

Biological Control of Aphids (Hemiptera: Aphididae) in Potato Farms

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Abstract— Aphids are a diverse group of plant feeding insects. Investigation into the potential use of predatory to control aphid pests received a greater attention for a reduction of chemical damages to the environment. This research was conducted for founding of aphid's natural enemy in potato farms in Iran during 2012-2013. Natural enemies were collected by different traps such as net, light and pheromone traps respectively. Results showed Ladybirds, wasp parasitoid, aphid lion and fly parasite feed on aphids. Altogether six species belong to Coleoptera: 1- *Coccinella septempunctata* 2- *Hippodamia variegata* 3- *Oenopia conglobata* 4- *Oenopia oncina* 5- *Adalia bipunctata* 6- *Adalia decimpunctata* , two species belong to Hymenoptera: *Aphelinus* spp. and one species belong to Neuroptera: *Chrysoperla carnea* were collected and identified.

Keywords— Aphids, Natural enemies, crops.

I. INTRODUCTION

A variety of biological controls are available for use, but further development and effective adoption will require a greater understanding of the complex interactions among plants, people, and the environment. To that end, this article is presented as an advanced survey of the nature and practice of biological control as it is applied to the suppression of plant diseases. Aphids are a diverse group of plant feeding insects belong to family Aphididae of order Hemiptera, predominantly found in temperate climate zones such as north America, Europe, Central and Eastern Asia[6], [7], [8], [10]. They cause damage directly by sucking cell sap, secrete honeydew resulting in development of sooty mould on leaves and shoots and directly as vectors of certain plant viruses[11], [12]. In Iran the potato growers use various insecticides to control aphids. Insecticidal control is not only expensive but also its residues left over the sprayed surface of the crops or in the soil and have become a matter of concern of environmental pollution. The indiscriminate use of pesticides causes phytotoxicity and destruction of beneficial organisms such as predators, parasitoids, microorganisms and pollinators[13]. Global warning has cautioned us and the adverse consequences of insecticide use are always alarming and also inducing pest out break because of pest resistance. These entomological backlashes have compelled the scientists to be concerned with entomologically compatible pest management programs[11]. Therefore, use of natural enemies in biological control is a good pest management tactic to minimize the

population level of invasive pests[1]. Investigation into the potential use of predatory insects or mites to control aphid pests received a greater attention for a reduction of chemical damages to the environment. First step for biological control is collection and identify.).

II. MATERIALS AND METHODS

This research was conducted for founding of aphid's natural enemy in potato farms in Iran during 2012-2013. The study was conducted to collect predatory insects on potato at different altitudes in Azna (Lorestan Province, Iran). Each locality was repeatedly sampled throughout spring and summer seasons during 2013- 2014. Samples were collected with a standard sweeping net, light traps, and a hand-held aspirator. In some localities more than one method was used for insect collection. Adult insects collected from various habitats were killed in a cyanide bottle and pinned. Each specimen was tagged with the information about host plants, locality, and date. To protect the specimens from the insect pests, naphthalene tablets were added to collection boxes. Immature stages were collected directly from the potatoes and preserved in 70% ethyl alcohol in bottles. Each bottle was labeled with information of host, area and date from which it was collected. The collected natural enemies were taken to laboratory. These were identified to the species level with the help of available keys [2], [3], [4], [5], [9].

III. RESULTS AND DISCUSSION

In this study altogether nine species belonging to three orders (Coleoptera, Hymenoptera and Neuroptera) were recorded.

1- Order coleopteran six species were belonged to Coccinellids family.

Coccinella septempunctata (Linnaeus 1758)

Length 6.50 to 7.80 mm. Head black with 2 well separated pale spots; pronotum with anterior margin black at middle with ventral pale spot small, extending posterior 1/3 as far as dorsal spot; elytron with 4 black spots in addition to scutellar spot.

Hippodamia variegata (Goeze 1777)

Length 4.4 to 5 mm, width 3 to 3.25 mm. color and pattern of the elytra varied . Male genitalia with flat trabes, fovea at apex; siphon with membranous process at apex. In most collected samples of this species, elytra were red with 6 black spots in addition to scutellar spot.

Adalia bipunctata (Linnaeus 1758)

Length 3.7 to 5.1 mm, width 2.8 to 3.9 mm. Dorsal color pattern highly variable genitalia with parameters less than basal lobe; siphon spoon-shaped apically.

Adalia decempunctata (Linnaeus 1758)

Length 3.5 to 5 mm, width 2.6 to 3.5 mm. Body ground color with variable patterns. Mesosternal epimera with light color. The common form was light red background with ten black spots.

Oenopia conglobata (Linnaeus 1758)

Length 3.3 to 4 mm, width 2.4 to 3 mm. Length. Head and pronotum light color; 7 dark spots usually on pronotum; elytron light color with 8 dark spots. Male genitalia with triangular siphon at apex. Female genitalia with apically divided basal lobe.

2- Order Hymenoptera two species were belonged to Aphelinidae family.

Aphelinus abdominalis

Length 2.5 to 3 mm, adults are black with a yellow abdomen.

Aphelinus semiflavus

Length 1mm, antenna elbowed.

2- Order Neuroptera one species was belonged to Chrysopidae family.

Chrysoperla carnea

Adult have slender antennae, golden eye and large veined, gauzelike wings that are 1.3 to 2 mm long.

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