

Short Paper

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

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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 spina-christi* (L.) Wild. Also aphid feeding caused severe damage to the dodder vine wraps on native hophbush *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is distributed in north, northwest, west, center as well as northeast (Jafari *et al.*, 2016) and southeast (unpublished data) regions of Iran.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 haustoria 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,

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1991). However, extensive study is needed before commercial application of any biological control agent (Bewick *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 Jujube. 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

- Ashigh, J. and Marquez, E. 2010. Dodder (*Cuscuta* spp.) Biology and Management. College of Agricultural, Consumer and Environmental Sciences, 1-3.
- Bewick, T. A., Binning, L. K., Stevenson, W. R. and Stewart, J. 1987. A mycoherbicide for control of swamp dodder (*Cuscuta gronovii* Willd) Cuscutaceae. 4th International Symposium. Parasitic Flowering Plants, Marburg, Germany, p. 93-104.
- Heie, O. E. 1995. The Aphidoidea (Hemiptera) of fennoscandia and Denmark, VI. Family Aphididae: part 3 of tribe macrosiphini of Subfamily Aphidinae, and family Lachnidae. Fauna Entomologica Scaenavica, 31: 222 p.
- Holm, L., Doll, J., Holm, E., Panch, J. and Herberger, J. 1997. World Weeds: Natural Histories and Distribution. John Wiley and Sons, New York, 1129 pp.
- Jafari, E., Assadi, M. and Ghanbarian, G. A. 2016. A revision of Cuscutaceae family in Iran. Iran Journal Botany, 22: 23-29.
- Johnson, N. F. and Borror, D. J. 2005. Borror and DeLong's Introduction to the Study of Insects. 7th Edn., Thomson, Brooks/Cole, USA.
- Parker, C. 1991. Protection of crops against parasitic weeds. Crop Protection, 10: 6-22.
- Parker, C. and Riches, CR. 1993. Parasitic Weeds of the World: Biology and Control. Wallingford, UK: CAB International, 332 pp.
- Sabahi, Q., Rasekh, A. and Michaud, J. P. 2010. Toxicity of three insecticides to *Lysiphlebus fabarum* a parasitoid of the black bean aphid, *Aphis fabae*. Journal of Insect Science, 4: 1-8.
- Shimi, P., BayatAsadi, H., Rezapanah, M. R. and Koliaii, R. 1995. A study of *Smicronyx robustus* Faust (Curculionidae) as a biological control agent of eastern dodder (*Cuscuta monogyna* Vahl.) in Iran. Journal of Agricultural Sciences Islamic Azad University, 1: 43-51.
- Toth, P., Tothova, M. and Cagan, L. 2008. Potential biological control agents of field bindweed, common teasel and field dodder from Slovakia. XII International Symposium on Biological Control of Weeds. France, p 768.
- USDA. 2009. Significant Pest Bulletin Cottonseed Bug. United States, Department of Agriculture, Animal and Plant Health Inspection Service, p 1.

اولین گزارش از تغذیه *Oxycarenus hyalinipennis* و *Aphis fabae* روی سس *Cuscuta campestris* در ایران

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چکیده: آزمایشاتی جهت شناسایی حشرات تغذیه‌کننده روی سس *Cuscuta campestris* Yuncke به‌عنوان یک گیاه انگلی گل‌دار مهم انجام شد. در نتیجه، دو عامل کنترل بیولوژیک بالقوه جدید روی سس شامل سن بذرخوار *Oxycarenus hyalinipennis* (Costa, 1843) (Hemiptera: Lygaeidae) و شته سیاه باقلا *Aphis fabae* Scopoli, 1763 (Hemiptera: Aphididae) شناخته شدند. سن *O. hyalinipennis* به‌شدت از کیسول بذر سس‌هایی که انگل درخت کنار *Ziziphus spina-christi* (L.) Wild تغذیه می‌کرد. هم‌چنین شته سیاه باقلا از سس‌هایی که گیاه ناترک *Dodonaea viscosa* (L.) Jacq را آلوده می‌کنند، تغذیه می‌نماید. بنابراین حشرات *A. fabae* و *O. hyalinipennis* به‌عنوان اولین گزارش از عوامل کنترل بیولوژیک بالقوه روی سس در ایران محسوب می‌شوند.

واژگان کلیدی: *Aphis fabae*، *Oxycarenus hyalinipennis*، سس، عامل کنترل بیولوژیک