

## Abundance and incidence of pollinator visitors on different cotton varieties

H.M.S. Azad, M.R. Amin<sup>1</sup>, S.M.A. Hossain and D.A. Tithi<sup>1</sup>

Regional Cotton Research Station, Dinajpur, Bangladesh, <sup>1</sup>Department of Entomology, Hajee Mohammad Danesh Science and Technology University, Dinajpur, Bangladesh

**Abstract:** Abundance and incidence of pollinator visitors on cotton varieties CB9, CB10 and SR05 were studied under threshold sprayed of chemical insecticides and non-sprayed conditions at Regional Cotton Research Station, Dinajpur, Bangladesh. The pollinator visitors on different cotton varieties constituted 12 species of which 5 are in two families of Hymenoptera, 5 are in two families of Lepidoptera and 2 in two families of Diptera. The major pollinator honeybee and bumblebee incidence were statistically similar on the studied cotton varieties both in threshold sprayed and non-sprayed condition.

**Key words:** Abundance, incidence, cotton, pollinator, variety.

### Introduction

Pollination is the transfer of pollen grains in flower is mainly provided by bees, butterflies, beetles and many other wild life species (Van der Stern, 1994). Cotton flowers contain valuable resources for insects (Mailhot *et al.*, 2007) and attract more than 600 insect and spider species in the field (Hoffmann and Frodsham, 1993). The flower blooms in the morning and possessed cream-coloured. The flowers turn in pink colour in the afternoon and close at night and never to reopen (Van Deynze, 2005). The flower is preferred by Hymenopteran, Lepidopteran and Dipterans with short and long mouthparts. Mainly *Apis mellifera* L. has been useful for increasing crop production around the world (Allen-Wardell *et al.*, 1998). However, wild pollinators may provide higher pollination services than *A. mellifera*, without incurring economic costs (Kremen *et al.*, 2002; Olschewski *et al.*, 2006). Pollinators play a great role on fruit and seed production which depend on the population dynamics of the pollinator species, pollination efficiency of different pollinator species, competition between cultivated and wild plants for pollinators etc (Kevan, 1999). Currently, insect pollinators are disappearing at alarming rates due to the environmental disruption caused by abuse of pesticides. Therefore, this study was taken into account to know the present status of insect pollinators associated with three cotton varieties.

### Materials and Methods

The experiment was conducted in the Regional Cotton Research Station, Dinajpur, Bangladesh during August to November, 2008. The land was prepared at field condition by deep ploughing and harrowing followed by laddering. The field layout was done after final land preparation and the experiment was conducted in randomized complete

block design. The plot size was 5.4 m × 5.0 m and the spacing between block to block and plot to plot was 1.5 and 1.0 m respectively. Seeds of CB9, CB10 and SR05 varieties were sown in rows on 3<sup>rd</sup> August with a spacing 45 cm from plant to plant and 90 cm from row to row. Each variety was cultivated following ETL based insecticide sprayed and non-sprayed conditions following three replications. Intercultural operations such as mulching, weeding and irrigation etc were done whenever necessary and fertilizers were applied according to the recommended doses of Cotton Development Board of Bangladesh. In the ETL based plots, Decis 2.5 EC, Ripcord 10 EC and Relothrin 25 EC were sprayed following their recommended doses for controlling chewing insects. Whereas Asataf 75 SP, Imitaf 20 SL and Actara 25 WG were applied for controlling sucking pests. Pollinator abundance was recorded by weekly observation of the plots. Incidence of the major pollinators was estimated by weekly scouting. In each scouting 5 plants were randomly selected from each replication. Plants were examined for honey bee and bumblebee. A scouting form was used during estimation of the incidence. Data of the major pollinator incidence were analyzed by analysis of variance (ANOVA) and the mean values were separated by Duncan's Multiple Range Test (DMRT).

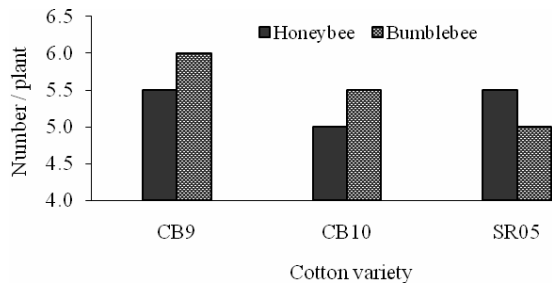
### Results and Discussion

Insects of three orders viz. Hymenoptera, Lepidoptera and Diptera were abundant during the blooming season (Table 1). The Hymenoptera constituted five species of pollinators and there were five species of Lepidopteran pollinators. The Dipteran pollinators constituted two species belonged to two genus.

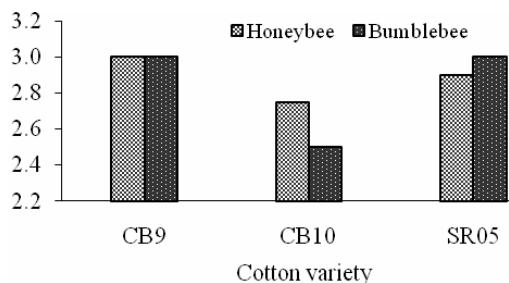
**Table 1.** Pollinator visitors in ETL based insecticide sprayed cotton field during the season

Pollinator	Order	Family	Genus	Species
Honeybee	Hymenoptera	Apidae	<i>Apis</i>	<i>Apis floreae</i> , <i>Apis cerana indica</i>
Bumblebee	Hymenoptera	Apidae	<i>Bombus</i>	<i>Bombus ignitus</i>
	Hymenoptera	Halticidae	<i>Halticus</i>	<i>Halticus sp</i>
Alkalibee	Hymenoptera	Halticidae	<i>Nomia</i>	<i>Nomia melanderi</i>
Lemon butterfly	Lepidoptera	Papilionidae	<i>Papilio</i>	<i>Papilio demoleus</i>
Sulphur butterfly	Lepidoptera	Pieridae	<i>Pieris</i>	<i>Pieris spp</i>
Lady's finger shoot and fruit borer	Lepidoptera	Noctuidae	<i>Earias</i>	<i>Earias vitella</i>
Hover fly	Diptera	Syrphidae	<i>Eristalis</i>	<i>Eristalis spp</i>
House fly	Diptera	Muscidae	<i>Musca</i>	<i>Musca spp</i>

The pollinator honey bee and bumblebee were most abundant in the field. Their incidence presented in fig. 1. Results show that the incidence of honeybee varied from 5.10 to 5.60 and bumblebee from 4.91 to 5.80 / plant and the cotton varieties did not show significant effect on their incidence.



**Fig. 1.** Incidence of major pollinator visitors on different varieties in insecticide free cotton field during the season. Bars with common letter (s) are not significantly different (DMRT,  $p \leq 0.05$ )



**Fig. 2.** Incidence of major pollinator visitors on different varieties in ETL based insecticide sprayed cotton field during the season. Bars with common letter (s) are not significantly different (DMRT,  $p \leq 0.05$ )

Fig. 2 shows honey bee and bumblebee incidence on different cotton varieties under ETL based insecticide sprayed condition. Honey bees incidence was found from 2.75 to 3.1 and bumblebees from 2.60 to 3.10 / plant, and the cotton varieties did not show significant effect on their incidence. This study showed that two species of honeybees were found in the cotton field. Whereas, in various parts of India, honeybee species *A. dorsata*, *A. cerana*, *A. florea* and *A. mellifera* are the most effective pollinators (Chandel *et al.*, 2004). There are over 100 species of bumblebees are distributed in Asia (Kwon *et al.*, 2003). In this study only one species of bumblebee was found in the cotton field. Variation in pollinator composition among populations of the same plant seems to be the rule in nature (Thompson, 2001; Eckert, 2002). Kumer *et al.* (1989) stated that pollinator attraction towards crops varied with the type and variety of crops. Dipterans are the most common insects that visit flowers.

At least 71 Dipteran families contain pollinators (Larson *et al.*, 2001). This study showed that only hover fly and house fly were the most common Dipterans in the cotton field. Hoverflies are vital pollinator of crops (Bohart *et al.*, 1970) were found in this study. Results of this study showed that cultivated varieties did not affect the incidence of pollinators both in ETL based insecticide sprayed and non-sprayed conditions. However, the incidence was lower in ETL based insecticide sprayed field compared to non-sprayed field, and the species abundance was alarming compared to world perspective.

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