First Occurrence of *Athaumastus haematicus* (Stål, 1860) on Crotalaria sp. in Ijuí, RS, Brazil

Primeira ocorrência de *Athaumastus haematicus* (Stål, 1860) em Crotalaria sp. em Ijuí, RS, Brasil

Primer hallazgo de *Athaumastus haematicus* (Stål, 1860) en Crotalaria sp. en Ijuí, RS, Brasil

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ABSTRACT
The diversification of crops and the introduction of new agricultural species are essential for the sustainability of production systems in Brazil, with a highlight on *Crotalaria juncea*. This plant, belonging to the Fabaceae family, is widely used as a green manure due to its nitrogen fixation ability, which improves soil fertility and controls nematodes and invasive plants, making it an excellent option for degraded soils and low fertility areas. *C. juncea* is primarily applied in agricultural systems such as sugarcane plantations due to its high biomass production and efficiency in controlling weeds like *Ipomoea sp*. and *Euphorbia heterophylla*. Studies demonstrate its adaptability to different sowing methods and local conditions. However, despite its benefits, this plant may be attacked by pests. In Brazil, the moth *Utetheisa ornatrix* is one of the main defoliators of Crotalaria, and globally, pests such as *Utetheisa pulchella*, *Laspeyresia pseudonectis*, and *Moissonia importunitas* affect the species. The presence of insects can compromise the productivity and quality of the plants, making constant monitoring and proper management essential. This work aims to report the first record of the red stink bug *Athaumastus haematicus* causing damage to *Crotalaria juncea* in Ijui, RS, Brazil.

Keywords: red stink bug, diversification, rotation, *Crotalaria* spp., NFB, IPM

RESUMO
A diversificação de culturas e a introdução de novas espécies agrícolas são essenciais para a sustentabilidade dos sistemas de produção no Brasil, com destaque para Crotalaria juncea. Esta planta, pertencente à família Fabaceae, é amplamente utilizada como adubo verde devido à sua capacidade de fixação de nitrogênio, que melhora a fertilidade do solo e controla nematoides e plantas invasoras, tornando-se uma excelente opção para solos degradados e áreas de baixa fertilidade. *Crotalaria juncea* é aplicada principalmente em sistemas agrícolas como plantações de cana-de-açúcar devido à sua alta produção de biomassa e eficiência no controle de plantas daninhas como *Ipomoea sp. e Euphorbia heterophylla*. Estudos demonstram sua adaptabilidade a diferentes métodos de semeadura e condições locais. Entretanto, apesar de seus benefícios, esta planta pode ser atacada por pragas. No Brasil, a mariposa *Utetheisa ornatrix* é um dos principais desfolhadores de *Crotalaria juncea* e, globalmente, pragas como *Utetheisa pulchella*, *Laspeyresia pseudonectis* e *Moissonia importunitas* afetam a espécie. A presença de insetos pode comprometer a produtividade e a qualidade das plantas, tornando essenciais o monitoramento constante e o manejo adequado. Este trabalho tem como objetivo relatar o primeiro registro do percevejo-vermelho *Athaumastus haematicus* causando danos em *Crotalaria juncea* em Ijuí, RS, Brasil.

Palavras-chave: percevejo-vermelho, diversificação, rotação, Crotalaria spp., FBN, MIP

RESUMEN
La diversificación de cultivos y la introducción de nuevas especies agrícolas son esenciales para la sostenibilidad de los sistemas de producción en Brasil, destacando la *Crotalaria juncea*. Esta planta, que pertenece a la familia Fabaceae, se utiliza ampliamente como abono verde debido a su capacidad de fijación de nitrógeno, lo que mejora la fertilidad del suelo, además de controlar nematodos y plantas invasoras, lo que la convierte en una excelente opción para suelos degradados y de baja fertilidad. La *C. juncea* se aplica principalmente en sistemas agrícolas como los cañaverales, debido a su alta producción de biomasa y su eficiencia en el control de maleza como *Ipomoea sp*. y *Euphorbia heterophylla*. Los estudios demuestran su adaptabilidad a diferentes métodos de siembra y condiciones locales. Sin embargo, a pesar de sus beneficios, esta planta puede ser atacada por plagas. En Brasil, la polilla *Utetheisa ornatrix* es uno de los principales defoliadores de Crotalaria, y a nivel mundial, plagas como *Utetheisa pulchella*, *Laspeyresia pseudonectis* y *Moissonia* importunitas afectan a la especie. La presencia de insectos puede comprometer la productividad y la calidad de las plantas, por lo que es esencial un monitoreo constante y una gestión adecuada. Este trabajo tiene como objetivo reportar el primer registro del chinche rojo *Athaumastus haematicus* causando daños en *Crotalaria juncea* en Ijuí, RS, Brasil.

Palabras clave: chinche roja, diversificación, rotación, Crotalaria spp., FBN, MIP

1 INTRODUCTION

The diversification of crops and the use of new agricultural species are fundamental for promoting the sustainability of production systems in Brazil (Magano et al., 2024). Alternative crops, such as cover plants and green manures, have shown significant potential in improving soil quality, controlling weeds, and reducing chemical inputs. Among the most promising species for green manure, Crotalaria juncea stands out for its high adaptability and the agroecological benefits it provides (Carvalho et al., 2024).

The Crotalaria genus, belonging to the Fabaceae family, comprises more than 600 species widely distributed in tropical and subtropical regions. These plants, native to India, are known for their hardiness and ecological efficiency presenting a robust taproot system that facilitates biological nitrogen fixation in association with symbiotic bacteria (Flores, 2004). This characteristic is essential for improving soil fertility, controlling nematodes, and suppressing invasive plants, making Crotalaria an excellent alternative for degraded areas and soils of low fertility (Copetti et al., 2024). *C. juncea* has been widely employed in agricultural systems such as sugarcane plantations due to its high biomass production and efficiency in weed control. Studies conducted by Gomes et al. (2014) demonstrate that incorporated Crotalaria biomass suppresses the development of weeds such as *Ipomoea sp*. (morning glory) and *Euphorbia heterophylla* (euphorbia), while the plant residue left on the soil surface reduces the emergence of *Cenchrus echinatus* (sandbur).

These properties reinforce the need for specific management practices to enhance the suppressive effects of this species. Timossi et al. (2011) demonstrated that *C. juncea* maintains its

weed-suppressing efficiency regardless of the sowing method used, whether broadcasting or in rows 50 and 75 cm. This adaptability to local conditions and agricultural practices solidifies its relevance as a green manure in sustainable management systems. Similarly, Sodré Filho et al. (2004) and Duarte Júnior & Coelho (2008) emphasized that the use of green manures reduces the competition from invasive plants for light, water, and nutrients, making it harder for difficult-to-control species to persist. Cover crops in agricultural management have collaborated with weed suppression and overall cultivation improvements. In this context, the present study emphasizes the importance of Crotalaria juncea as a green manure, evaluating its effects on weed control and the associated benefits of its use in Brazilian agricultural systems (Araújo et al., 2021).

Although there is limited specific information on pests attacking Crotalaria in Brazil. Studies abroad have identified several insect species that affect this plant in different parts of the world. In Brazil, the moth *Utetheisa ornatrix* is one of the main defoliators in Crotalaria crops. In India, species such as *Utetheisa pulchella* and the top shoot borer *Laspeyresia pseudonectis* are recognized as significant pests of *Crotalaria juncea* (Orwa et al., 2009). In Africa, the stink bug *Moissonia importunitas* is also a major pest of the Crotalaria species. In North America, the moth *Syncopacma crotolariella* has been observed feeding on *Crotalaria pumilla*. These findings underscore the need for monitoring and controlling pests that affect Crotalaria, especially in sustainable agricultural systems, ensuring plant health and the effectiveness of its use.

According to Gallo et al. (2002), insects can cause significant damage to the crops at different stages of development, from emergence to harvest. These damages can vary in intensity and nature depending on the insect species, plant type, and environmental conditions. The pest's interference in the plant's life cycle can affect its productivity and quality, making constant monitoring and appropriate management strategies essential to minimize negative impacts (Ghoneim, 2022; Magano et al, 2023).

Leaf-footed bugs, pod bugs, and squash bugs, all members of the Coreidae family, are significant pests that can damage many crops, including Crotalaria juncea. These insects use their piercing-sucking mouthparts to feed seeds, pods, and stems, which can lead to reduced seed production, poor quality, and stunted growth. Leaf-footed bugs, with their distinctive leaf-like extensions on their hind legs, and pod bugs, such as Piezodorus guildinii, specifically target the developing pods, while squash bugs primarily affect cucurbit plants but can also infest other crops (Broadhead; Cottrell; Beck, 2024). The presence of these pests poses a threat to agricultural productivity, making monitoring and effective pest management essential. In this regard, this study aims to report the presence of Athaumastus haematicus (Stål, 1860) causing damage to *Crotalaria juncea* in Ijuí, RS.

2 THEORETICAL FRAMEWORK

The diversification of agricultural systems and the adoption of sustainable practices have increased the use of green manure species in Brazilian agriculture. Among these species, *Crotalaria juncea* stands out due to its high biomass production, biological nitrogen fixation capacity, and efficiency in weed suppression, making it an important component of conservation and low-input production systems (Magano et al., 2024; Carvalho et al., 2024). In addition to improving soil fertility, the species contributes to reducing invasive plants such as *Ipomoea spp*. and *Euphorbia heterophylla*, reinforcing its relevance in sustainable agriculture.

Despite its agronomic benefits, *Crotalaria juncea* may be affected by several insect pests capable of compromising plant development and biomass production. In Brazil, the moth Utetheisa ornatrix is recognized as one of the principal defoliators of Crotalaria species. Internationally, pests such as *Utetheisa pulchella*, *Laspeyresia pseudonectis, Moissonia importunitas*, and *Syncopacma crotolariella* have also been reported causing damage to species of the genus.

Among the insect groups associated with agricultural crops, members of the Coreidae family are considered economically important due to their piercing-sucking feeding habit. These insects feed on stems, pods, and seeds, causing reductions in plant vigor, productivity, and seed quality (Broadhead; Cottrell; Beck, 2024). According to Gallo et al. (2002), insect pests can interfere with plant development at different growth stages, emphasizing the importance of monitoring and pest identification within integrated pest management programs.

In this context, the identification of *Athaumastus haematicus* associated with *Crotalaria juncea* represents an important phytosanitary record for Brazilian agriculture. To date, there are few studies and limited biological and ecological information available regarding this species in Brazil, especially concerning its association with agricultural crops. Therefore, this study reports the first occurrence of *Athaumastus haematicus* causing damage to *Crotalaria juncea* in Brazil, contributing to the knowledge of pest-host relationships and supporting future monitoring and management strategies in sustainable agricultural systems.

3 MATERIAL AND METHODS

The research was conducted at the UNIJUI Experimental Campus, located in the municipality of Ijuí, RS, at coordinates 28°23'15"S and 53°56'39"W, during the period from August to November 2023. Each experimental unit comprised a plot measuring 9.00 x 2.40 meters, resulting in a total of 12 plots, each occupying an area of 21.6 square meters. The plots were planted with Crotalaria sp., where the specimens were found. Images were captured using a Sony Alpha a6400 digital camera, renowned for its excellent image quality, fast autofocus, and advanced features. This

camera is, equipped with a 24.2MP APS-C sensor and Real-time Eye AF technology, ensuring high-quality images throughout the developmental phases of the insects, which were studied in the Entomology Laboratory at UNIJUI.

4 RESULTS AND DISCUSSIONS

Crotalaria is widely used as a cover crop for biomass production in no-tillage systems and for mulching formation (Flores and Miotto, 2005; Garcia et al., 2013; Lima and Castro et al., 2017). Despite its importance, there is a lack of detailed technical knowledge about the management of this crop. Additionally, Crotalaria is often intercropped with economically significant crops, providing benefits such as nematode control, pollinator attraction, and increased nitrogen fixation in the soil (Garcia et al., 2013). It is also used to manage phytonematodes, rehabilitate areas contaminated by toxic substances such as arsenic, and produce textile fibers (Garcia et al., 2013). These plants are notable for their high dry mass production, nitrogen fixation, and nutrient cycling, although these characteristics vary depending on the species, planting season, management practices, and edaphoclimatic conditions (Lima and Castro, 2017).

The above-ground portion of certain plants, such as the inflorescence, plays a critical role in attracting pollinators and natural enemies due to its vibrant coloration and abundant floral resources, including pollen and nectar. Additionally, the seeds and leaves of these plants contain bioactive compounds, such as monocrotaline, which contribute to defense mechanisms against herbivory and pest population reduction (Rech et al., 2024). The seeds have a higher concentration of monocrotaline, while the leaves contain lower amounts but still play an important role in plant defense. Monocrotaline, a secondary metabolite, is essential for protecting plants from herbivores. Below ground, the roots are responsible for the synthesis of monocrotaline and promote root nodulations that contribute to nematode control and increased soil fauna diversity. (Hartmann, 1995; Hartmann e White, 1999). Organic matter in the soil also plays a significant role, as plants that do not produce monocrotaline can accumulate this compound when growing in soils with decomposing plants that contain monocrotaline, further contributing to pest suppression (Rech et al., 2024).

Despite the presence of Crotalaria in the experimental area, an infestation of insects was observed. This occurred even with the diversity of crops in the field, which demonstrated a variety of food sources. However, the choice of infestation was driven primarily by the specific preferences of the insect species, particularly during the reproductive period of the Crotalaria crop. The insects' selection was influenced not only by the availability of floral and vegetative resources but also by the plant's phenological stage, highlighting the complex interactions between crop timing and pest dynamics in agroecosystems.

Athaumastus haematicus is an insect species with males having a total body length ranging from 12.3 to 14.2 mm, and females from 12.0 to 13.5 mm. Males have a brown head with reddish tones, a brown pronotum, and a dark red scutellum, while females have light brown dorsal and ventral coloration. The antennal and rostral segments vary in length, with males showing more variation. Both sexes have dark legs tinged with red and distinctive morphological features, such as spines on the metafemora and teeth on the tibiae. The hemelytra are shorter in males, and the abdomen of females is slightly larger and wider.

The taxonomic hierarchy is as follows: belonging to the Kingdom Animalia and the Phylum Arthropoda, this species is classified under the Superclass Hexapoda and the Class Insecta. Within the Order Hemiptera, it is placed in the Suborder Heteroptera, the Family Coreidae, and the Subfamily Coreinae. Its Tribe is Acanthocerini, and its Genus is *Athaumastus*, culminating in the Species *Athaumastus haematicus* (Stål, 1860).

According to Pall & Coscarón, 2009 the male of Athaumastus haematicus has a total body length ranging from 12.3 to 14.2 mm. The head length is between 1.0 and 1.2 mm, with a width ranging from 1.4 to 1.8 mm. The eye width varies between 0.2 and 0.3 mm, with the interocular space ranging from 0.8 to 0.9 mm, the preocellar distance being 0.4 mm, and the interocellar space being 0.2 mm. The rostrum length in the segments is as follows: segment I from 0.7 to 0.8 mm, segment II 1.2 mm, segment III 1.0 mm, and segment IV from 0.64 to 0.7 mm. The antennal segments have the following measurements: segment I from 1.8 to 2.1 mm, segment II from 1.3 to 2.2 mm, segment III from 2.2 to 2.7 mm, and segment IV from 1.4 to 2.0 mm. The pronotum has a length ranging from 2.3 to 2.9 mm and a width from 4.6 to 6.4 mm, while the scutellum has a length of 2.3 mm and a width of 2.2 mm.

The length of the abdomen, including the hemelytra, ranges from 8.6 to 9.8 mm, with a width between 3.9 and 4.6 mm. The dorsal coloration is characterized by a brown head with reddish tones, except for the bases of segments 2 and 3 of the antennae, which have brownish tones. The pronotum is brown with reddish tones, and the scutellum is dark red. The corium and clavus are brown with reddish tones, and the hemelytral membrane is dark brown with light brown veins. The connexival segments are dark with a slight reddish coloration. The ventral coloration is light brown with reddish tinges, the mesosternum is darker, and the abdomen is not uniformly pigmented. The legs are brown with reddish tones. The structure of the pronotum is rugose, with rough, acute spine-like projections on the frontal angles, and the humeral angles have two rounded projections. The scutellum has a granulated surface. The metafemora has two rows of spines, and the tibiae has small teeth at the base. The hemelytra are shorter than the abdomen.

According to Pall & Coscarón, 2009 the female of *Athaumastus haematicus* has a total body length ranging from 12.0 to 13.5 mm. The head length is 1.0 mm, with a width ranging from 1.4 to 1.6 mm, eye width between 0.2 and 0.3 mm, interocular space from 0.8 to 0.9 mm, preocellar distance of 0.4 mm, and interocellar space of 0.3 mm. The rostrum length in the segments is as follows: segment I from 0.6 to 0.8 mm, segment II 1.2 mm, segment III 0.9 mm, and segment IV 0.7 mm. The antennal segments have the following measurements: segment I from 1.1 to 1.7 mm, segment II from 1.5 to 1.6 mm, segment III from 1.9 to 2.0 mm, and segment IV from 1.2 to 1.5 mm. The pronotum length ranges from 2.2 to 2.7 mm, with a width between 4.2 and 5.0 mm. The scutellum has a length of 1.7 mm and a width of 1.5 mm. The length of the abdomen, including the hemelytra, ranges from 9.0 to 11.0 mm, and without the hemelytra, it ranges from 9.6 to 11.3 mm. The abdomen width ranges from 4.7 to 5.4 mm. Both the dorsal and ventral coloration are light brown. The pronotum has granulated anterior angles, and the humeral angles have two rounded projections.

The damage caused by stink bugs to Crotalaria significantly affects both the plant's development and seed quality. The sucking of sap weakens the plant, hindering its growth and photosynthetic capacity, which directly impacts flower and pod formation. This damage reduces the quantity and quality of seeds, which are essential for commercial production. Additionally, stink bugs can act as vectors for diseases, exacerbating the damage and compromising plant health. Severe infestations can even lead to the death of plant tissues, particularly in young plants, resulting in considerable productivity losses. Efficient pest control is crucial to ensure healthy and high-quality seed production

5 CONCLUSIONS

Additionally, the observation of parasitism in one individual of Athaumastus haematicus suggests the occurrence of natural enemies that may contribute to its population regulation. This reinforces the importance of Integrated Pest Management (IPM) strategies and the investigation of biological control agents associated with the species.

The early identification of new pest occurrences is essential for supporting monitoring programs and developing sustainable management practices, minimizing potential economic and environmental impacts while preserving the agronomic benefits provided by Crotalaria juncea in Brazilian agricultural systems.

However, this study was limited to field observations conducted in a restricted geographic area and over a single evaluation period, which may not fully represent the distribution, seasonal dynamics, or infestation potential of the species in other production regions. Future studies should

focus on population dynamics, life cycle characterization, feeding behavior, host range, environmental factors influencing infestation, and the identification of natural enemies and biological control strategies. Furthermore, research evaluating the economic damage threshold and management alternatives for *Athaumastus haematicus* in sustainable cropping systems is strongly recommended.

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Figure 1 – *Athaumastus haematicus* (Hemiptera: Coreidae) on *Crotalaria juncea*. plants. (A) Adult on the host plant leaf. (B and C) Individuals in different stages interacting with the pods. (D) Interaction of a smaller insect with the plant's reproductive structure.

