INCIDENCE OF MAJOR INSECT PESTS OF BLACKGRAM AT DIFFERENT DATES OF SOWING

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ABSTRACT

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Incidence of major insect pests of blackgram at different dates of sowing was studied at Regional Agricultural Research Station, Bangladesh Agricultural Research Institute, Ishurdi, Pabna with six sowing dates initiating from August 07 to September 11, 2007 at an interval of seven days. Hundred percent of the sampled plant was found to be infested by stemfly and flea beetle while their intensity of infestation varied significantly. The lowest stem tunneling per plant by stemfly, damaged leaf by flea beetle and pod borer infestation was observed in Aug 7 sowing followed by Aug 14 and 21. The maximum number of thrips was found in early plantings (up to 21 Aug) whereas minimum in late plantings. The study indicates that early planting (up to 21 August), in general, gave lower infestation by the insects than late plantings. Significantly the highest yield was obtained from Aug 7 followed by Aug 14 and Aug 21, while Sept 11 and Sept 04 had the lowest yield.

Keywords: Insect pests, dates of sowing, blackgram, yield

INTRODUCTION

Blackgram also known as mashkalai, urdbean or blackbean belongs to the family leguminosae is the fourth most important pulses in Bangladesh having high nutritive value. It contains 24% protein, 3.2% minerals and 59.6% carbohydrate. It also contains 154 mg calcium, 9.1 mg iron and 38 mg β-carotine per 100g of split daul (Bakr *et al*., 2004). Like other leguminous crop, blackgram play a vital role in maintaining the nitrogen balance in the soil. It possesses nodules on its roots, containing nitrogen fixing bacteria *Rhizobium* sp which fixes nitrogen in symbiotic association with the plant and release a significant amount for plant growth and development. The national average yield of blackgram in Bangladesh is very low. Only 76200 metric tons grains are produced from 102800 ha of land that being used for cultivation of blackgram (BBS, 2005). Of the several factors responsible for such poor yield undoubtedly insect infestation is considered as one of the most important factor. A number of insect pests attack blackgram in the field. Among these, a) stemfly,*Ophiomyia phaseoli* (Rahman 1991; Mia 1998; Prodhan *et al*. 2000) b) flea beetle, *Phyllotreta striolata* c) thrips, *Thrips tabaci* and d) pod borer, *Maruca testulalis* (Mia, 1998) are the major pest of blackgram in Bangladesh causing serious damage to the crop.

At present, effective control techniques other than insecticide application against the pests are not available. The blackgram growers use various insecticides to control the pest. Insecticidal control is not only expensive but also its residues on the sprayed surface of the crops or in the soil have become a matter of concern and environmental pollution. The indiscriminate use of pesticides causes phytotoxicity and destruction of beneficial organisms such as predators, parasitoids, microorganisms and pollinators (Luckman and Metcalf, 1978; Hussain, 1984). Under these circumstances it becomes necessary to find out some eco-friendly alternative methods for insect pest's management which include the manipulation of the cultural practices like deviating the dates of sowing, mulching, intercropping, screening of genotypes in formulating the Integrated Pest Management approach. But in Bangladesh such non-chemical practices have yet to be investigated for avoiding the attack of major insect pests in blackgram. The present study was undertaken to determine the appropriate sowing time(s) to minimize major insect pest of blackgram.

MATERIALS AND METHODS

The experiment was conducted in the field of Regional Agricultural Research Station, Bangladesh Agricultural Research Institute (BARI), Ishurdi, Pabna, Bangladesh during August to September 2007. Seeds of blackgram (variety Barimash 3) were sown on 6 different dates from August 7 to September 11, 2007 at an interval of seven days (August 7, 14, 21, 28, September 4 and 11). Each sowing date was considered as individual treatment. The experiment was laid out in randomized complete block design with four replications having plot size 3.0 × 3.0 m with an inter plot distance of 0.75 m and inter block distance of 1.0 m. Spacing of row to row and seed to seed was 30 cm and 10 cm, respectively. Soil was fertilized with Urea, Triple supper phosphate and Muriate of potash at the rate of 45, 100 and 58 kg/ha, respectively (Razzaque *et al*. 2000). All the fertilizers were incorporated in the soil during final land preparation.

For stemfly infestation, ten randomly selected plants were uprooted from each plot and brought in the laboratory. Roots were cleaned to remove adhering soil, stems of each plant were dissected with a scalpel and observations of length of stem, length of tunnel and the number of larvae and pupae present in the stem were recorded. The number of stemfly infested plants in each sample was also recorded. In case of flea beetle, ten randomly selected plants were carefully examined at 45 days after sowing. The number of flea beetle damaged plants and percentage of damaged leaf per plant was also recorded. In case of thrips, twenty flowers were carefully examined from each plot. The number of thrips was recorded. Regarding pod borer infestation, at harvest, 10 randomly selected plants from each plot were carefully uprooted to record the number of infested and healthy pod. The number of pod borer damaged plants was also recorded.

The yield per plot was recorded and converted into yield per hectare. Data were analyzed statistically and the treatment means were separated by Duncan's Multiple Range Test (DMRT) according to Gomez and Gomez (1984).

RESULTS AND DISCUSSION

The results of the incidence of major insect pests of blackgram at different dates of sowing are presented in Table 1. 100% stemfly infested plants were found among sowing dates while percentage of stem tunneling/plant by the fly varied significantly. The lowest stem tunneling (14.88%) was recorded from the crop sown on Aug 07. Aug 14 (18.80%) sowing ranked next to Aug 07 and it was statistically similar to Aug 21 (20.39%) sowing. The last sowing (Sept 11) had the highest percentage of stem tunneling (28.54%) which was statistically similar to Sept 04 (27.30%) and Aug 28 (26.01%). Like stemfly, 100% flea beetle infested plants were also observed among the sowing dates but percent damaged leaf by the beetle differed significantly. The last sowing had the highest damaged leaf (31.67%) which was statistically similar to Sept 4 (28.33%) and Aug 28 (23.33%). The lowest damaged leaf (11.67%) was observed in Aug 7 sowing which was statistically similar to Aug 14(13.33%) and 21 (16.67%). The maximum number of thrips/flower were recorded from Aug 14 (4.35) sowing which was statistically similar to Aug 7 (3.63) and Aug 21 (3.47). The last sowing had the minimum number of thrips (0.80) which was statistically similar to Sept 4 (1.07). Pod borer infestation varied significantly among the sowing dates. The last sowing had the highest infestation (16.01%) which was statistically similar to Sept 4 (13.62%), Aug 28 (11.40%) and Aug 21 (9.63%). The lowest infestation was recorded from the crop sown on Aug 7 (6.85%) which was statistically similar to all sowing dates except Sept 4 and Sept 11.

Yield of blackgram as influenced by different dates of sowing are presented in Figure 1. Seed yield, although the maximum of 742 kg seed per ha was harvested numerically when the crops sown on Aug 07 but it was statistically similar to Aug 14 (722 kg/ha) and Aug 21 sowing (698 kg/ha). The lowest yield of 403 kg per ha was obtained from Sept 11 sowing and it did not differ significantly with Sept 4 (451 kg/ha) sowing.

The present study indicates that early planting gave lower infestation of major insect pests and late plantings showed higher infestation (except thrips). Crop under early plantings received more rainfall than late plantings. Insect movement and egg deposition probably hampered due to rainfall. For this reason infestations were lower at earlier plantings compared to late plantings. The present findings are in confirmly with those of Nderitu *et al.* (1990) and Prodhan (2007). Nderitu *et al.* (1990) reported that the numbers of leaf punctures, eggs, larvae and puparia of stemfly were higher in late than in early planted crops and the crop planted late in the season was severely damaged due to generally higher population levels which had been building up in the course of the season. Prodhan (2007) early planting (up to 21 August) gave lower infestation of stemfly than late planting. In case of thrips, late planting had lower population. In early plantings, temperature relatively higher than late plantings. Due to low temperature number of thrips may be minimum in late plantings. This was in line with the reports of Arif *et al*. (2006) who reported temperature played a significant correlation with positive response for population fluctuation of thrips.

Considering the damage severity of major insect pest and yield of blackgram it may be suggested that higher yield can be obtained through escaping insect infestation if blackgram is sown between Aug 7 and Aug 21.

Table 1. Effect of dates of sowing on infestation of major insect pests of blackgram

Sowing time	Stemfly infested plant (%)	Stem tunneling/ plant (%)	Flea beetle infested leaf (%)	Damaged leaf by flea beetle (%)	Thrips/ flower (no.)	Pod borer infestation (%)
Aug 7	100	14.88 c	100	11.67 c (18.62)	3.63 a	6.85 c (2.58)
Aug 14	100	18.80 b	100	13.33 bc (20.58)	4.35 a	9.08 bc (3.00)
Aug 21	100	20.39 b	100	16.67 bc (23.20)	3.47 a	9.63 abc (3.09)
Aug 28	100	26.01 a	100	23.33 ab (27.53)	2.15 b	11.40 abc (3.34)
Sept 4	100	27.30 a	100	28.33 a (31.01)	1.07 c	13.62ab (3.64)
Sept 11	100	28.54 a	100	31.67 a (32.82)	0.80 c	16.01 a (3.99)
$S\bar{x}$	NS	1.237	NS	2.138	0.272	0.2852

Means in a column having same letter(s) did not differ significantly at 5% by DMRT

Figures in the parentheses are transformed arc sine values for damaged leaf by flea beetle and square roots values for pod borer infestation

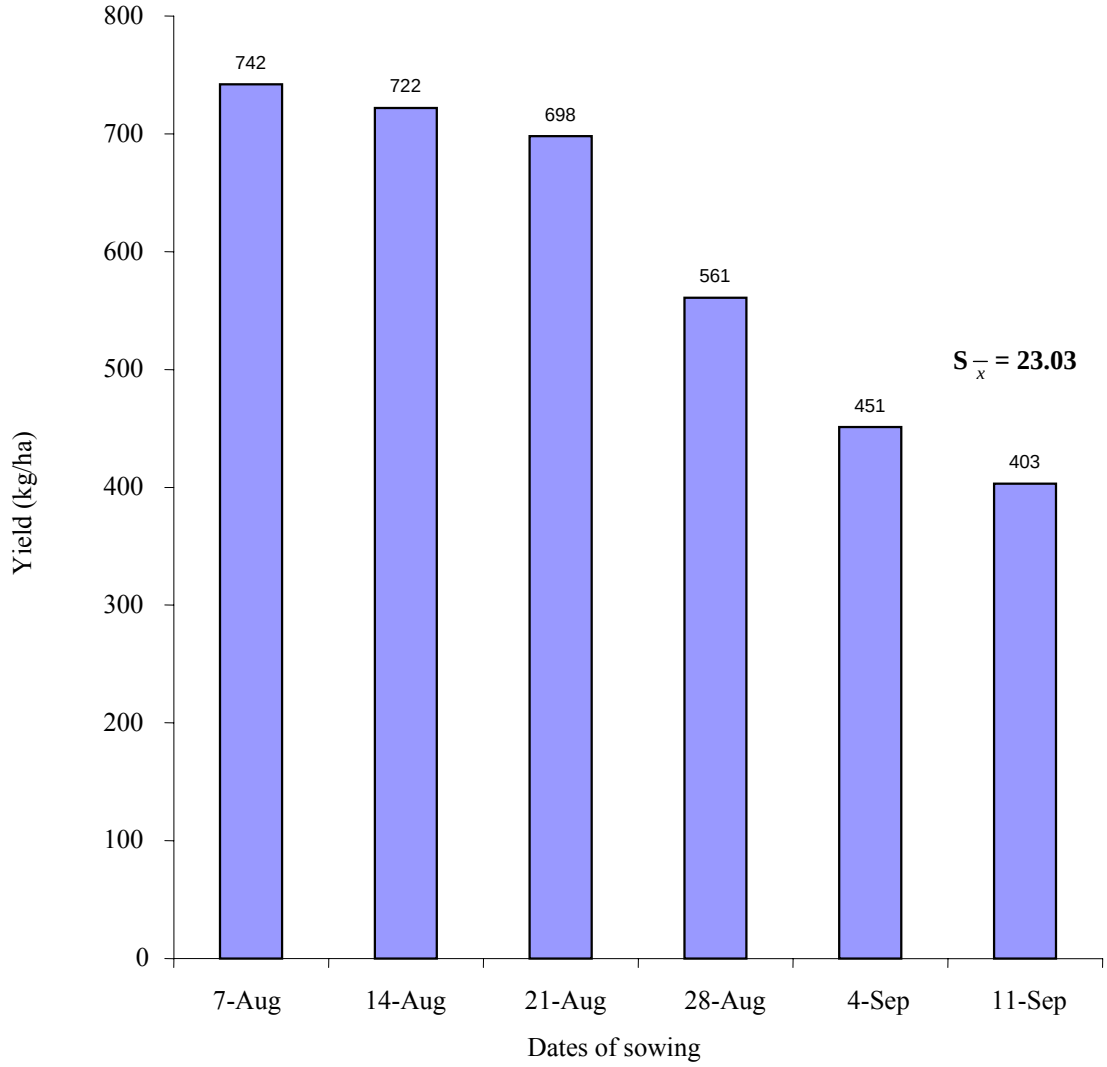

Figure 1. Yield of blackgram as influenced by different dates of sowing

REFERENCES

Arif, M. J., Gogi, M.D., Mirza, M., Zia, K. and Hafeez, F. 2006. Impact of plant spacing and abiotic factors on population dynamics of sucking insect pests of cotton. Pak. J. Biol. Sci., 9(7): 1364-1369

Bakr, M. A., M. A. Afzal, A. Hamid, M. M. Haque and M. S. Aktar. 2004. Blackgram in Bangladesh. Lentil Blackgram and Mungbean Development Pilot Project, Publication No.25, Pulses Research Centre, BARI, Gazipur, 60 p

BBS. 2005. Yearbook of Agricultural Statistics of Bangladesh. Statistics Division, Bangladesh Bureau of Statistics, Ministry of planning, Government of Peoples Republic of Bangladesh

Gomez, K.A and Gomez, A.A. 1984. Statistical procedures for Agricultural Research, Int. Rice Res. Inst. John Willy and Sons, New York, Chickester, Brisbane, Torento, Singapore, p. 643

Hussain, M. 1984. Controlling rice borers under Bangladesh conditions. Pestology, 8 (8): 28

Luckman, W.H. and R.L. Metcalf. 1978. The pest management concept. *In*: *Introduction to Insect Pest Management.* John Willey and Sons, New York, pp.3-35

Mia, M. D. 1998. Current status of insect research of pulse crops and future research needs. *In*: *Proceedings of the workshop on disease resistance breeding in pulses*. Thana cereal technology transfer and identification project, Dhaka, pp. 87-93

Nderitu, J. H., H. Y. Kayumbo and J. M. Mueke. 1990. Effect of date of sowing on beanfly infestation of the bean crop. Insect Sci. Appli. 11(1): 97-101

Prodhan, M. Z. H. 2007. Bioecology and Management of stemfly, *Ophiomyia phaseoli* (Tryon) (Diptera: Agromyzidae) on blackgram.Ph.D. Thesis. Department of Entomology, Bangladesh Agricultural University, Mymensingh.115 p.

Prodhan, M. Z. H., M. A. Maleque, K. H. Kabir, M. A. Zahid and. M. A. Hossain. 2000. Effect of sowing date and variety on the incidence of stemfly (*Ophiomyia phaseoli* Tryon) in Blackgram. Bangladesh J. Entomol. 10(1&2): 79-86

Rahman, M. M. 1991. Control measures of important insect pests of major pulses. *In*: *Advances in Pulses Research in Bangladesh*. Proc. Second National Workshop on Pulses, 6-8 June, 1989, BARI, Joydebpur, Bangladesh, pp. 139-141

Razzaque, M.A., M.A.Satter, M.S.Amin, M.A.Quiyum and M.S.Alam. 2000. Edited. *Krishi Projukti Hatboi (Handbook of Agro-technology)*, 2nd edition. Bangladesh Agricultural Research Institute, Gazipur 1701, Bangladesh. pp 90-91