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Effect of shade cast by akashmoni tree on the incidence of insects in aman rice (cv. Kalojira)

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Abstract: The performance of rice (kalojira) as understorey crop grown in association with 15 years old akashmoni was studied in respect of the prevalence of insects and its relationship with yield contributing characters in the field laboratory of the Department of Agroforestry, Bangladesh Agricultural University (BAU), Mymensingh during the period from July to December, 2015. The experiment was laid out in RCBD (Randomized Complete Block Design) with three replications taking Akashmoni as the tree component and kalojira as the test crop. Akashmoni-rice association showed high insect infestation compared to open rice field. Stem borer, plant hopper, grasshopper, leaf roller, rice bug, case worm, skipper and ear cutting caterpillar are the common harmful insects in open rice field and also in rice field with akashmoni association. Population of insect on open rice field was low than that in rice field with akashmoni association. In open rice field, the number of stem borer and rice bug was more than other species. Rice field with akashmoni tree association, the number of grass hopper was more than other species. The result also found that its insect infestation and population is high on low light intensity, low temperature and high relative humidity. Yield on akashmoni-rice association was 1.71 t/ha, which was lower than the open rice field by 22.7%. Therefore, tree species having sparse canopy which allowed easy penetration of sunlight are suitable for tree-rice agroforestry system.
Key words: Insect incidence, *Acacia auriculiformis*, shade, aman rice, Kalojira.

Introduction

Bangladesh is an agricultural country and its agriculture is predominantly rice based. The science of agroforestry is of recent origin although the practice is age old. There are numerous types of agroforestry systems in different parts of the world. Cropland agroforestry is one of the most important and widely used practice where trees are grown in and around the crop field. Various types of cropland agroforestry systems are found in the different location of Bangladesh, viz., date palm and palmyra palm based system found in Jessore and Faridpur, Jackfruit based system found in Bhawal and Madhupur Tract region of greater Dhaka, Mymensingh and Tangail districts, Babla based system in the Barind Tract and also in the high land situation of greater Kushtia and Jessore districts. Cropland agroforestry is not a traditional practice except in a few places of north-western part of Bangladesh, where tree species like Date palm, Babla, Khoir, and Palmyra palm grow naturally on agricultural lands in the higher parts of the Ganges flood plain and are intentionally retained and maintained by the farmers for different house hold utilities and products and also for earning money. There have been few studies of insect pest in agroforestry context. Scanty information is available about the insects associated with multipurpose trees and shrubs that are gaining economic importance as components of agroforestry system. Abdullah (2004) reported that, the prevalence of insects viz. plant hopper, rice bug and stem borer were high when the amount of urea is applied around 270 kg per hectare and the prevalence of insect is gradually increased with the increase of urea amount. Monayem (2004) reported that, high insect infestation of most of the major rice insect resulting the low yield of rice plant. Chakma (2008) reported severe insect infestation during flowering stage. Many factors that govern the pest situation in agroforestry are vegetational diversity, taxonomic alliance and non-taxonomic alliance, the host range of pest, biological control potential, microclimate, masking effect, barrier effects, field configuration and design, exotic plants and pests, domestication of plants, tree-crop competition for nutrition.

As the practices of cultivation of rice with akashmoni tree species is gaining popularity, the prevalence of major insects and their effects on yield is necessary to determine. Keeping this view in mind, the present research has been undertaken to determine the effect of akashmoni tree grown in the rice field on the prevalence of insect pests, and to determine the effect of shade cast by akashmoni tree on the yield and yield contributing characters of rice as influenced by the prevailing insect pests.

Materials and Methods

Experimental site and season: The experiment was conducted at the experimental farm (Plate 1), Department of Agroforestry, Bangladesh Agricultural University, Mymensingh during the August to November 2015.

Plate 1. Aman rice field under Akashmoni tree

Experimental design: The experiment was carried out in RCBD (Randomize Complete Block Design) with three replications taking akashmoni on the tree component and kalojira as the that crop. Plot having 1.0×2.0 m^2 size were selected in east, west, north and south direction of the

selected Akashmoni tree. The treatment combinations were T_0 = Without tree × Rice association(as control), T_1 = Akashmoni × Rice association (agroforestry system).

Sampling and data collection: During sampling the sampler was placed on the emerged rice plants inside the fields. The number of infested tillers, leaves and spikelet were counted by following the method. Infestation (%) = {(A ÷ B) ×100}, where, A=Number of infested tillers or spikelets or leaves, B=Number of total tillers or spikelets or leaves.

The estimation of insect infested tillers leaves and spikelets in the rice fields was carried out at different stages then average mean of four stages was taken.

Statistical analysis of the data: The collected data were computed and analyzed following the appropriate design of the experiment. Duncan's new multiple range tests were done in order to show the significant differences between the treatment mean (Zaman *et al.*, 1982).

Results and Discussion

Prevalence of rice pest (insect) in akashmoni -tree association: Eight different species of rice pests viz-stem borer (STB), case worm (CaW), plant hopper (PH), leaf roller(LR), skipper (SK), rice bug (RB), ear cutting caterpillar (ECCP) and grasshopper (GH) were observed at akashmoni-rice association (Fig. 1) Alam, (1967), observed similar type of infestation by similar insects .

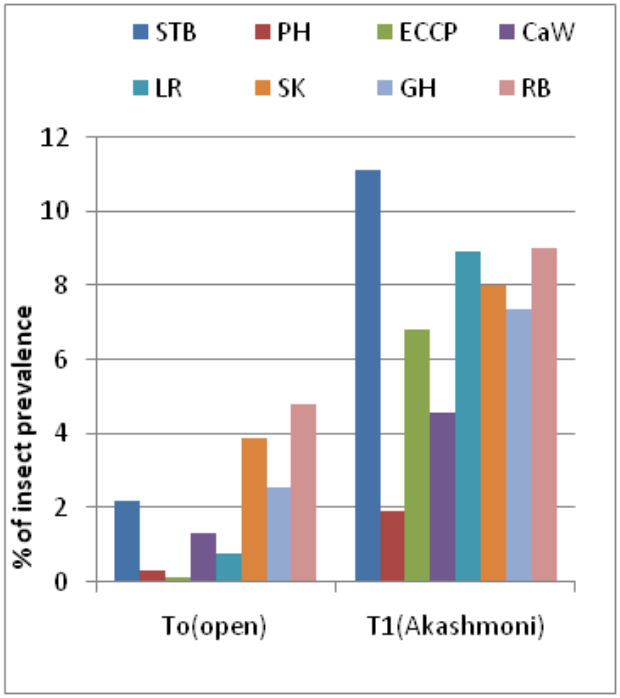

Fig. 1. Prevalence of insects between open rice field and akashmoni-rice association

Effect of temperature, relative humidity and light intensity in insect infestation and population: Light intensity in open rice field is high than that of akashmoni-rice association. For this reason insect infestation rate is high in akashmoni-rice association compare to open rice field. In open rice field, the light intensity is 1300u/mol. While this was 1025 u/mol in tree-rice association (Fig. 2) Pathak and Khan, (1994), recorded more infestation of different insects of rice at high tempaerature and relative humidity.

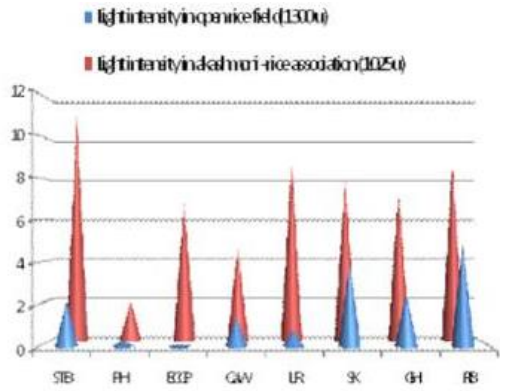

Fig. 2. Influence of light intensity on insect infestation in rice plant, here,vertical axis shows % of insect infestation

Temperature is another factor. Average temperature in open rice field and akashmoni-rice association were 31^0 and 26^0, respectively. Every insect shows their behavior high in low temperature except stem borer and rice bug. Rice bug and stem borer prefers high temperature for doing their harmful activities (Fig. 3).

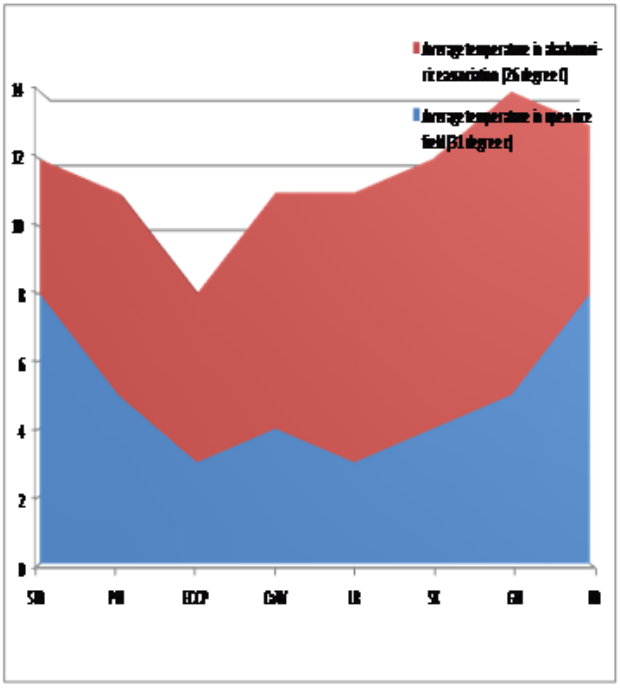

Fig. 3. Influence of temperature on insect population in rice plant, here,vertical axis shows no. of insects/5 sweeps.

Relative humidity plays a vital role for the presence and enforcement of insects. Average relative humidity in open rice field about 64% and 76% of average relative humidity was in akashmoni-rice association. 76% relative humidity prefers many insects for showing their existence without

rice bug and stem borer. Stem borer and rice bug likes comparatively low relative humidity (Fig. 4).

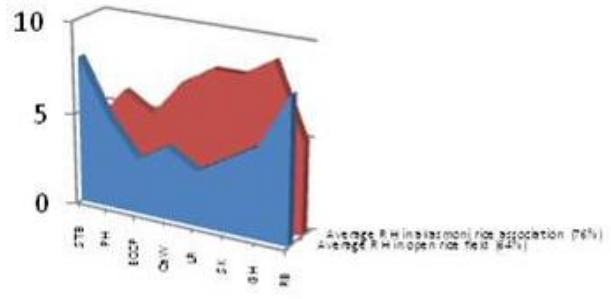

Fig. 4. Influence of relative humidity on insect population in rice plant, here,vertical axis shows no. of insects/5 sweeps.

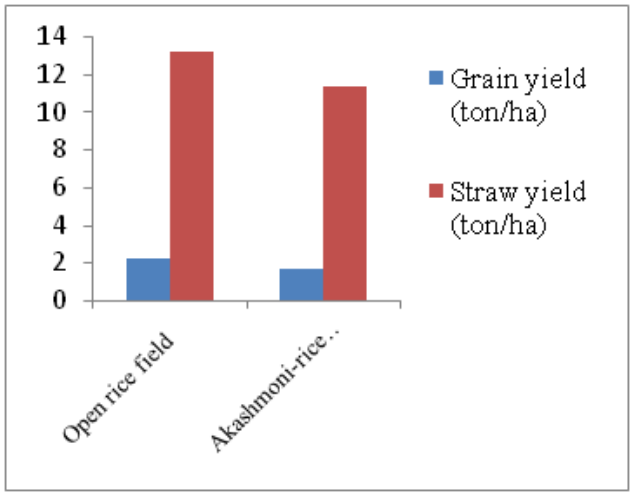

Fig. 5. Amount of yield and straw of open rice field and akashmoni-rice

Effect of insect infestation on yield and yield contributing characters of rice: A significant difference was present between open rice field and akashmoni-rice association (Fig. 5). In open rice field, yield is 2.21 ton/Acre. In akashmoni-rice association yield is 1.71 ton/ha. Yield reduction of rice under tree-rice association observed in the present study might be due to the resulting from the shading effect. Insects infestation reduce yield and yield contributing fetures of rice when produce under intercropping system (Singh et *al*., 1967; Van *et al*., 1986).

References

Abdullah, M. R. 2004. Effect of tree litter and different levels of N-fertilizers combination on yield of rice and insect prevalence. MS Thesis, Department of Agroforestry, BAU, Mymensingh, pp. 1-69.

Alam, M. Z. 1967. Insect pests of rice in East Pakistan. In: Major insect pests of the rice plants. Johnhopkins press. Baltimore; USA, pp. 643-655.

Chakma, A. 2008. Insect pests and its effects on the growth and yield of soybean plants grown under three different tree species. pp.1-51.

Monayem, A. 2004. Prevalence of insect pests in tree-rice based agroforestry system during amon season in the agroforestry farm. MS Thesis, Department of Agroforestry, BAU, Mymensingh, pp. 1-50.

Pathak, M.D. and Khan, Z.R. 1994. Insect pests of rice. Manila (Philippines) : International Rice Research Institute.89p.

Singh, M.P. and Chandra, S. 1967. Population dynamics of rice sting bug. *Leptocorisa varicomis* in relation to weather factor: Ind. J. Agric. Sci. 37 (2): 112-119.

Van Vereden, G. and Ahmadzabidi, Al. 1986. Pest of rice and their natural enemies in peninsular. Malaysia. Wageningen (Netherlands). Center for Agricultural Publishing and Documentation (Pudoc). 230 p.

Zaman, SM. S., Rahim, K. and Howlader, M. 1982. Simple lessons from Biometry. Bangladesh Rice Research Institute. Publication No. 54.