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Short Communication

Iphimeis dives (Crysomelidae) Beetle occurrence in beans in western Parana State, Brazil

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Iphimeis dives **(Germar, 1824) is a species of beetle from Chrysomelidae family, commonly found in fruit trees, and it is known as a vine defoliator beetle or Green Beetle. In this study, *I. dives* occurrence in bean *(Phaseolus vulgaris L.)* is registered in the cities of Assis Chateaubriand and Palotina, western region of Paraná State. This is the first recorded *I. dives* attack in Brazil's bean crops. The insects were collected when plants were between the phenological development stages V4 /R5. Although commonly found in fruit trees and some vegetables, this record in bean crop suggests greater attention to this insect because of the damage it may cause in this culture.**

Key words: *Phaseolus vulgaris* L., defoliator beetle, green beetle.

INTRODUCTION

Beans (*Phaseolus vulgaris* L.) is the Brazilian population's staple food, being an excellent food since it provides essential nutrients to humans such as protein, iron, calcium, magnesium, zinc, vitamins, carbohydrates and fiber (Mesquita et al., 2007). In addition, bean has a great socio-economic importance as it is grown by small, medium and large producers throughout the country, in diverse production systems (Moura and Brito, 2014). The total grain production in Brazil's 2013/14 crop was 3.45 million tons in an area of 3.36 million hectares, whereas Paraná state had a production of 808,900 tons of grains (Conab, 2015), being the largest domestic producer. However, the crop can be affected by various insects, including Chrysomelidae family coleopterous (Oliveira and Ramos, 2012), especially *Diabrotica speciosa* and *Cerotoma arcuata*, known as little cows (Moura et al., 2014; Pratissoli et al., 2012; Schmildt et al., 2010). In adulthood, these insects reduce the plants leaf area (Quintela and Barbosa, 2014) and it may cause significant decrease in the photosynthetic capacity of the crop, resulting in decreased productivity (Pratissoli et al., 2012; Schmildt et al., 2010; Silva et al., 2003).

The Chrysomelidae family consists of various coleopterous, including the *Iphimeis dives* species (Germar, 1824), also known as vine defoliator beetle or green beetle, which has been reported attacking various fruit trees, some crops and vegetables (Basso et al., 1974; Mariconi, 1962; Milléo et al., 2013;. Wiest and Barreto, 2012). According to Quintela and Barbosa

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(2014), coleopterous of this family in adulthood cause defoliation throughout the bean crop cycle, and they may feed on flowers and pods. The most significant damage occurrs in the seedling stage, since they may consume the apical bud. In case of a high insect population, there might not be available leaf area, causing plant death.

Silva et al. (2003) point out that the bean's ability to recover after defoliation varies according to the development stage it is subject to damage. Glier et al. (2015) observed that defoliation in V4 and R5 stages are the most harmful to the crop, occurring greater reduction in production potential. Similarly, Fontoura et al. (2006) also observed that the most critical stage for leaf area loss is R5, which significantly reduces crop yield with the intensification of the plant's leaf area removal. Silva et al. (2012) found that in all phenological stages productivity is lost as the defoliation degree is intensified.

Knowledge of the habits and biology of insect pests species that occur in each region is essential to avoid crop losses, because during the crop cycle many species of insects can arise, and some of which can increase its population at the extend of being capable to cause losses to farmers, due to reduced production. In this context, Wiest and Barreto (2012), mention that it is essential to have knowledge about the insects that occur in a crop, in order to be programmed to perform phytosanitary treatments and also to predict new pests emergence. Thus, the aim of this study was to report for the first time the *I. dives* coleopterous occurrence in bean crops in the Western Paraná State region.

MATERIALS AND METHODS

In experiments with the bean crop installed in August 2014, in the cities of Assis Chateaubriand- PR and Palotina-PR, western Paraná state, the presence of a beetle was observed between the months of September and October, occurrence that has not been reported so far in bean crops in this region. The beetle's size was 7 to 9 mm long, with shiny metallic green coloration in its elytra and metallic dark blue on its prothorax. It fell on the ground when touched, as it was dead.

Bean cultivars used in the experiments were IPR Campos Gerais, IPR Tangará and IPR Tuiuiú. When bean plants were among the phenological stages V4 - third trifoliate leaf, and R5 - flower buds (Didonet and Victoria, 2006; Fancelli and Dourado Neto, 2007) insects present in the experimental area were collected and stored in 70% alcohol, and later were sent for identification in the Invertebrate Zoology section at Natural Sciences Museum from Zoobotanic Foundation of Rio Grande do Sul, Porto Alegre, state of Rio Grande do Sul, Brazil.

RESULTS AND DISCUSSION

The insect was identified as a coleopterous belonging to the Chrysomelidae family, which species is the *Iphimeis dives* (Germar, 1824). Regarding this species, Mariconi (1962) mentioned that for a few reasons known it had not been investigated by the entomologists yet, although at that time there were already reports of this insect using various plants as hosts (black wattle, coffee, jabuticaba, orange, velvet bean, kapok, rose, soy, vines). Basso et al. (1974) also reported that this insect attacks the eggplant (*Solanum melongela*). Milléo et al. (2013) mentioned that *I. dives* occur very often in various fruit tree orchards (orange, lemon, tangelo, tangerine, persimmon, apple, nectarine, pear, peach).

Figure 1. *Iphimeis dives* coleopterous (Germar, 1824) in bean leaves (*Phaseolus vulgaris).*

Wiest and Barreto (2012), reporting the insect pests evolution on soybean crops in Mato Grosso state, mentioned that in 1988 *I. dives* was considered a secondary pest of this crop. However, in later years there was no record of this pest attacking the soybean crop. These authors further said that since the survey conducted in 2008, this pest was not even framed as a sporadic pest of soybean crops; it was possibly removed from that farming. Though, there are still few information about this insect in the bibliography, and the few quotes found relate to damage caused by the adult ones in some fruit trees. In the experimental field *I. dives* was found feeding on bean leaves (Figure 1), which resulted in decreased plant leaf area (Figure 2). The leaves are responsible for the plant gas exchange and photosynthetic activity, so any factor that interferes with the leaf area can affect productivity (Raven et al., 2007).

According to Acioli et al. (2014), chrysomelids while feeding can cause superficial damage in leaf tissue or even pierce the leaves by making more or less regular and circular shaped holes. When their attack is intense, the leaf is completely perforated, what reduces the photosynthetic capacity, and consequently the production.

Figure 2. Damage in bean leaves (*Phaseolus vulgaris* L.) caused by *Iphimeis dives* coleopterous (Germar, 1824).

Oliveira and Ramos (2012) point out that it is important to observe the crop development stage in which the damage occurs. For Acioli et al. (2014) chrysomelids attack can occur at any stage or period of the plant's development, but occurring preferably in younger plants and leaves, which requires greater care in the early stages of plant growth. Quintela and Barbosa (2014) mentioned that when plants are in a higher stage of development, the damage caused by chrysomelids are smaller.

Studies have been performed simulating the attack by defoliator insects in bean crop. For example, Silva et al. (2003), by evaluating defoliation on bean crop, concluded that a defoliation of 25% at 24 days after emergence caused an average decrease of 21.7% in bean yield. Pratissoli et al. (2012) and Schmildt et al. (2010), by evaluating the influence of artificial defoliation to simulate losses in bean production, observed a productivity reduction with increased defoliation levels in virtually all development stages analyzed.

For Pratissoli et al. (2012), this fall of grain yield is due to the reduction in photosynthetically active area, which consequently reduces the amount of photoassimilates produced, affecting negatively the productivity components. Fontoura et al. (2006) also mention that productivity components are adversely affected by the intensity of defoliation.

On the other hand, Quintela and Barbosa (2014) report several studies have indicated that bean can withstand tolerable levels of defoliation (20-66%) without reducing production.

However, variations in responses to defoliation observed in diverse studies demonstrate the existence of genotypic variability, and such results should not be extrapolated to different cultivars (Pratissoli et al., 2012).

For Morales (2000), it is important to have knowledge of the insect populations of Coleoptera order to develop appropriate management methods, aiming to prevent the population increase of pest species of this group. It is worth noting that the Chrysomelidae family insects are an important group of phytophagous insects that feed on a wide variety of plants. In addition to leaves, adult chrysomelids also consume root, stem, flowers, pollen and anther, thus causing direct damage, or even being able to act as virus transmitters to the plants, causing indirect damage (Acioli et al., 2014) and resulting in decreased productivity.

Conclusion

This report records the occurrence of *I. dives* coleopterous attacking bean crops (*Phaseolus vulgaris* L.), in the cities of Assis Chateaubriand and Palotina, Western Parana State region. Since it is the first record of this insect in bean crop, it is important to follow up its population in this culture in order to observe the real potential of this species as a pest, as it is cited causing damage to other crops of economic importance.

Conflict of interests

The author have not declared any conflict of interest.

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REFERENCES

Acioli ANS, Costa GKG, Moura TN, Guimarães MA, Almeida R, Miranda JF (2014). Entomofauna associada ao cultivo de cubiu (*Solanum sessiliflorum* Dunal) no município de Benjamin Constant, Amazonas, Brasil. EntomoBrasilis 7:99-105.

Basso IV, Link D, Lopes OJ (1974). Entomofauna de algumas solanáceas em Santa Maria, RS. Revista Centro Ciências Rurais 4:263-270.

Conab - Companhia Nacional de Abastecimento (2015). Acompanhamento da Safra Brasileira de Grãos, oitavo levantamento, maio 2015. Brasília: Conab. P 122.

Didonet AD, Vitória TB (2006). Resposta do feijoeiro comum ao estresse térmico aplicado em diferentes estágios fenológicos. Pesquisa Agropecuária Tropical 36:199-204.

Fancelli AL, Dourado Neto D (2007). Produção de feijão. Piracicaba: Livroceres. P 386.

Fontoura TB, Costa JS, Daros E (2006). Efeitos de níveis e épocas de desfolhamento sobre o rendimento e os componentes do rendimento de grãos da soja. Scientia Agraria 7:49-54.

Glier CAS, Duarte Júnior JB, Fachin GM, Costa ACT, Guimarães VF, Mrozinski C (2015). Defoliation percentage in two soybean cultivars at different growth stages. Rev. Bras. Eng. Agríc. Ambient. 19:567-573.

Mariconi FAM (1962). "Besouro Verde", novo depredador da laranjeira. Anais da Escola Superior de Agricultura "Luiz de Queiroz" 19:383-388.

Mesquita FR, Corrêa AD, Abreu CMP, Lima RAZ, Abreu AFB (2007). Linhagens de feijão (*Phaseolus vulgaris* L.): composição química e digestibilidade protéica. Ciênc. Agrotec. 31:1114-1121.

Milléo J, Souza JMT, Barbola IF, Moura LA, Pucci MB (2013). Diversidade e sazonalidade de crisomelídeos (Coleoptera: Chrysomelidae) em pomar, no município de Ponta Grossa, Paraná, Brasil. Rev. Bras. Frutic. 35:454-463.

Morales NE (2000). Flutuación poblacional de *Scolytidae* (Coleoptera) em zonas reflorestadas com *Eucalyptus grandis* em Minas Gerais, Brasil. Rev. Biol. Trop. 48:101-107.

Moura AD, Brito LM (2014). Aspectos socioeconômicos. In: Carneiro JE, Paula Júnior TJ, Borém A. Feijão: do plantio à colheita. Viçosa: UFV. p. 384.

Moura JZ, Páuda LEM, Moura SG, Ribeiro NWSM, Silva PRR (2014). Nível de dano econômico para insetos desfolhadores em feijão-caupi. Rev. Caatinga 27:239-246.

Oliveira MB, Ramos VM (2012). Simulação de dano de *Diabrotica* em feijoeiro (*Phaseolus vulgaris*) para estimativa de nível de ação. Rev. Agrar. 5:181-186.

Pratissoli D, Schmildt ER, Amaral JAT, Schmildt O (2012). Níveis de desfolha artificial para simular perdas na produtividade do feijoeiro comum. Scientia Agraria Paranaensis 11:68-76.

Quintela ED, Barbosa FR (2014). Manejo de pragas. In: Carneiro JE, Paula Júnior TJ, Borém A. Feijão: do plantio à colheita. Viçosa: UFV. P 384.

Raven PH, Evert RR, Eichhorn SE (2007). Biologia Vegetal. 7.ed. Rio de Janeiro: Editora Guanabara Koogan. P 856.

Schmildt ER, Amaral JAT, Pratissoli D, Reis EF (2010). Influência de desfolhas artificiais para simular perdas na produção do feijoeiro (*Phaseolus vulgaris* L. cv. xamego). Arq. Inst. Biol. 77:457-463.

Silva AL, Veloso VRS, Crispim CMP, Braz VC, Santos LP, Carvalho MP (2003). Avaliação do efeito de desfolha na cultura do feijoeiro (*Phaseolus vulgaris* L.). Pesqui. Agropecuária Trop. 33:82-87.

Silva AM, Degrande PE, Suekane R, Fernandes MG, Zeviani WM (2012). Impacto de diferentes níveis de desfolha artificial nos estádios fenológicos do algodoeiro. Rev. de Ciências Agrárias 35:163-172.

Wiest A, Barreto MR (2012). Evolução dos insetos-pragas na cultura da soja no Mato Grosso. Entomobrasilis 5:84-87.