

INSECT POLLINATORS OF LITCHI (*LITCHI CHINENSIS*) FROM DISTRICT HARIPUR, PAKISTAN

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ABSTRACT:- Insect pollinator fauna in litchi orchards from three localities of district Haripur was studied. Insect collections were made from mid March to mid May, 2012. During collection, 494 insects were collected which yielded 20 species under 16 genera of eight families belonging to orders Diptera and Hymenoptera. Family Calliphoridae, Muscidae, Sarcophagidae and Syrphidae, represented the order Diptera, while families, Andrenidae, Apidae, Halictidae and Vespidae belonged to order Hymenoptera.

Key Words: Litchi; Insect Pollinators; Species; Fauna; Identification; Pakistan.

INTRODUCTION

Litchi belongs to family Sapindaceae, is a tropical tree renowned for its delicious fruits. For good yield it requires cool dry winters and warm wet summers (Menzel, 2001; Lemmer, 2002). Litchi is a cross pollinated plant and self-pollination may also occur. Insects are the basic agents for the transfer of pollen and generally considered best to obtain a good and profitable production (Badiyala and Garg, 1990; DuToit, 1994; Menzel and Waite, 2005).

Litchi flowers are visited by variety of insects including Coleoptera, Hemiptera, Homoptera and Lepidoptera; however, honey bees, flies, ants and wasps are important floral visitors (Chaturvedi, 1965). Pandey and Yadava (1970) found that *Apis* and *Melipona* spp. represent 98-99% of the all visitors of litchi, but *Apis*

mellifera plays leading role and recognized as the principal pollinator (McGregor, 1976; Vithanage and Ironside, 1986; Vithanage, 1986).

Haripur District is one of the renowned city of the Hazara Division in Pakistan. It is located 65 km north of Islamabad at an altitude of 520 m. It has latitude 33° 44' - 34° 22' and longitude 72° 35' - 73° 15'. Haripur is a green valley, wealthy in fruits and vegetables. It is famous for its guavas, red blood oranges, litchi etc. Khanpur one of the main areas of Haripur is recognized for its red blood oranges and litchi. Litchi has four varieties grown namely Gola, Surahi, Bedana and China. Haripur has 1,294 acres of fruit orchards and litchi orchards alone are spread over 100 acres.

As per review no study has been carried out on the insect pollinators of litchi in Pakistan. Keeping in view the importance of pollination in litchi,

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there is great need to explore the insect fauna of litchi from district Haripur, Khyber Pakhtunkhwa.

MATERIALS AND METHOD

The study was conducted within the vicinities of Haripur i.e., Khanpur, Pind Gakhar and Sikandar Pur. Insect pollinators were collected with the help of hand net during the flowering season of litchi from mid March to mid May, 2012. Bowl trap method was also used for the collection of insect pollinators. White, florescent blue and yellow coloured bowls were placed to attract bees and other insects. Water was used with soap to fill the bowls (soap is used to break the surface tension of the bee's tarsus when they land). At each sampling location 24 bowl traps (8 of each colour) were placed 5m apart in a transect, and the colors alternated throughout the transect.

Collected insects were brought to the laboratory of National Insect Museum (NIM), NARC, Islamabad. Specimens were identified with the help of stereoscope by running them through identification keys in addition to color plates and bee reference collection housed at NIM.

RESULTS AND DISCUSSION

Among 494 collected specimens, 20 species were identified, which are arranged in 16 genera and ten subfamilies i.e., I) Milesiinae ii) Syrphinae iii) Lucilinae iv) Muscinae v) Sarcophaginae vi) Apinae vii) Andreninae viii) Vespinae ix) Halictinae and x) Eumeninae. Their details are as follow:

Order Diptera

Family Syrphidae

Genus *Eristalis* Latreille, 1804

1. *Eristalis tenax* Linnaeus, 1758

Material Examined

Haripur, Sikandar Pur, 02-iv-12, 6♀, 4♂, Shahid, ex NIM; Pind Gakhar, 3♀, 2♂, 15-iv-12, Shahid, ex NIM.

Distribution

This species was reported from Mansehra by Ishaq (1999) from different plants i.e. wild flowers, rice, wheat, pine; Arif (2001) from Faisalabad; Saleem et al. (2001) from Peshawar and Sajjad et al. (2010) from Multan. This species was previously reported from Australia, China, Europe, India, Japan, Malaya Peninsula, Siberia, South Asia, and Sri Lanka, (Brunetti, 1923). Cosmopolitan except Antarctica, highest latitudes in the North (Metcalf 1913), United States (Milne and Milne, 1980).

2. *Eristalis arvorum* Fabricius, 1787

Material Examined

Haripur, Sikandar Pur, 06-iv-12, 1♀, Shahid, ex NIM; Pind Gakhar, 2♀, 2♂, 07-iv-12, Shahid, ex NIM; Khanpur, 26-iv-12, 2♀, 4♂, Shahid, ex NIM.

Distribution

This species was reported from China, India, Kashmir, North Africa, North Persia, Pakistan, and Siberia. It occurs probably in all parts of Oriental region (Brunetti, 1923).

3. *Eristalis solitus* Walker, 1849

Material Examined

Haripur, Sikandar Pur, 01-iv-12, 1♀, 2♂, Shahid, ex NIM; Pind Gakhar, 08-iv-12, 5♀, 4♂, Shahid, ex NIM;

Khanpur, 15-iv-12, 1♀, Shahid, ex NIM.

Distribution

This species was reported from China, India, Japan, Myanmar, and West (Brunetti, 1923). Common in the Himalayan region.

Genus *Episyrphus*

(Matsumura Adachi, 1917)

1. *Episyrphus balteatus* DeGeer, 1776

Material Examined

Haripur, Sikandar Pur, 15-iv-12, 8♀, 8♂, ex NIM; Pind Gakhar, 15-iv-12, 15♂, 9♀, Shahid, ex NIM; Khanpur, 15-iv-12, 5♂, 4♀, Shahid, ex NIM.

Distribution

Its distribution includes Asia, Canaries, Europe, Japan, Madeira, and North Africa (Brunetti, 1923). This species is present in abundance in the Oriental region of world, also in countries of Asia (India, Pakistan and Kashmir) and Europe. Also reported from Iran and Turkey (Dousti and Hayat, 2006; Hayat and Alaoglu, 1990).

Genus *Eupeodes*

(Osten Sacken, 1877)

1. *Eupeodes corollae* Fabricus, 1794

Material Examined

Haripur, Sikandar Pur, 22-iv-12, 9♂, 11♀, Shahid, ex NIM; Pind Gakhar, 15-iv-12, 10♂, 13♀, Shahid, ex NIM; Khanpur, 22-iv-12, 9♂, 9♀, Shahid, ex NIM.

Distribution

This species was previously reported from the Mediterranean, Africa including South Africa, most of the parts of Europe and also from Russia, Japan and China. *E. corollae* is a migratory species (Speight, 2006)

also reported from Iran (Dousti and Hayat, 2006) and Turkey (Hayat and Alaoglu, 1990). Sajjad et al. (2010) studied seasonal variation in abundance and composition of *E. corollae* communities in Multan (Pakistan).

2. *Eupeodes confrater* Wiedemann, 1830

Material Examined

Haripur, Sikandar Pur, 01-iv-12, 10♂, 7♀, Shahid, ex NIM; Pind Gakhar, 08-iv-12, 1♀, Shahid, ex NIM; Khanpur, 15-iv-12, 12♂, 8♀, Shahid, ex NIM.

Distribution

Widely distributed species throughout Afghanistan, China, India, Pakistan, and Sri Lanka, (Brunetti, 1923).

Genus *Sphaerophoria* Lepeletier & Serville

1. *Sphaerophoria indiana* Bigot, 1881

Material Examined

Haripur, Pind Gakhar, 29-iv-12, 3♂, 4♀, Shahid, ex NIM; Khanpur, 06-v-12, 1♂, 2♀, Shahid, ex NIM.

Distribution

Widely distributed in Pakistan also throughout Afghanistan, China, India, Nepal, and Sri Lanka (Brunetti, 1923).

**Genus *Melanostoma* Wiedemann
Melanostoma orientale
Wiedemann, 1824**

Material Examined

Haripur, Sikandar Pur, 06-v-12, 6♂, 4♀, Shahid, ex NIM; Pind Gakhar, 22-iv-12, 2♂, 2♀, Shahid, ex NIM; Khanpur, 15-iv-12, 10♂, 5♀, Shahid, ex NIM.

Distribution

Already reported from Assam, Bengal, Bhutan, Darjeeling, Naini, Peshawar and Shimla. Apparently the commonest and most broadly spread species in the world's East, in the plains and hilly areas throughout the warm weathers (Brunetti, 1923).

Genus Ischiodon (Sack, 1913)
***Ischiodon scutellaris* Fabricius, 1805**

Material Examined

Haripur, Pind Gakhar, 08-iv-12, 1♀, 2♂, Shahid, ex NIM.

Distribution

Previously reported from India and Northern Africa (Brunetti, 1923). While in Pakistan also considered as widespread and already reported by Sajjad and Saeed (2010) from Southern Punjab, while in another study Sajjad et al. (2010) have reported that *I. scutellaris* visited nearly 37 plant species in Multan.

Family Muscidae
Genus Musca (Linnaeus, 1758)

1. *Musca domestica* Linnaeus, 1758

Material Examined

Haripur, Sikandar Pur, 01-iv-12, 4♀, Shahid, ex NIM; Pind Gakhar, 01-iv-12, 3♂, 7♀, Shahid, ex NIM; Khanpur, 15-iv-12, 4♂, 8♀, Shahid, ex NIM.

Distribution

M. domestica is a species of worldwide distribution, originated on the extensive plains in Southern Russia of central Asia, while now present on all continents, in all climates ranging from tropical to temperate. In Pakistan this species is present both in rural and urban environments (Smith, 1986; Ferreira

and Lacerda, 1993).

Family Sarcophagidae
Genus Sarcophaga Meigen, 1826

1. *Sarcophaga* sp.

Material Examined

Haripur, Pind Gakhar, 08-iv-12, 2♀, Shahid, ex NIM; Khanpur, 22-iv-12, 1♂, Shahid, ex NIM.

Distribution

This genus was previously reported from Faisalabad (Shazia et al., 2006).

Family Calliphoridae
Genus Lucilia (Robineau, 1830)

1. *Lucilia sericata* Meigen, 1826

Material Examined

Haripur, Sikandar Pur, 29-iv-12, 5♀, 4♂, Shahid, ex NIM; Pind Gakhar, 15-iv-12, 2♀, 4♂, Shahid, ex NIM; Khanpur, 06-v-12, 8♀, 8♂, Shahid, ex NIM.

Distribution

It is found throughout the world, (Rueda et al., 2010). In Pakistan present on all populated areas in variety of climates from tropical to temperate regions.

Order Hymenoptera
Family Apidae
Genus Bombus (Latreille, 1802)

1. *Bombus haemorrhoidalis* Smith, 1852

Material Examined

Haripur, Pind Gakhar, 13-v-12, 3♀, 4♂, Shahid, ex NIM; Khanpur, 13-v-12, 3♀, 1♂, Shahid, ex NIM.

Distribution

Widely distributed species in Bengal, Bhutan, Himachal Pradesh, Kashmir, Myanmar, Nepal, Pakistan,

Sikkim, Thailand, Tibet, Uttaranchal, and Vietnam (Brunetti, 1923).

Genus *Apis* (Linnaeus, 1767)

1. *Apis cerana* Fabricius, 1793

Material Examined

Haripur, Sikandar Pur, 01-iv-12, 10♀, 9♂, Shahid, ex NIM; Pind Gakhar, 01-iv-12, 9♀, 12♂, Shahid, ex NIM; Khanpur, 13-v-12, 15♀, 10♂, Shahid, ex NIM.

Distribution

Formerly named as *Apis indica*. *A. cerana* is widely distributed throughout Asia including Afghanistan, China, Iran, India, Japan, Pakistan, and Sri Lanka. It is found throughout the tropical, sub-tropical and temperate zones of Asia. It is found further North in the Southern USSR and China, throughout Korea to Japan (Ruttner, 1988).

2. *Apis dorsata* Fabricius, 1793

Material Examined

Haripur, Sikandar Pur, 15-iv-12, 2♀, 4♂, Shahid, ex NIM; Pind Gakhar, 22-iv-12, 8♀, 4♂, Shahid, ex NIM; Khanpur, 08-iv-12, 2♀, 4♂, Shahid, ex NIM.

Distribution

In Asia it occurs from Pakistan, Southern Afghanistan the Indian sub-continent in the west and Sri Lanka to Indonesia in the east. Its north-south distribution ranges from Indonesia to southern part of China (Abrol, 2006). In the mountainous Hindu Kush Himalayan region *Apis dorsata* is the most frequent flower visitor (Chandel et al., 2004).

3. *Apis mellifera* Linnaeus, 1758

Material Examined

Haripur, Sikandar Pur, 06-v-12, 6♀, 15♂, Shahid, ex NIM; Pind Gakhar, 29-

iv-12, 8♀, 5♂, Shahid, ex NIM; Khanpur, 08-iv-12, 5♀, 6♂, Shahid, ex NIM.

Distribution

Cosmopolitan species present throughout Asia, Europe, Africa, North and South America and Arctic (Cocker, 2003) while also reported in Pakistan (Ahmad, 1987). *A. mellifera* is considered as one of the most significant flower pollinator in the range of Hindu Kush Himalaya (Chandel et al., 2004), while it is poorly represented in the areas of plains of Punjab (Pakistan). It was previously reported as a significant pollinator of the cucumber (Sarwar et al., 2008), canola and black seed (Munawar et al., 2009 a&b).

Family Andrenidae

Genus *Andrena* Fabricius, 1775

1. *Andrena* sp.

Material Examined

Haripur, Sikandar Pur, 15-iv-12, 1♀, Shahid, ex NIM; Pind Gakhar, 26-iv-12, 1♂, Shahid, ex NIM.

During present study 03 specimens were collected from two localities.

Distribution

The Andrenidae family is present in all continents but absent in Australia. it is distributed in Holarctic, Western hemisphere, Okinawa, Taiwan, southern and eastern Africa, Asia including mountains of southern India and Malaysia (Michener, 2007); Pakistan (Bibi, 1984; Gupta, 2003; Hussain, 2010). From Pakistan only single species, *A. retngleiculate* was reported few years ago from Peshawar by Bibi (1984), while Gupta (2003) described 19 species from Pakistan and Hussain et al. (2010) reported

Andrena harrietae and *A. anonyma* from Skardu.

Family Halictidae

Genus *Lassioglossum* Curtis, 1833

1. *Lassioglossum* sp.

Material Examined

Haripur, Khanpur, 13-v-12, 1 ♀, Shahid, ex NIM.

During present study only one specimen was collected from Khanpur.

Distribution

Its distribution range includes Palearctic, Oriental, Africa and Australia (Michener, 2007). While Ascher and Rasmussen (2010) reported 21 species of this genus from Pakistan but without describing any reference and locality.

Genus *Vespa* (Linnaeus, 1758)

1. *Vespa velutina* Lepeletier, 1836

Material Examined

Haripur, Sikandar Pur, 06-v-12, 8 ♀, 4 ♂, Shahid, ex NIM; Pind Gakhar, 29-iv-12, 2 ♀, 3 ♂, Shahid, ex NIM; Khanpur, 22-iv-12, 2 ♀, Shahid, ex NIM.

Distribution

Well distributed in Southeast Asia, reported from some areas of Iran (Abbasi et al., 2006). While it is also distributed in some other countries of Asia including Assam (India), Myanmar, Sumatra, Malaysia, Southern areas of China, Taiwan, Northern parts of Thailand and Indonesia (Lien and Carpenter, 2002). Aziz (2008) reported this species for the first time from Khyber Pakhtunkhwa.

2. *Vespa orientalis* Linnaeus, 1771

Material Examined

Haripur, Sikandar Pur, 02-iv-12, 1 ♀, 3 ♂, Shahid, ex NIM; Pind Gakhar, 02-iv-12, 4 ♀, Shahid, ex NIM; Khanpur, 13-v-12, 6 ♀, 5 ♂, Shahid, ex NIM.

Distribution

Broadly distributed in some European countries like Albania, Bulgaria, Cyprus, Greece, Italy, Malta, Romania, Russia, Turkey and in some Asian countries including Afghanistan, China, India, Iran, Nepal, Pakistan, Tajikistan, Turkmenistan, Uzbekistan, and some middle east countries like Bahrain, Iraq, Israel, Jordan, Lebanon, Oman, Saudi Arabia, Syria, United Arab Emirates, Yemen and also widely present in some African countries Algeria, Egypt, Ethiopia, Libya, and Somalia (Carpenter and Kojima, 1997). Archer (1989) already reported *V. orientalis* from different areas of Pakistan. Aziz (2008) has reported this species from Abbotabad, Azad Jammu and Kashmir, Hajjira, Islamabad, Kohat, Kohistan, Mansehra, Mardan, Peshawar, Quetta, Rawalakot, and also from Northern areas (Chillas, Gilgit) in Pakistan.

3. *Vespa tropica* Linnaeus, 1758

Material Examined

Haripur, Pind Gakhar, 01-iv-12, 4 ♀, Shahid, ex NIM; Khanpur, 05-iv-12, 5 ♀, 1 ♂, Shahid, ex NIM.

Distribution

Widely distributed hornet in much of tropical Asian countries. A widely distributed species in Indian sub-continent including Pakistan,

China, Malaysia, Indonesia (Bequaert, 1928). This species is widely distributed in the Indo-Malayan and Papuan regions, from Afghanistan to New Guinea and its adjacent islands including New Britain.

Genus *Vespula* Thomson
***Vespula germanica* Fabricius,**
1793

Material Examined

Haripur, Sikandar Pur, 06-v-12, 1♀, Shahid, ex NIM.

Distribution

Afghanistan, Albania, Armenia, Austria, Bulgaria, China, Germany, Georgia, India, Iran, Israel, Kashmir, Kazakhstan, Mongolia, Norway, Pakistan, Romania, Switzerland, Sweden, Syria, Tajikistan, Turkey, Turkmenistan, and Uzbekistan (Carpenter and Kojima 1997). Archer (1989) previously described and reported this species from different localities of Pakistan i.e., Abbottabad, Chillas, Diamer, Dir, Gilgit, Hunza, Mansehra, Passu, Swat, and Sost, this species was reported by Aziz (2008).

Genus *Ancistrocerus* (Wesmael,
1836)

1. *Ancistrocerus trifasciatus*
Muller, 1776

Material Examined

Haripur, Pind Gakhar, 01-iv-12, 6♀, Shahid, ex NIM; Sikandar Pur, 05-iv-12, 3♂, Shahid, ex NIM.

Distribution

It is widely distributed species in the Palearctic region, present across Asia from Pakistan to Mongolia and throughout Europe in the west (Vecht and Fischer, 1972).

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