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Massive occurrence of *Podagrica fuscicornis* (L.) (Coleoptera, Chrysomelidae) on common marshmallow (*Althaea officinalis* L.)

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ABSTRACT

In May 2011 we noticed high number of *Podagrica fuscicornis* adults on the leaves of common marshmallow (*Althaea officinalis*) grown on Laboratory Field of Biotechnical Faculty in Ljubljana. In Slovenia, this beetle was already recorded earlier but it did not caused any damage on common marshmallow (*Althaea officinalis*). Due to the feeding of beetles on leaves, 1 to 2 mm large holes appear. By expecting climate changes, already known bionomics of some related species and giving more emphasis on herb production in the future, Chrysomelid *P. fuscicornis* might represent medium sized biological factor in producing common marshmallow.

Key words: flea beetles, *Podagrica fuscicornis*, medicinal plants, common marshmallow, *Althaea officinalis*

IZVLEČEK

MOČAN POJAV VRSTE *Podagrica fuscicornis* (L.) (Coleoptera, Chrysomelidae) NA NAVADNEM SLEZU (*Althaea officinalis* L.)

V maju 2011 smo na listih navadnega sleza (*Althaea officinalis*) na Laboratorijskem polju Biotehniške fakultete v Ljubljani ugotovili večje število odraslih osebkov bolhača *Podagrica fuscicornis*. Vrsta je bila v Sloveniji že prej zastopana, a ni bila škodljiva pri pridelovanju navadnega sleza (*Althaea officinalis*). Na listih rastlin se kot posledica hranjenja hroščev pojavijo 1-2 mm velike luknjice. Ob pričakovanih podnebnih spremembah, znani bionomiji nekaterih sorodnih vrst in večjem pomenu pridelave zelišč v Sloveniji bi lahko vrsta *P. fuscicornis* v prihodnosti bila srednje pomemben biotični dejavnik pri pridelavi navadnega sleza.

Gljučne besede: bolhači, *Podagrica fuscicornis*, zdravilne rastline, navadni slez, *Althaea officinalis*

1 INTRODUCTION

In Europe herbal plants production is taking place on land area of around 120,000 hectares and utilisation of medicinal plants, flavour and aromatic plants, spices and herbs for special purposes (natural pigments, antioxidants etc.) is becoming an important category of agricultural production. Slovenia is among those countries which do not have any particular tradition in medicinal plant production. In Flora of Slovenia there are 3216 species which are registered as higher plants and almost 12 % are less or more used as medicinal or aromatic plants. According to survey data from 2004

medicinal plants are grown on 20 to 25 hectares in Slovenia (Rode and Knapič, 2006), and afterwards their production extent decreased (Statistični urad RS, 2011).

Flea beetles are members of family leaf beetles (Chrysomelidae) and occur in all vegetation habitats. Palaearctic species occur most frequently in the open, namely in the vicinity of grasslands, forests and water bodies (Gruev and Döberl, 1997; Çilbiroglu and Gok, 2004). Only some of these species cause damage on cultivated or native plants permanently or on occasions.

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Tanja BOHINC in sod.

In the following paper we want to introduce the species of flea beetles, which is a typical member of subfamily Alticinae, but in contrast to some other related species – flea beetles (*Phyllotreta* spp.) (Brelj *et al.*, 2003) or hop flea beetle (*Psylliodes attenuatus* [Koch] (Brelj *et al.*, 2003; Rak Cizej and Milevoj, 2007) – not yet

presenting special danger in plant production. In 2011 we noticed on common marshmallow a massive occurrence of adult beetles which fed on leaves and flowers and consecutively evoke typical symptoms – spherical and oblong hollows.

2 MATERIALS AND METHODS

In May 2011 we noticed during the survey of occurrence of pest organisms on herbal plants on Laboratory Field of Biotechnical Faculty, hollows on leaves of common marshmallow. The hollows were characteristic for representatives of Chrysomelidae family. On leaves (Figures 1

and 2) we found larger number of beetles, which were determined as *Podagrica fuscicornis* (Linnaeus, 1767) according to morphological characters. During the monitoring in July we noticed that the adults feed also on flowers of common marshmallow (Figure 3).

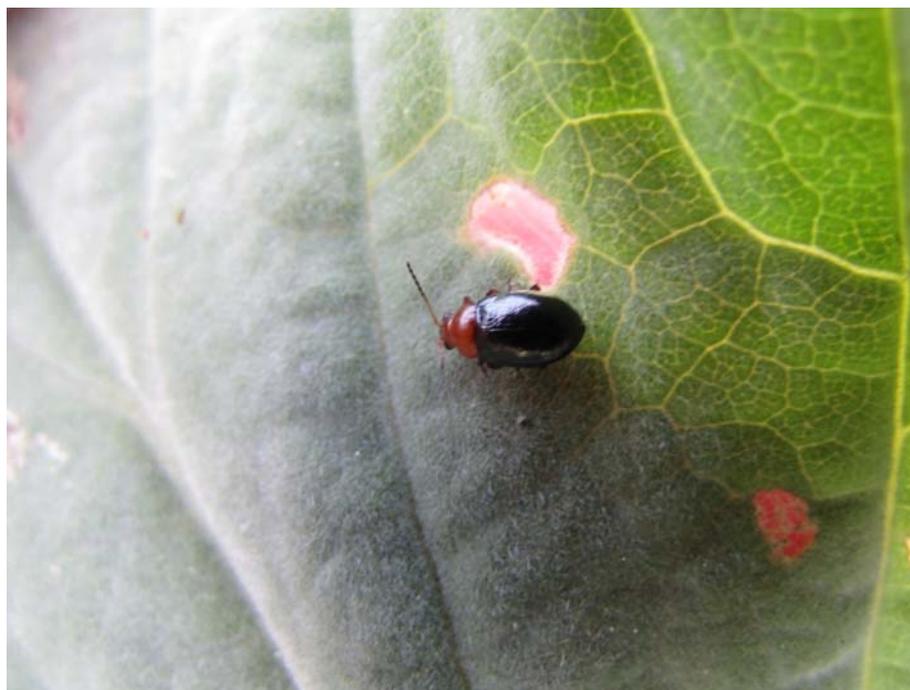


Figure 1: Flea beetle *Podagrica fuscicornis* and damage spots made because of its feeding on leaf of common marshmallow (photo by T. Bohinc)



Figure 2: Damage on the leaf of common marshmallow due to the feeding of *Podagrica fuscicornis* adults (photo by T. Bohinc)



Figure 3: Damage on the flower of common marshmallow due to the feeding of *Podagrica fuscicornis* adults (photo by T. Bohinc)

3 PRESENTATION OF THE SPECIES

3.1 Description

We describe flea beetles as small bugs with a size from 1.5 to 4 mm. They can jump due to the enlarged

backside organ (hind legs) – Maulik's organ. They also have an ability to fly. When plant is heavily attacked by flea beetles, small round holes (up to 1 mm) caused by

Tanja BOHINC in sod.

an individual flea beetle's feeding may coalesce into larger areas of damage (Maceljski, 1999).

Adult beetles of *Podagrica fuscicornis* are 3.0 to 6.0 mm in size. Head and neck shield are coloured red. Front wings (sheath-wings) are dark blue to blue green and rarely are detected metal coloured. Sheath wings contain hollows which are deep, very abundant and spread scarced. Hollows on neck shield are even more compacted. Legs are characteristically yellowish to bright brownish, and upper labium is also yellow (Hubble, 2010).

3.2 Systematics

Flea beetles are classified into family leaf beetles (Chrysomelidae) and subfamily Alticinae (Aslan *et al.*, 1998). In Slovenia up till now 204 species and 5 subspecies of flea beetles (Breljih *et al.*, 2003) were detected, while on the global level more than 7000 species were described (Jolivet, 1988). In Slovenia beside *Podagrica fuscicornis* we are ranging in the same genus also species *P. malvae* (Illiger), *P. menetriesi* (Falderman) and *P. fuscipes* (F.) (Podagrica..., 2011).

3.3 Geographical distribution

Podagrica fuscicornis belongs to European-Mediterranean species group. The abundance of its populations is very large in the majority of Europe. Flea beetle is not present in Nordic countries. In Asia it occurs in Turkey and western part of Arabian Peninsula. It can be found also in Tunisia, Morocco and on Canary Islands. The abundance of this pest is from time to time also high in warmer parts of Slovenia (Breljih *et al.*, 2003), but till now no clear evidence is noted that it would cause extensive range of damage on its host plants.

3.4 Bionomics

Flea beetles are insects with complete metamorphosis. Adult females lay eggs, which hatch into larvae of various shapes. After feeding and molting several times, larvae mature, pupate and later emerge as adult beetles; the length of time it takes to complete the life cycle varies greatly from species to species and is also

dependent on weather and other environmental conditions (Rak Cizej *et al.*, 2001).

Physical and chemical factors of plant defence many times have influence on the survival ability of larvae. The latter can be also affected by the appearance of natural enemies, unfavourable weather conditions,... (Rak Cizej *et al.*, 2001).

Larvae molt three to four times and then pupate. After one to two weeks adults occur. The Chrysomelid has only one generation per year (Cmoluch, 1988). Adults overwinter usually in the soil under the grass sward, where often enough organic matter or nearby host plant are present. During overwintering they avoid exposed surfaces as arable field are (Rak Cizej *et al.*, 2001).

3.5 Host plants

Very know members of genus *Podagrica* cause most damage on plants from family Malvaceae. *Podagrica fuscicornis* belongs among oligophagus herbivores and it induces damage on plants from genera *Althaea*, *Malva* and *Lavatera* (Neubauer *et al.*, 1974; Cmoluch, 1988; Lecheva *et al.*, 1996; Rotrekl, 1996; Breljih *et al.*, 2003). Above mentioned species can cause damage also on plants from families Lamiaceae and Urticaceae (Petitpierre, 1985).

3.5.1 Common marshmallow (*Althaea officinalis* L.)

Common marshmallow or iviscus (Figure 4) is classified into family Malvaceae. The plant is perennial and soft and velvety due to a dense covering of stellate hairs and grows 2.2 m in height. Its origin is Europe but it can be found also in North and South America. Its natural habitats are usually moist fields, but it could be found also by the seashores and more and more it is also cultivated (Chevallier, 1996). Growers cultivate it on warmer soils. Common marshmallow is not very demanding for nutrients, it only needs deep soils and with good porosity and no rocks. It likes moisture but not standing water. We can reproduce it by seeds or vegetative with roots. Planting distance depends on which part of the plant we are aiming as a final product (Rode and Knapič, 2006).



Figure 4: Plants of common marshmallow (*Althaea officinalis*) at the Laboratory Field of Biotechnical Faculty in Ljubljana in 2011 (photo by T. Bohinc).

Roots of common marshmallow contain 37 % of starch and 11 % of plant mucilage and both represent important part of herbal plant. Important medicinal parts of the plant are also leaves and flowers. Common marshmallow is used to treat infections which affect

mucous membrane as its appeasing effect reassures and protects against harmful influences (Chevallier, 1996; Franova *et al.*, 2006). It is used particularly in herbal tea mixtures (Franova *et al.*, 2006).

4 POTENTIAL ECONOMIC IMPORTANCE OF *Podagrica fuscicornis* IN SLOVENIA WITH CONCLUSIONS

Among most important flea beetles pests in Slovenia cabbage flea beetles (*Phyllotreta* spp.) are placed as they can have an influence on reducing the yield of cabbage and other cultivated Brassicas (Brown *et al.*, 2004). Also hop can be damaged and this is attribute to hop flea beetle (*Psylliodes attenuatus*). Important host plants of hop flea beetle are common hop plant (*Humulus lupulus* [L.]), common hemp (*Cannabis sativa* ssp. *sativa* var. *sativa* [L.]), and common nettle (*Urtica dioica* [L.]) (Rak Cizej and Milevoj, 2007).

The presence of *P. fuscicornis* in Slovenia for now did not represent larger danger. But in tropical and subtropical regions representative of genus *Podagrica* spp. regularly threaten the plant production from family Malvaceae. In this relation a permanent treath of economical reasonableness of okra production (*Abelmoschus esculentum* [Moench]) in Africa (Echereobia *et al.*, 2010) is worth to mention as this species carries also viruses (Triendrébéogo *et al.*, 2010).

Different plant species are differently adapted to drought periods. Some herbs originate from arid regions and are basically already adjusted to the shortage of moisture in the soil (Rode and Knapič, 2006). Plants of common marshmallow are described as the one which love marshy environments and are very well present all around Europe (Ross, 2001; Gardner, 2005). Global climate changes could have already in the near by future an extensive influence on greater importance of some pests, also those which harm common marshmallow. And *P. fuscicornis* could spread in the forthcoming time from warmer parts of the Europe to regions which have till now unfavourable climate factors for the occurrence of species.

In our opinion, induced extent of damage made by flea beetle presented in this paper did not influence the productivity of common marshmallow. But the abundance of up till now less known insect species warns us that changes in weather patterns and future climate changes could have influence on bionomics of the plant pests (Fuhrer, 2003; Thomson *et al.*, 2010),

which was not till now classified as economically important. If expecting the increase in herbal plants

production, as well on domestic as broader, we must namely take into consideration also this factor.

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