every alternate row. However, the highest shoot infestation (3.02%) was recorded where carbofuran 7.50 kg/ha (furataf 5G used @ 22.50g/ 30 m^2; T_4) was applied in every plant of three alternative rows and followed by carbofuran 11.25 kg/ha (furataf 5G used @ 37.75g/ 30 m^2; T_3) was applied in every plant of two alternative rows. Fruit infestation both in terms of number and weight followed the same trend as in shoot infestation and having no significant difference between these two treatments. The highest percent fruit infestation (36.53%) by number was recorded in where carbofuran was applied in every plant of three alternative rows followed by carbofuran was applied in every plant of two alternative rows. The highest yield (37.67 t/ha) was obtained from where carbofuran was applied in every plant of every row and the second highest yield (37.58 t/ha) was recorded where carbofuran was applied in every plant of every alternate row, although there was no significant difference between these treatments in respect to yield. Significantly, the lowest yield (33.56 t/ha) was recorded where carbofuran was applied in every plant of three alternative rows in which the maximum distance was maintained in carbofuran application pattern. The highest net return (4,08,500 Tk/ha) and cost benefit ratio (1.19) was found where carbofuran was applied in every plant of every alternate row. In view of different row combinations, the higher net return and cost benefit ratio may come from where carbofuran application in ring furrow to every plant of one alternate row would be the best option to be utilized in BSFB management programs.

Keywords: brinjal shoot and fruit borer, alternative row, fruit infestation, net return.

INTRODUCTION

Brinjal, *Solanum melongena* is one of the most popular and economically important vegetables in Bangladesh. It is generally cultivated on small family-owned farms and the sale of its produce serves as a ready source of cash income throughout the year to improve the farmers' livelihood. The attack of various insect pests is considered one of the important factors limiting its production. Of several pests, the attack of brinjal shoot and fruit borer (BSFB), *Leucindoes orbonalis* (Guen.) is the most destructive. More severe economic damage comes from feeding inside the fruits, making even slightly damaged fruits unfit for human consumption. The yield loss varies but can exceed 65% in Bangladesh (BARI, 1999). Despite the importance of brinjal and severity of BSFB problem, the management practice to combat this pest is still limited to frequent sprays of toxic chemical insecticides (Kabir *et. al.*, 1996). Among the insecticides, carbofuran 5G constitute an important part in BSFB management due to some advantages of granular insecticides over foliar sprays. Carbofuran applied at sowing has

[1]Additional Deputy Director (Admin-1), Administration & Finance Wing, Deparment of Agricultural Extension (DAE), Khamarbari, Farmgate, Dhaka, [2] Professor, Department of Soil Science, Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU), Gazipur 1706, [3] Director General, Bangladesh Sugarcane Research Institute (BSRI), Ishwardi, Pabna, Bangladesh

been proved to be very effective against brinjal shoot and fruit borer. Non-optimal and non-judicious use of carbofuran may result in a series of problems such as pollution, health hazards, resistant to pests, loss of soil quality etc. It is reported that more than 80% of most insecticides miss the bodies of the pests at which they are aimed (Hill and Wright, 1978). After application, a large part of applied carbofuran may be lost from cropping fields through vertical and horizontal movements. This transmitted pesticide may enhance soil and water contamination in the environment. Indiscriminate use of carbamate pesticide has not only complicated the management, but also has created several adverse effects such as bio-accumulation, soil and water contamination, health hazards and environmental pollution etc. (Kavadia *et al.,* 1984; Desmarchelier, 1985; Devi *et al.,* 1986; Fishwick, 1988). Specific studies on carbofuran such as its economic use, pattern of application etc. has not been done in Bangladesh. Hence, this study was undertaken to determine the suitable pattern of carbofuran application for brinjal cultivation and minimize the application of carbofuran for maximum protection of brinjal crop against shoot and fruit borer.

MATERIALS AND METHODS

The experiment was conducted at the research field of Soil Science Department, Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU), Gazipur during the period from September 2008 to March 2009. The land was well prepared by harrowing followed by ploughing, cross ploughing and leveling. Cowdung and other chemical fertilizers were applied as recommended dose for brinjal cultivation (Rashid, 1993) at the rate of 15 tons of cowdung and 250, 150 and 125 kg Urea, TSP and MP, respectively per hectare. The experiment was laid out in RCBD with 4 treatments and 3 replications. Considering 6m x 5m plot size for each treatment and 60 cm x 75 cm plant spacing with 40 days old brinjal seedlings. There were 4 patterns of carbofuran application and those were individually treated as a treatment. The treatments were as follows application of carbofuran in ring furrow to every plant of every row at recommended dose (30 kg/ha,) furataf 5G used @ 90g/ 30 m^2 (T_1); application of carbofuran in ring furrow to every plant of alternate rows furataf 5G used @ 45g/ 30 m^2 (T_2); application of carbofuran in ring furrow to every plant of two alternate rows furataf 5G used @ 33.75g/ 30 m^2 (T_3) and application of carbofuran in ring furrow to every plant of three alternate rows furataf 5G used @ 22.50g/ 30 m^2 (T_4). The carbofuran (furataf 5G) was applied at 30 days after transplanting of brinjal seedlings with assigned doses. Carbofuran was applied to 5 cm circle of brinjal plant at 5 cm depth from the soil surface. Following carbofuran application, a light irrigation was done to each plant by water can. The total numbers of healthy and infested shoots were recorded from 10 randomly selected plants of each plot at seven days intervals and the percent shoot infestation was calculated. Sampling started after 30 days of transplanting for healthy and infested shoots and 90 days for healthy and infested fruits. Fruits were harvested at seven days intervals. In total 10 harvests were done throughout the cropping season .The number and weight of healthy and infested fruits were recorded at each harvest and percent fruit infestation by number and weight and marketable yield were calculated. Data were analyzed by MSTAT-C computer package and the means were separated by Duncan Multiple Range Test (DMRT).

RESULTS AND DISCUSSION

Effect of Carbofuran on Brinjal Shoot and Fruit Borer Infestation and Yield

The results of the present study are presented in Table1. Results revealed that the lowest percent of shoot infestation ((1.24%) was in T_1, where carbofuran was applied in every plant of every row. It was followed by T_2 where carbofuran was applied in every plant of every alternate row. But there was no significant differences between per cent shoot infestation of T_1 and T_2. However, the highest shoot infestation (3.02%) was recorded in T_4 treated plots, where application of carbofuran in ring furrow to every plant of three alternate rows. Fruit infestation both in terms of number and weight followed the same trend as in shoot infestation. Percent fruit infestation by number was the lowest (14.82%) in T_1 which was closely followed by T_2 (15.23%) having no significant difference between this two treatments. The highest (36.53%) percent fruit infestation by number was recorded in T_4 treated plots followed by T_3 treated plots where application of carbofuran in ring furrow to every plant of two alternate rows. Similarly percent fruit infestation by weight was the lowest (16.02%) in T_1 which was followed by T_2 (17.83%) having no significant difference between this two treatments. The highest (39.28%) percent of fruit infestation by weight was recorded in T_4 followed by T_3.

Table 1. Effect of different patterns of carbofuran 5G application on shoot and fruit infestation caused by brinjal shoot and fruit borer (BSFB)

Treatments	Percent shoot infestation	Percent fruit infestation by number	Percent fruit infestation by weight	Yield t/ha (healthy fruits)
T_1	1.24c	14.82c	16.02c	37.67a
T_2	1.28c	15.23c	17.83c	37.58a
T_3	2.31b	26.27b	32.01b	34.54b
T_4	3.02a	36.53a	39.28a	33.56c

Data are the average of three replications. Table followed within a column by the same letter(s) are not significantly different (P>0.01, DMRT) excluding.

Similarly, the highest yield (37.67 t/ha) was obtained from T_1 treated plots and the second highest (37.58 t/ha) yield was recorded in T_2 treated plots, although there was no significant difference between these two treatments. Significantly, the lowest yield (33.56 t/ha) was obtained from T_4 treated plots where the highest distance was maintained in carbofuran application pattern.

Economic Analysis of the Different Patterns of Carbofuran Application

The economic analysis of four patterns of Carbofuran application was done to find out the most economic method to obtain maximum yield. Among four patterns, T_2 gave the highest benefit cost ration (1.19) which was statistically different from all other patterns followed by T_1 (1.12). On the other hand, the minimum BCR was found from T_3 (1.08) which was statistically similar with T_4 (1.09).

Table 2. Costs and return analysis of different patterns of carbofuran 5G application on shoot and fruit infestation caused by brinjal shoot and fruit borer (BSFB)

Treatments	Yield t/ha (Healthy fruits)	Gross return (Tk./ha)	Cost of Production (Tk./ha)	Net return (Tk./ha)	BCR
T_1	37.67a	7,53,400a	3,54,600a	3,98,800b	1.12b
T_2	37.58a	7,51,600a	3,43,100b	4,08,500a	1.19a
T_3	34.54b	6,90,800b	3,31,600c	3,59,200c	1.08c
T_4	33.56c	6,71,200c	3,20,100c	3,51,100c	1.09c

Data are the average of three replications. Table followed within a column by the same letter(s) are not significantly different (P>0.01, DMRT) excluding.

The findings of the present study led to assume that BSFB infestation both in terms of shoot and fruit infestation showed increasing trend with the increase of placement distance of carbofuran. However, in view of higher net return and economic use of carbofuran, T_2 comprising the application of carbofuran in ring furrow to every plant of one alternate rows would be the best option to be utilized in BSFB management programs.

REFERENCES

Bari, M.A., Nahar, S., Alam, M., and Mian, I.H. 1999. Efficacy of pre-plant soil treatment with four organic amendments and two nematicides to control root-knot of okra. *Bangladesh J. Plant Patho.* 15(1&2):27-30.

Desmarchelier, Y.M. 1985. Bolivian of pesticide residues on stored grain, Aciar Prof. Series, Australian Centre Int. Agril. Res. 14:19-29.

Devi, D.A., Mohandas, N. and Vistakshy, A. 1986. Residues of Fenthion, Quinphos and Malathion in paddy grains following surface treatment of gunny bags. *Agril. Res. J. Kerala.* 24(2):222-224.

Fishwick, R.B. (1988). Pesticide residues in grain arising from post harvest treatments. Aspects Appl. Biol. 17(2):37-46.

Hill, I.R. and Wright, S.J.L. 1978. Microbial aspects of pesticides behaviour in the environment. Pesticide Microbiology. viii. p.

Hill, I.R. and Wright, S.J.L. 1978. Microbial aspects of pesticides behaviour in the environment. Pesticide Microbiol. 79-94 pp.

Kabir, K.H., Baksh, M.E., Rouf, F.M.A. and Ahmed. A. 1996. Insecticide use pattern on vegetables at farmers level of Jessore region in Bangladesh. *Bangladesh J. Agric. Res.* 21(2): 214-254.

Kavadia, V.S., Pareek, B.L. and Sharma, K.P. 1984. Residues of malathion and carbaryl in stored sorghum. Bull. Grain Tech. 22(3):247-250.

Rashid, M.M. 1993. Begun Paribarer Shabji. In: Shabji Biggan (in Bangla). 1st ed. Bangla Academy, Dhaka, Bangladesh. 137-154 pp.