Short Paper

The first report on feeding of *Oxycarenus hyalinipennis* and *Aphis fabae* on dodder *Cuscuta campestris* in Iran

Zabihollah Azami-Sardooei¹, Saeideh Shahreyarinejad²*, Mohammad Rouzkhosh¹ and Farnaz Fekrat¹

1. Department of Crop Protection, Faculty of Agriculture, University of Jiroft, Jiroft, Iran.
2. Ph. D. Student of Entomology, Department of Plant Protection, College of Agriculture, Shahid Chamran University of Ahvaz, Ahvaz, Iran.

Abstract: Some experiments with the aim to identify insects feeding on the dodder *Cuscuta campestris* Yuncke as an important parasitic flowering plant, resulted in the discovery of two new potential biological control agents namely *Oxycarenus hyalinipennis* (Costa, 1843) (Hemiptera: Lygaeidae) and *Aphis fabae* Scopoli, 1763 (Hemiptera: Aphididae). *Oxycarenus hyalinipennis* was observed feeding extensively on dodder seed capsules that were parasitizing Christ's thorn Jujube tree *Ziziphus spinosa-christi* (L.) Wild. Also aphid feeding caused severe damage to the dodder vine wraps on native hopbush *Dodonaea viscosa* (L.) Jacq. This is the first report of *O. hyalinipennis* and *A. fabae* feeding on *C. campestris* highlighting their potential as a biological control agent in Iran.

Keyword: *Aphis fabae*, *Oxycarenus hyalinipennis*, Dodder, Biological control agent

Introduction

Parasitic plants such as dodder or *Cuscuta* spp. (Convolvulaceae) are known in many parts of the world. All species and varieties of dodder are parasites of plants. They are of intrinsic botanical interest and are also significant weeds in agriculture, horticulture and forestry. Through an intimate attachment to their host crop, parasitic weeds profoundly alter the physiology of the host plant and can cause severe loss of crop (Parker and Riches 1993). *Cuscuta campestris* was introduced from North America to Europe in 1883 (Toth et al., 2005). Members of The genus *Cuscuta* (known as dodder) are obligate parasitic plants with approximately 170 described species distributed throughout the world (Holm et al., 1997). *Cuscuta campestris* is distributed in north, northwest, west, center as well as northeast (Jafari et al., 2016) and southeast (unpublished data) regions of Iran. Dodder is an annual parasitic plant that reproduces by seed and has no leaves or chlorophyll for carbohydrate synthesis therefore all of its growth requirements (water, minerals and carbohydrates) must be met by attachment to another living green host plant. Host plants include those grown for agricultural purposes, ornamental plants and a whole range of other plants and weeds (Ashigh and Marquez, 2010). The damage caused by dodder to its host plant varies from moderate to severe, depending on growth cause damage of the host plant and on the number of haustorium attachments. Although a relatively large number of insect species has been recorded from the Cuscutaceae, only a small number of these seem to have potential as a biological control agent (Toth et al., 2005). The potential of using insects and pathogens for dodder control has been reviewed (Parker, 2005).
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1991). However, extensive study is needed before commercial application of any biological control agent (Bewicket et al., 1987). Cuscuta grow from seeds and pieces of their filaments. Therefore, use of organisms that feed on the seeds of parasitic plants and damage them presents a strategy for complete control of parasitic plants. Thus preventing seed production in these plants is more important than damage to an individual plant. Research is needed to identify seed-eating arthropods that impart maximum stress on parasitic plants. Oxycarenus hyalinipennis is a polyphagous insect, and is known as a dominant pest on the family Malvaceae. Oxycarenus hyalinipennis primarily feeds on plant seeds of the Malvaceae family, especially Gossypium spp. cotton (USDA, 2009). In addition to cotton, this pest has also been reported on some fruit and vegetables such as apple, avocado, corn, date, fig, grape, peach, okra, pineapple and pomegranate, as well as hibiscus (USDA, 2009). Black bean aphid is one of the most polyphagous aphid species, exploiting more than 200 leguminous plants and infesting all plant parts (Sabahi et al., 2010).

Materials and Methods

During 2014, dodder plants, C. campestris, parasitizing Z. spina-christi L. and D. viscosa were examined for presence of insects in field investigations in Kerman (Jiroft) (Southern Iran). Insect colonies were found on C. campestris collected and brought in laboratory and preserved in 70% Ethylalcohol for identification. Preliminary identification of insects was performed using valid identification keys (Johnson and Borror, 2005). Samples were confirmed by Dr. Berend Aukema, Naturalis Biodiversity Centre, The Netherlands.

Results

Cuscuta campestris was active on two plant species of Z. spina-christi and D. viscosa in the study region. Field investigations in Kerman (Jiroft) (Southeastern Iran) resulted in the discovery of two new potential biological control agents of C. campestris including, O. hyalinipennis (Costa, 1843) (Hemiptera: Lygaeidae) on Z. spina-christi L. Extensive feeding of O. hyalinipennis was observed on dodder seed capsules parasitizing Christ's Thorn Jujuibe. Adult and nymph insects feed heavily on the seed capsules that are then destroyed completely. This is the first report in the world of O. hyalinipennis feeding on dodder parasitic plants.

Aphis fabae was active on plant species of D. viscosa in the study region. It was observed that adult and nymph A. fabae fed on the vine wraps of C. campestris that had parasitized potato plants Solanum tuberosum L. and native hop bushes (D. viscosa). Aphid feeding clearly caused serious damage to the dodder vine wraps. This is the first record of C. campestris as a host of A. fabae in Iran.

But the use of insects as a biocontrol agent for C. campestris requires further study. Because these insects are primarily plant pests and their use in biological control needs more extensive study.

Discussion

This is the first report of O. hyalinipennis and A. fabae feeding on C. campestris and their potential as biological control agents in Iran. Shimi et al. (1995) reported twenty-three species of Cuscuta gall weevils (Smicronyx spp.) that specifically infected various species of dodder. According to a study (Toth et al., 2008), species from three orders were regularly found feeding on dodder plants; aphids and bugs (Hemiptera), weevils (Coleoptera) and flies (Diptera). They consisted of A. fabae, Lygus rugulipennis Poppius (Hemiptera: Miridae), Melanagromyza cuscutae Hering (Diptera: Agromyzidae) and weevil from the genus Smicronyx (Coleoptera: Curculionidae). Cuscuta weeds only propagate by seed; the best method of biological control is use of organisms that damage their seeds. The cotton seed bug, O. hyalinipennis feeds heavily on C. campestris seeds. However, O. hyalinipennis is a polyphagous insect, thus its role as a biological agent requires further study.
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References


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*Cuscuta campestris* Yuncke Rotes and *Oxycarenus hyalinipennis* (Costa, 1843) (Hemiptera: Lygaeidae) and *Aphis fabae* Scopoli, 1763 (Hemiptera: Aphididae) are two important pest species that feed on the plant *Cuscuta campestris* Yuncke. A comprehensive study was conducted to assess the impact of these pests on the plant in Iran.

In this study, the impact of *Oxycarenus hyalinipennis* and *Aphis fabae* on *Cuscuta campestris* was evaluated. The results showed that these pests significantly affect the growth and development of the plant. Further research is needed to understand the complex interactions between these pests and the plant, and to develop effective management strategies.

Keywords: *Aphis fabae*, *Oxycarenus hyalinipennis*, *Cuscuta campestris*, pest management.