



Interaction of *Myzus* spp. (Hemiptera: Aphididae) with their Food Plants, Parasitoids and Predators in Northeast Bihar

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Article History	Abstract
Received: 02 February 2022 Revised: 08 June 2023 Accepted: 11 July 2023	<p>The article examines the association of aphids along with their food plants, parasitoids and predators in varying ecological conditions for the possible use in biological control programs. Aphids are small, sap-sucking insects and they are considered an important pest of agricultural and horticultural plants due to sucking of vital nutrients and transmitting viral diseases. During the survey, 41 species of aphids were recorded on 122 plant species in northeast Bihar. Three species of <i>Myzus</i> viz., <i>M. ascalonicus</i>, <i>M. persicae</i> and <i>M. variants</i> were recorded. <i>M. persicae</i> was recorded on 36 food plants from December to April but its peak population was observed during February and March. Five species of parasitoids (<i>Aphelinus albipodus</i>, <i>Aphelinus gossypii</i>, <i>Aphidius colemani</i>, <i>Binodoxys indicus</i>, <i>Diaeretiella rapae</i>, <i>Lipolexis oregmae</i>), five species of coccinellid predators (<i>Cheilomenes sexmaculata</i>, <i>Coccinella septempunctata</i>, <i>Coccinella transversalis</i>, <i>Micraspis discolor</i>, <i>Scymnus pyrocheilus</i>) and three species of syrphid predators (<i>Dideopsis aegrota</i>, <i>Ischiodon scutellaris</i>, <i>Melanostoma orientale</i>) were recorded on <i>M. persicae</i>. Among these, three parasitoids (<i>B. indicus</i>, <i>L. oregmae</i>, <i>A. gossypii</i>), four coccinellid predators (<i>C. sexmaculata</i>, <i>C. septempunctata</i>, <i>C. transversalis</i>, <i>S. pyrocheilus</i>) and two syrphid predators (<i>D. aegrota</i>, <i>I. scutellaris</i>) were observed abundantly in all localities with a high rate of parasitization/predation on <i>M. persicae</i>.</p>
CC License CC-BY-NC-SA 4.0	Keywords: <i>Myzus Persicae</i> , <i>Myzus Spp.</i> Parasitoids, Predators, Coccinellids, Syrphids.

1. Introduction

Aphids are small hemipteran bugs. They suck the nutrient from different parts of a plant, retarding the growth and development of plants⁹. They also damage the crops by transmitting several viral diseases¹⁵. Hence, the management of aphids is essential in agro-economic systems. The modernization of agriculture has led to dependence on various agrochemical practices which are highly hazardous and imbalanced in nature. This is due to high pesticide residues in the food chain¹⁷. Thus, the IPM program can be implemented through the introduction of biological methods in controlling pest populations. The extensive survey of aphids and their natural enemies was done in

different areas of northeast Bihar. During the survey, 41 species of aphids on more than 122 plants, 7 species of parasitoids, 6 species of coccinellids and 7 species of syrphids were recorded^{2,3,4,5,6,7}.

Genus *Myzus* is containing 70 species¹⁸. *M. persicae* is the most important pest in the world^{20,21}. It causes damage by direct feeding and by the transmission of plant viruses¹³. This aphid is alone responsible for the transmission of more than 100 viruses throughout the world^{8,15}.

2. Materials And Methods

A survey of a few districts of northeast Bihar was done to study the association between aphids, food plants, and their natural enemies. The parts of plants infested with aphids along with their larval predators were transported to the laboratory. Few aphids were kept in 70% ethanol for taxonomic study. Parasitized aphids were sorted and kept separately in a BOD incubator at 22°C until the emergence of adult parasitoids. Aphids with larval predators were kept separately in the BOD incubator for the emergence of adults. The aphids were identified with the help of a key provided by Raychaudhari¹⁶. The parasitoids were identified based on Sary and Ghosh¹⁹. Coccinellids and syrphids were identified by experts of the Zoological Survey of India, Kolkata.

3. Results and Discussion

In the study, 41 species of aphids were recorded on 122 plants belonging to 35 families. Three species of *Myzus* viz, *M. ascalonicus*, *M. persicae*, *M. varians* were recorded in northeast Bihar. Among these, *M. persicae* was recorded on 36 plants of 28 genera of 13 families (Table-1). However, earlier it was recorded on 15 species of food plants belonging to 6 families viz., Apiaceae, Asteraceae, Cucurbitaceae, Fabaceae, Malvaceae and Solanaceae³. In the present survey, the most suffering families were Asteraceae (6 plants), Brassicaceae (6 plants), and Solanaceae (8 plants).

(1) *Myzus ascalonicus*

It was recorded on only one plant viz., *Bauhinia vahlii* (= *Phanera vahlii*) of the Fabaceae family with a low degree of infestation during February.

Parasitoid/ Predator

No parasitoids or predators were recorded on this aphid.

(2) *Myzus persicae*

Myzus persicae is the most economically important aphid crop pest worldwide²⁰. It is highly polyphagous infesting about 1600 plant species^{10,11}. It was reported on 300 plant species in India¹⁸. Adult paterae are pale yellow-green uniformly colored, but not shiny. Alatae has a black central patch on the abdominal dorsum (Fig-1). Aphids collected on brinjal and tomatoes are often pink.



Fig.-1: *M. persicae* (Alate)

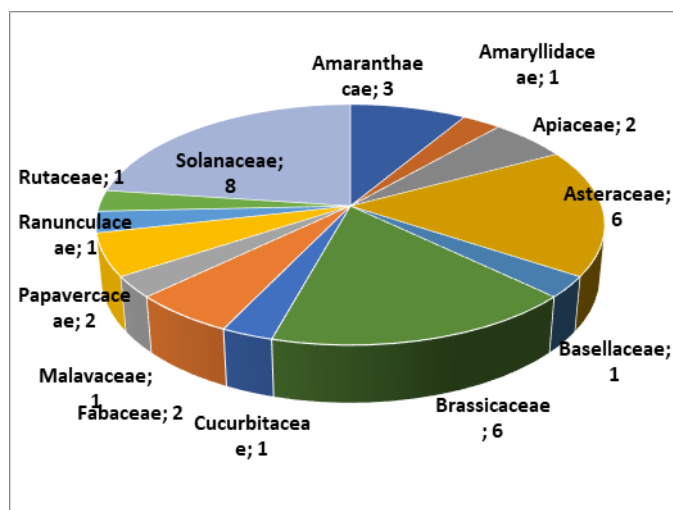


Fig.-2: No. of plants of different families infested by *M. persicae*

M. persicae is a major pest and recorded on 36 species of plants belonging to 13 families (Table-1). The intensity of infestation varied in different localities even on the same plant. Most suffered plants were *Brassica rapa*, *Brassica oleracea* var. *botrytis*, *Brassica oleracea* var. *capitata*, *Capsicum frutescens*, *Raphanus sativus*, *Solanum melongena* and *Solanum tuberosum*. Most suffering families were Asteraceae, Brassicaceae and Solanaceae. The low infestation was observed on host plants of other families viz., Amaranthaceae, Amaryllidaceae, Apiaceae, Basellaceae, Cucurbitaceae, Fabaceae, Malvaceae and Rutaceae (Fig-2). Earlier, it was recorded on several host plants from India^{1,3,12,16}. The young colonies were mostly observed on growing points of the host plant like leaves, stems, buds, flowers, and fruits. *Allium sativum* and *Hibiscus sabdariffa* are recorded for the first time as a host for this aphid from India.

M. persicae was recorded from January to April but the degree of infestation varies in different months. A seasonal study revealed that its high population gradually increased from February to March. Its population started to decline in April due to an increase in temperature. It makes enormous colonies on host plants belonging to the family Asteraceae, Brassicaceae, and Solanaceae.

Table-1: Association of *Myzus* spp. with their food plants, parasitoids and predators

Food plants / families/ intensity of infestation	Parasitoids/intensity of parasitisation	Coccinellids/intensity of predation	Syrphids/intensity of predation
<i>Myzus ascalonicus</i>			
<i>Bauhinia vahlii</i> (Fabaceae) +	-	-	-
<i>Myzus persicae</i>			
<i>Allium sativum</i> (Amaryllidaceae) +	-	-	-
<i>Amaranthus spinosus</i> (Amaranthaceae) +	-	-	-
<i>Argemone mexicana</i> (Papaveraceae) +	-	-	-
<i>Basella alba</i> (Basellaceae) +++	-	-	-
<i>Beta vulgaris</i> (Amaranthaceae) +++	<i>A. albipodus</i> +	-	<i>D. aegrota</i> ++
<i>Brassica rapa</i> (Brassicaceae) +++	<i>A. gossypii</i> ++ <i>D. rapae</i> ++	-	<i>M. orientale</i> +
<i>Brassica oleracea</i> var. <i>botrytis</i> (Brassicaceae) ++++	<i>D. rapae</i> ++	<i>C. transversalis</i> +	-

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<i>Brassica oleracea</i> var. <i>capitata</i> (Brassicaceae) +++++	<i>A. albipodus</i> ++ <i>D. rapae</i> +++++	<i>C. septempunctata</i> +++	-
<i>Calendula</i> sp. (Asteraceae) ++	-	-	-
<i>Capsicum frutescens</i> (Solanaceae) +++++	<i>A. gossypii</i> ++	<i>S. pyrocheilus</i> +	-
<i>Carthamus tinctorius</i> (Asteraceae) +++	-	-	-
<i>Chenopodium album</i> (Amaranthaceae) +	-	-	-
<i>Citrus</i> sp. (Rutaceae) ++	-	-	-
<i>Coriandrum sativum</i> (Apiaceae) +++	-	-	-
<i>Cucurbita maxima</i> (Cucurbitaceae) +	-	-	-
<i>Datura stramonium</i> (Solanaceae) ++	-	-	-
<i>Eschscholzia californica</i> (Papaveraceae) +	-	-	-
<i>Foeniculum vulgare</i> (Apiaceae) +	-	-	-
<i>Gnaphalium</i> sp. (Asteraceae) +++	-	-	-
<i>Helianthus annuus</i> (Asteraceae) +	-	-	-
<i>Hibiscus sabdariffa</i> (Malvaceae) ++	<i>B. indicus</i> +++	-	<i>I. scutellaris</i> ++
<i>Lablab purpureus</i> (Fabaceae) ++	-	-	-
<i>Lycopersicon esculentum</i> (Solanaceae) +++	<i>A. gossypii</i> ++ <i>B. indicus</i> ++	-	-
<i>Nicotiana tabacum</i> (Solanaceae) +++	-	<i>C. septempunctata</i> +++ <i>C. sexmaculata</i> ++	-
<i>Nicotiana</i> sp. (Solanaceae) +++	-	-	-
<i>Pisum sativum</i> (Fabaceae) +++	-	<i>C. transversalis</i> +++ <i>M. discolor</i> ++	-
<i>Ranunculus sceleratus</i> (Ranunculaceae) +++	-	-	-
<i>Ranunculus</i> sp. (Ranunculaceae) +++	-	<i>S. pyrocheilus</i> ++ <i>C. septempunctata</i> ++	-
<i>Raphanus sativus</i> (Brassicaceae) +++	<i>A. albipodus</i> ++	<i>C. transversalis</i> +	-
<i>Solanum melongena</i> (Solanaceae) +++++	<i>L. oregmae</i> +	<i>C. sexmaculata</i> + <i>M. discolor</i> ++ <i>S. pyrocheilus</i> ++	-
<i>Solanum nigrum</i> (Solanaceae) +++	-	-	-
<i>Solanum tuberosum</i> (Solanaceae) +++	<i>A. albipodus</i> ++ <i>A. gossypii</i> +	<i>C. transversalis</i> +++ <i>C. sexmaculata</i> ++	-

		<i>M. discolor</i> +	
<i>Spinacia oleracea</i> (Amaranthaceae) +++++	-	<i>C. sexmaculata</i> +	-
<i>Tagetes</i> sp. (Asteraceae) +++	-	-	-
<i>Withania</i> sp. (Asteraceae) +++++	-	-	-
Wild plants (Unidentified) +	-	<i>C. transversalis</i> ++	-
Myzus varians			
<i>Rumex</i> sp. (Polygonaceae) +	-	-	-

Degree of infestation

(+ = low, ++ = Moderate, +++ = High, +++++ = Very High)

Parasitoids

Aphelinus albipodus, *Aphelinus gossypii*, *Binodoxys indicus*, *Diaeretiella rapae* and *Lipolexis oregmae* were recorded on *M. persicae* infesting different host plants. *A. albipodus* was recorded on this aphid infesting four plants during February and March. *A. gossypii* was also recorded on *M. persicae* when infesting four host plants during January to March in the target area. *B. indicus* was recorded on *M. persicae* on two host plants in February in two different localities. *D. rapae* was most abundantly found in most of the localities on three host plants in March. *L. oregmae* was recorded on only one host plant in February in one locality of the target area (Table-1). *A. albipodus* is recorded first time in Bihar. However, it was earlier reported from India¹⁴.

Predator

Cheilomenes sexmaculata, *Coccinella septempunctata*, *Coccinella transversalis*, *Micraspis discolor* and *Scymnus pyrocheilus* were recorded in the target area on this aphid with moderate to high rate of predation (Table-1). Three species of syrphid predators viz., *Dideopsis aegrota*, *Ischiodon scutellaris* and *Melanostoma orientale* were recorded on the target area of *M. persicae* (Table-1).

(3) Myzus varians

M. varians was recorded on one food plant viz., *Rumex* sp. belonging to the Polygonaceae family. It was observed only in February with low intensity of infestation. The species was earlier known on only *Prunus* spp.¹⁸.

Parasitoid/Predator

No parasitoids or predators were recorded on this aphid.

Thus, the present paper will help in studying the relationship between the aphids, their food plants, the parasitoids, Coccinellids and the Syrphids predators for possible use in biological control programs.

4. Conclusion

The study explored the association of aphids along with their food plants, parasitoids and predators in varying ecological conditions for the possible use in the biological control program. Based on the survey results, it can be concluded that *M. persicae* is a major pest of several crops. *Aphelinus gossypii* (parasitoid) and *Cheilomenes sexmaculata* (Predator) are found abundantly and may be used in Biological control programs.

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Conflict of interest:

The authors declare no conflict of interest.

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