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First documented feeding interaction between the agricultural pest insect *Oulema melanopus* and the invasive weed species *Eriochloa villosa*

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Abstract:

Oulema melanopus is a widespread agricultural pest insect that causes significant yield losses in cereal crops as a result of leaf damage during its larval stages. Infestations are unpredictable and sporadic, and research shows it can reliably feed on Poaceae family weeds, as well. In this paper we describe the first observed feeding interaction between *O. melanopus* and *Eriochloa villosa*, an East Asian weed that became a relevant invasive species in North America and Europe, especially due to its competitive nature and resulting yield losses within crops such as maize and soybeans. In June 2024, *O. melanopus* adults were observed to intensively feed on *E. villosa*, leaving typical elongated slits on most plant individuals grown in untreated experimental pots. We describe the resulting injuries in detail and discuss the relevance of the timing, as this occurred before surrounding cereal fields were harvested, and thus these individuals were most likely not forcefully displaced from their main hosts. We also discuss the importance of reporting interspecific interactions officially through scientific outlets due to the potential aid in creating better management strategies and prevention programs for invasive species and problematic pests, while also providing relevant ecological insights on their adaptability and interaction dynamics for further studies.

• Introduction

Oulema melanopus Linnaeus 1761 is a widespread native Eurasian agricultural pest species from the Chrysomelidae family. Although both life stages feed on cereal leaves, late larval instars cause the most economic damage. It is also a known disease vector for several pathogens such as viruses and bacteria. *Eriochloa villosa* (Thunberg) Kunth 1815, commonly known as the woolly cupgrass, is part of the same family as of many of *O. melanopus'* preferred hosts, Poaceae. In this paper we report the first observation of the interaction between them.

• Materials and Methods

In total, 30 pots with a 20 cm diameter and 15 cm deep were used for *E. villosa* multiplication, with about 30 seeds sown per pot. No treatments such as pesticides or fertilizers were applied on the plant individuals. *E. villosa* seeds were collected from wild populations found in agricultural fields near Sânandrei village, Romania in 2022 and 2023. They were mixed together and stored in open glass jars at room temperature in a dry environment after collection. Before sowing, the seeds were stored at 4–5 °C for 6 weeks; no pre-sowing treatment was performed. On May 14, 2024, the seeds were directly sown and seedlings started emerging on May 25. The nursery area was installed in a residential area in Timișoara city, Romania, under supervision in order to prevent an unwanted spread of *E. villosa*.

On June 13, perforations typical of *O. melanopus* adults were observed for the first time and closely studied. Both *O. melanopus* and *E. villosa* species determination was done using specialty literature and comparison with sample specimens.

• Results and Discussion

During the observations only adult individuals could be found (Figure 1). No larvae or larvae excrements encountered or observed. The wounds were thin, elongated parallel slits that mostly cut through leaves, but almost entirely between leaf veins. This damage is highly characteristic of adult *O. melanopus*, unlike that of their larvae which generally only consume the chlorophyll layer of the upper leaf part, giving it the aspect of a translucent "window pane" (Figure 2). Despite the large numbers of slits, the structural integrity of leaves was mostly intact and they did not undergo further chlorosis or necrosis. All plants remained green until their natural decline. The survival and spread of the newly emerged *O. melanopus* adults that appear starting with August is highly likely to depend on feeding upon secondary host plant species.

• Conclusions

A potential risk is that of turning the facultative perennial species *E. villosa* into a disease reservoir and vector that could affect subsequent crop cultures. Further studies are needed in order to better understand their interaction, preferences and susceptibility to pathogens.

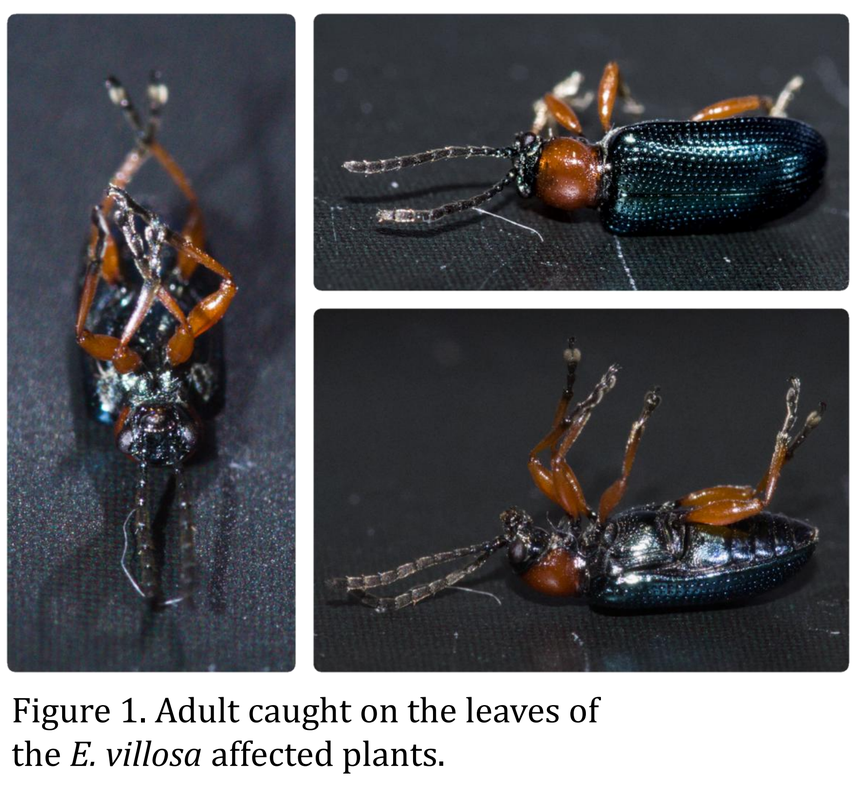

Figure 1. Adult caught on the leaves of the *E. villosa* affected plants.

Figure 2. Perforation lesions caused by adult *O. melanopus* feeding patterns.

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