

SEASONAL ABUNDANCE OF *MYZUS PERSICAE* (SULZER) AND ITS ASSOCIATION WITH FOOD PLANTS AND NATURAL ENEMIES IN NORTHEAST BIHAR

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ABSTRACT

Myzus persicae (Sulzer) is a most common polyphagous pest in northeast Bihar and was recorded on more than 25 species of food plants of 17 genera belonging to 8 families. Highly infested food plants were *Beta vulgaris* L., *Brassica rapa* var. *campestris* (L.), *B. oleracea* var. *botrytis* Linn., *B. oleracea* var. *capitata* Linn., *Lycopersicon esculentum* Mill., *Nicotiana tabaccum* Linn., *Nicotiana* sp., *Solanum melongena* L. and *Spinacia oleracea* L.. The most suffered family was Brassicaceae. *M. persicae* was found to be parasitoids viz., *Aphelinus gossypii* Timberlake, *Aphidius colemani* Vierek, *Binodoxis indicus* (Subba Rao and Sharma), *Diaretiella rapae* (McIntoch) and *Lipolexis oregmae* Ghan in the target area. Among of these *A. gossypii*, *B. indicus* and *L. oregmae* were found abundantly with high parasitisation rate was always observed when *M. persicae* infests *Calendula* sp., *Ganaphalium* sp., *Raphanus sativus* L., *Rumex* sp., *Solanum melongena* L. and *Withenia* sp. Only one hyperparasitoid *Alloxysta pleuralis* was recorded on *A. gossypii* and *B. indicus*. Several new host associations are also observed in the present study.

Key words: *Myzus persicae*, Aphid, Parasitoid and Hyperparasitoid.

INTRODUCTION

M. persicae is a small soft bodied polyphagous pest. It is the most significant pest of agricultural, horticultural as well as weeds plant, causing decreased growth, shriveling of the leaves and the death of various tissues. It is also hazardous because it acts as a vector for the transport of plant viruses, such as potato virus Y and potato leaf roll virus to members of the nightshade/potato family Solanaceae and various mosaic viruses to many other food crops (John, 2005). It is found all over the world, although it is less tolerant of climates and overwinters. Its reproductive potential is immense due to parthenogenesis.

Northeast Bihar has rich agricultural lands where farmers face a lot of problems due to heavy infestation of crops by aphids. Most of them are serious pests of the crops in this area. Thus extensive survey of the aphids along with their food plants in different seasons and their natural enemies are essential to understand their relationships or the effective control of economically important of aphid host.

Keeping in view, the importance of biotaxonomy and ecology in different localities of district of Northeast Bihar, viz., Araria, Begusarai, Bhagalpur, Darbhanga, Katihar, Kisanganj, Khagaria, Lakkhisarai, Madhepura, Munger and Purnea were extensively and

intensively surveyed in different seasons to obtain the records of aphid and their food plants, habitats, parasitoids and hyperparasitoids. In the present paper deals the association of *M. persicae* with food plants and their natural enemies is discussed in detail.

MATERIALS AND METHODS

M. persicae have been collected both directly from different parts of plants infested with aphids were cut and placed in a plastic bags tightened with rubber bands and transported to the laboratory. Some aphids were preserved in massed glass vials containing 70% ethanol and glycerine (5:1) for taxonomical studies and rest of alive or mummified aphids kept in BOD incubator at 22°C for the emergence of the parasitoid/hyperparasitoid. The aphids were identified with the help of Aphid Taxa Key CD-ROM developed by CAB London. Taxonomical characters provided by Blackman & Eastop (2000) and Raychaudhuri (1980) and the parasitoids were identified following Stary and Ghosh (1993).

RESULTS AND DISCUSSIONS

M. persicae is a most common polyphagous aphid in the target area and found abundantly in most of localities. It was recorded on more than 25 species of food plants of 17 genera belonging to 8 families viz., Amaranthaceae, Asteraceae, Brassicaceae, Chenopodiaceae, Fabaceae, Papaveraceae, Rutaceae, Solanaceae (Table-1). The intensity of infestation varied in different localities even on same food plants (Table-1). Highly infested food plants were *Beta vulgaris* L., *Brassica rapa* var. *campestris* (L.), *B. oleracea* var. *botrytis* Linn., *B. oleracea* var. *capitata* Linn., *Lycopersicon esculentum* Mill., *Nicotina tabaccum* Linn., *Nicotina* sp., *Solanum melongena* L., and *Spinacia oleracea* L.. The most suffered family was Brassicaceae (Table-1). Earlier, only few food plants were recorded as host of *M. persicae* by Ahmad & Singh (1997) in the target area. *Argemone mexicana*, *Calendulla* sp. are recorded as new host plants from India.

Most of the host plants are recorded first time from Bihar (Table-1).

The seasonal collection data reveals that *M. persicae* is generally found during month of December to April. However, its peak population was observed in the month of February and March.

Parasitoids :

In the present study 9 species of aphid parasitoid were recorded in the target area. Among of these 5 species of parasitoid were recorded on *M. persicae* (Table-2). One species belong to family Aphelinidae viz., *Aphelinus gossypii* Timberlake and 4 species belong to family Aphidiidae viz., *Aphidius colemani* Vierek, *Binodoxis indicus* (Subba Rao & Sharma), *Diaretiella rapae* (McIntosh) and *Lipolexis oregmae* Ghan in target area. The high extent of parasitism varied with the food plants (Table-2). *A. gossypii* was observed during August to September. Rest parasitoids were observed during December to March. Most of the host association of these parasitoids are recorded first time from Bihar. *A. gossypii* on *Aphis gossypii*, *A. colemani* on *M. persicae*, *B. indicus* on *Aphis craccivora*, *Aphis gossypii*, *Aphis nausturtii* and *Aphis nerii* and *L. oregmae* on *A. gossypii* and *A. nausturtii* were earlier recorded on few food plants from the Bihar by Ahmad & Singh (1996)

Hyperparasitoid :

Only 2 species of hyperparasitoids were recorded in this area. Only one species of hyperparasitoid *Alloxysta pleuralis* (Cameron) was recorded on *A. gossypii* and *B. indicus* parasitoids for *M. persicae*. The very high intensity of hyperparasitism was recorded on *B. indicus* (Table-2). It was recorded during December to March. Its high population was observed during December to January. Some workers viz., Ahmad & Kumar (2007); Ahmad & Parween (2009) and Ahmad et al., (2009) reported *A. pleuralis* on *B. indicus* and *L. oregmae* on *A. craccivora* and *A. gossypii* in the target area.

Table 1: Records of *M. persicae* with their food plants and degree of infestation from Northeast Bihar

Food plants/family	Site of infestation	Degree of Infestation	Month of collection
<i>Argemone mexicana</i> * Linn. Papaveraceae)	Stem, leaves & flowers	+	Feb - Mar.
<i>Beta vulgaris</i> L. (Brassicaceae)	Old & new leaves	++++	Feb. - Mar.
<i>Brassica rapa</i> var. <i>campestris</i> (L.) (Brassicaceae)	Stem, leaves Inflorescence & fruit	++++	Dec. - Feb
<i>Brassica oleracea</i> var. <i>botrytis</i> Linn. (Brassicaceae)	Lower surface of old & new leaves	++++	Feb. – Mar.
<i>Brassica oleracea</i> var. <i>capitata</i> Linn. (Brassicaceae)	Old & new leaves	+++	Feb. - Mar.
<i>Brassica nigra</i> L. (Brassicaceae)	Old & new leaves	++	Feb. - Mar.
<i>Calendula</i> sp.* (Asteraceae)	Leaves & flowers	+++	Feb. - Mar.
<i>Carthamus tinctorius</i> L. Asteraceae)	New leaves	+	Feb. - Mar.
<i>Chenopodium album</i> L. (Chenopodiaceae)	Lower surface of leaves	+	Feb. - Mar.
<i>Citrus</i> sp. (Rutaceae)	Leaves	++	Feb. - Mar.
<i>Datura stramonium</i> L. (Solanaceae)	Lower surface of leaves	++	Jan. - Feb.
<i>Eschscholzia californica</i> Cham.(Asteraceae)	Leaves & flower	+	Feb. – Mar.
<i>Gnaphalium</i> sp. (Asteraceae)	Leaves & flower	+++	Feb. – Mar.
<i>Lycopersicon esculentum</i> Mill. (Solanaceae)	Stem, leaves & flower	++++	Jan. – Mar.
<i>Nicotiana tabacum</i> Linn. (Solanaceae)	Whole parts of shoot	++++	Feb. - Mar.
<i>Nicotiana</i> sp. (Solanaceae)	Stem, leaves & flowers	++++	Mar.
<i>Pisum sativum</i> Linn. (Fabaceae)	Stem & leaves	+++	Feb. - Mar.
<i>Raphanus sativus</i> L. (Brassicaceae)	Old & new leaves	+++	Dec. - Feb.
<i>Rumex</i> sp. (Poligoniaceae)	Lower surface of leaves	++++	Jan. - April.
<i>Solanum melongena</i> L. (Solanaceae)	Whole parts of shoot	++++	Feb. - Mar.
<i>Solanum nigrum</i> Linn. (Solanaceae)	Leaves	+	April.
<i>Solanum tuberosum</i> L. (Solanaceae)	Stem & leaves	+	Jan. - Feb.
<i>Spinacia oleracea</i> L. (Amarantheceae)	Stem & leaves	++++	Feb. - Mar.
<i>Withania</i> sp. (Asteraceae)	Whole parts of plant	++++	Feb. – Mar.
Wild plants	Stem & leaves	++++	Jan. - Mar.

*New host record from India; +=Low infestation; +=Moderate infestation; +++=High infestation; ++++=Very high infestation

Table 2: Tetratrophic interaction of *M. persicae*

Food plants	Parasitoids/Degree of Parasitism	Hyperparasitoid/Degree of Hyperparasitism	Period of occurrence
1. <i>Brassica oleracea</i> var. <i>botrytis</i>	<i>Aphelinus gossypii</i>	-	Feb. - Mar.
2. <i>Calendulla</i> sp.	<i>A. gossypii</i> (++)* <i>Aphidius colemani</i> (+)* <i>Binodoxis indicus</i> (++)*	<i>Alloxysta pleuralis</i> (++)* <i>A. pleuralis</i> (++++)*	Feb. - Mar
3. <i>Datura stramonium</i>	<i>B. indicus</i> (+)	-	Jan.
4. <i>Ganophalium</i> sp.	<i>Lipolexis oregmae</i> (+++)	-	Feb.
5. <i>Raphanus sativum</i>	<i>B. indicus</i> (++)	-	Dec.
6. <i>Rumex</i> sp.	<i>A. gossypii</i> (+++) <i>A. colemani</i> (+)	-	Feb. Jan.
7. <i>Solanum melongena</i>	<i>L. oregmae</i> (++)	-	Mar.
8. <i>Solanum tuberosum</i>	<i>A. colemani</i> (+)	-	Jan.
9. <i>Withenia</i> sp.	<i>L. orgemae</i> (+++)	-	Feb.
10. Unknown flower (unidentified)	<i>Diaretiella rapae</i> (+)	-	Feb.
11. Wild plants (unidentified)	<i>A. gossypii</i> (+)	-	Mar.

*New host record from India; + Low parasitism/hyperparasitism; ++ Moderate parasitism/hyperparasitism; +++ High parasitism/hyperparasitism; ++++ Very high parasitism/hyperparasitism

CONCLUSION:

M. persicae is a serious pest in the target area. They attack all parts of plants including roots. Feeding on buds and opening blooms creates distortion or death and drying of tissues. Due to heavy infestation, sometimes fruit fail to develop normally and general devitalization of plants. It is also responsible for development of sooty mould and the transmission of viral diseases. This aphid should be controlled by 5 species of parasitoids viz., *A. gossypii*, *A. colemani*, *B. indicus*, *D. rapae* and *L. orgemae* are common and potent.

Acknowledgements:

The author is highly thankful to Head, University Department of Zoology, T. M. Bhagalpur University, Bhagalpur for providing laboratory facilities and to Dr. Md. Equbal Ahmad of Zoology Department, T. M.

Bhagalpur University, Bhagalpur for research supervision.

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DOI: <https://dx.doi.org/10.5281/zenodo.7193333>

Received: 8 October 2013;

Accepted; 25 November 2013;

Available online : 3 December 2013