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First recorded feeding of *Syngamia florella* (Lepidoptera: Crambidae: Spilomelinae) on *Ipomoea batatas* (Convolvulaceae) in Brazil

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Syngamia florella (Stoll in Cramer & Stoll) (Lepidoptera: Crambidae) belongs to the Spilomelinae subfamily. This subfamily comprises more than 5,200 species in 327 genera worldwide, with about one-third of the Pyraloidea species (Landry 2020; Yang et al. 2020). In Neotropical regions, it is represented by 1,423 species in 171 genera (Landry 2020). Spilomelinae caterpillars feed on angiosperms with different levels of host specificity, and some species also feed on gymnosperms and ferns (Creuwels 2017). Information regarding ecology and associations with host plants is extensive for species that occur in Europe and North America (Clavijo-Albertos & Arias-Celis 2017). However, the group is poorly studied in Brazil.

Ipomoea batatas (L.) Lam. (Convolvulaceae), the sweetpotato, is a food of major importance in the world with a growing market and is recognized for its contribution to food security (FAO 2018; Santos et al. 2018). Both roots and foliage are sources of human and animal nutrition, and provide the raw material for the production of biofuels and the food industry, because they are rich in carbohydrates, carotenoids, flavonoids, B vitamins, potassium, iron, and calcium (Echodu 2019; Alam 2021). Purple pulp cultivars may present anthocyanins, a type of flavonoid with antioxidant action, with levels similar to those of grape, acai berries, blueberry, blackberry, and plum plants with the potential to become commercial sources of this substance (Vendrame et al. 2022).

Ipomoea batatas is grown globally, with about 80% of its production in Asia, 15% in Africa, and 5% in the rest of the world (FAO 2018). The area planted and the yield of *I. batatas* in the US has increased by 65 and 35%, respectively, in the last 20 yr (2000–2020) (USDA 2021). This increase in *I. batatas* production is mainly due to the expansion of areas planted in California, Louisiana, Mississippi, and North Carolina (Johnson et al. 2015; Harvey et al. 2022). Florida also has become a prominent producer with nearly 2,500 ha of *I. batatas*, most in Miami-Dade and Suwannee counties (Alam 2021). The plant has diversified uses in the US, promoting the nutrition of humans and animals, especially in the food industry (Sawicka et al. 2018). The *I. batatas* vines are used as silage for animals, and the tuberous roots in the production of sugar, flour, dehydrated products, potato chips, candied products and desserts, soups, infant food, and to produce probiotic foods and bioethanol (Johnson et al. 2015; Costa et al. 2018).

The expansion of productive areas of *I. batatas* can increase pest populations and cause damage and economic losses (Ayabe et al. 2017). Aerial pests result in changes in leaf morphology that lead to leaf senescence. The yield of tuberous root production is reduced due to the loss of photosynthetic area, thus affecting the main commercial product (Chen et al. 2017). Density, distribution, and damage by pests vary according to host plants and geographic region (Erpen et al. 2013). The objective was to record, for the first time, the occurrence of *S. florella* feeding and developing on leaves of *I. batatas* in the region of Diamantina, Minas Gerais State, Brazil.

Syngamia florella caterpillars were found feeding on *I. batatas* leaves in experimental crops in the Olericulture Sector of the Universidade Federal dos Vales do Jequitinhonha e Mucuri in Diamantina, Minas Gerais State, Brazil (18.1967306°S, 43.5690944°W; 1,387 mals). Caterpillars were collected and taken to the Laboratory of Entomology at the Universidade Federal dos Vales do Jequitinhonha e Mucuri and reared with leaves of *I. batatas* until the adult stage. The taxonomist Victor Osmar Becker of the Instituto Uiraçu, Camacan, Bahia State, Brazil, identified the specimen.

Individuals identified as *S. florella* were found feeding on and damaging the leaves of *I. batatas* (Fig. 1). Its caterpillars fed on the leaves soon after eclosion, enclosing parts of the leaf blade with silk threads and scraping them internally, keeping the external cuticle intact. The final instar completely closes 1 part of the leaf, making a rigid protection with silk threads, where this insect pupates. The observation of *S. florella* feeding and completing its cycle with *I. batatas* leaves increases the potential for damage in commercial plantations of this species. Several species of Crambidae, Spilomelinae are known for their economic impact on crops, including *Omphisa anastomasalis* (Boisduval & Guenee) pest of *I. batatas*; *Ostrinia nubilalis* (Hübner) in maize; *Maruca vitrata* (Fabricius) in beans; *Cnaphalocrocis medinalis* (Guenée), *Cnaphalocrocis patnalis* (Bradley), *Cnaphalocrocis ruralis* (Walker), *Cnaphalocrocis trapezalis* (Guenée), *Cnaphalocrocis exigua* (Butler), and *Cnaphalocrocis poeyalis* in rice (Boisduval) (Wang et al. 2014; Saini et al. 2017; Makini et al. 2018).

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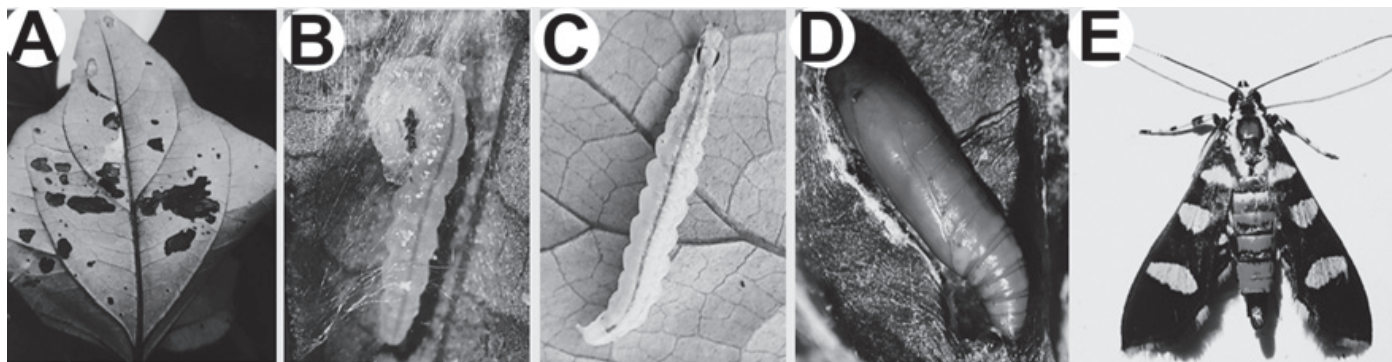


Fig. 1. Leaf of *Ipomoea batatas* with injuries (A), the caterpillar of early instars with the protection of silk threads (B), caterpillar of the last instar (C), pupae (D), and adult (E), of *Syngamia florella* (Stoll in Cramer & Stoll) (Lepidoptera: Crambidae) on leaves of *Ipomoea batatas*. Photo credits: Maria Jéssica dos Santos Cabral, Universidade Federal dos Vales do Jequitinhonha e Mucuri.

The *S. florella* was found feeding on *Spermacoce exilis* (L.O. Williams) (Rubiaceae) in the mid-northern tropical forest ecotone in the Guanacaste Conservation Area, northwest Costa Rica (Fleming et al. 2014). This insect is a diurnal and Neotropical moth found from the southern US to Argentina, including the West Indies and Bahamas (Fleming et al. 2014; Pickering & Staples 2016). It is a small, colorful moth and the only species of the genus listed for North America and Northern Mexico, and as a common species yr-round in Georgia, USA (Pickering & Staples 2016). Its color is mahogany (brown with a reddish hue), 3 large bright yellow spots on the forewing, and 2 outer spots somewhat elongated and oval (Brou 2002). The hindwing of this insect is mahogany, with yellow radiating from the basal area, mainly in the anal region (Brou 2002). The head and thorax are mahogany with yellow spots; the proximal abdominal segment is also mahogany, the next segment is yellow, and the remaining is predominantly orange, with similar coloration for both sexes (Brou 2002).

Syngamia florella is reported, for the first time, feeding and injuring leaves of *I. batatas* in Brazil. This record is important to understand this insect's survival, dispersion, establishment, and damage in areas where *I. batatas* is cultivated. This insect is registered in North, Central, and South America, and may become a pest of this crop in Brazil, requiring monitoring in integrated pest management programs.

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Summary

Spilomelinae comprises more than 5,200 described species worldwide. Several species are known for their economic impact on crops, occurring in high populations in host plants, with different degrees of host specificity. The objective was to record caterpillars of *Syngamia florella* (Stoll in Cramer & Stoll) (Lepidoptera: Crambidae: Spilomelinae) feeding on leaves of *Ipomoea batatas* (L.) Lam. (Convolvulaceae). Plants damaged by *S. florella* were observed in the field in the municipality of Diamantina, state of Minas Gerais, Brazil. This is the first record of *S. florella* feeding and completing its cycle on *I. batatas*. Registering a new host for *S. florella* is important to understand this insect's survival, dispersal, establishment, and damage in areas where *I. batatas* is cultivated.

Key Words: sweetpotato; pests; Spilomelinae

Sumario

Spilomelinae compreende mais de 5.200 espécies descritas em todo o mundo. Várias espécies são conhecidas por seu impacto econômico nas lavouras, ocorrendo em altas populações em plantas hospedeiras, com diferentes graus de especificidade ao hospedeiro. O objetivo foi registrar lagartas de *Syngamia florella* (Stoll in Cramer & Stoll) (Lepidoptera: Crambidae: Spilomelinae) alimentando-se de folhas de *Ipomoea batatas* (L.) Lam. (Convolvulaceae). Plantas danificadas por *S. florella* foram observadas em campo, no município de Diamantina, estado de Minas Gerais, Brasil. Este é o primeiro registro de *S. florella* alimentando-se e completando seu ciclo em *I. batatas*. O registro de um novo hospedeiro para *S. florella* é importante para entender a sobrevivência, dispersão, estabelecimento e dano desse inseto em áreas onde *I. batatas* é cultivada.

Palavras Chave: batata-doce; pragas; Spilomelinae

References Cited

- Alam MK. 2021. A comprehensive review of sweet potato (*Ipomoea batatas* [L.] Lam): Revisiting the associated health benefits. *Trends in Food Science & Technology* 115: 512–529.
- Ayabe Y, Minoura T, Hijii N. 2017. Oviposition site selection by a lepidopteran leafminer in response to heterogeneity of leaf surface conditions: structural traits and microclimates. *Ecological Entomology* 42: 294–305.
- Brou Jr VA. 2002. *Syngamia florella* (Stoll) (Pyralidae) in Louisiana. *Southern Lepidopterist's News* 24: 24. https://www.academia.edu/29897290/Syngamia_florella_Stoll_Pyraliae_in_Louisiana (last accessed 3 Mar 2023).
- Chen X, Kou M, Tang Z, Zhang A, Li H, Wei M. 2017. Responses of root physiological characteristics and yield of sweet potato to humic acid urea fertilizer. *PLoS ONE* 12: e0189715. doi: 10.1371/journal.pone.0189715
- Clavijo-Albertos J, Arias-Celis Q. 2017. Catálogo de los Spilomelinae de Venezuela (Lepidoptera: Crambidae). *SHILAP Revista de Lepidopterología* 45: 129–141.
- Costa D, Jesus J, Virgínio e Silva J, Silveira M. 2018. Life cycle assessment of bioethanol production from sweet potato (*Ipomoea batatas* L.) in an experimental plant. *BioEnergy Research* 11: 715–725.
- Creuwels J. 2017. Naturalis Biodiversity Center (NL) – Museum collection digitized at storage unit level. Naturalis Biodiversity Center, Leiden, Netherlands. <https://doi.org/10.15468/17e8en> (last accessed 3 Mar 2023).
- Echodu R, Edema H, Wokorach G, Zawedde C, Otim G, Luambano N, Asiimwe T. 2019. Farmers' practices and their knowledge of biotic constraints to sweet potato production in East Africa. *Physiological and Molecular Plant Pathology* 105: 3–16.
- Erpen L, Augusto SN, Uhlmann LO, Oliveira FCP, Andriolo JL. 2013. Tuberization and yield of sweet potato as a function of planting dates in subtropical climate. *Bragantia* 72: 396–402.
- FAO – Food and Agriculture Organization of the United Nations. 2018. Future of food and agriculture 2018: alternative pathways to 2050. FAO, Rome, Italy. <http://www.fao.org/3/CA1553EN/ca1553en.pdf> (last accessed 3 Mar 2023).

- Fleming AJ, Wood DM, Smith MA, Janzen D, Hallwachs W. 2014. A new species of *Cordyligaster* Macquart, reared from caterpillars in Area de Conservacion Guanacaste, northwestern Costa Rica. *Biodiversity Data Journal* 2: e4174. doi: 10.3897/BDJ.2.e4174
- Harvey LM, Shankle MW, Morris CJ, Hall MA, Chatterjee A, Harvey KM. 2022. Sweet potato (*Ipomoea batatas* L.) response to incremental application rates of potassium fertilizer in Mississippi. *Horticulturae* 8: 831. <https://doi.org/10.3390/horticulturae8090831>
- Johnson T, Wilson N, Worosz M, Fields D, Bond J. 2015. Commodity Highlight: Sweet Potatoes. USDA Economic Research Service. Situation and Outlook. Bulletin VGS-355-SA1. USDA, Washington, DC, USA.
- Landry B. 2020. Taxonomic revision of the Spilomelinae (Lepidoptera, Pyralidae) of the Galápagos Islands, Ecuador. *Revue Suisse de Zoologie* 123: 315–399.
- Makini FW, Mose LO, Kamau GK, Salasya B, Mulinge WW, Ongala J, Fatunbi AO. 2018. Innovation Opportunities in Sweet Potato Production in Kenya. Forum for Agricultural Research in Africa (FARA), Bonn, Germany.
- Pickering J, Staples T. 2016. How to sample moth diversity efficiently in a seasonal environment. *Southern Lepidopterist's News* 38: 142–147.
- Saini V, Singh S, Rawal R, Venkatesh YN. 2017. Species diversity and distribution of *Cnaphalocrocis* and *Scirpophaga* (Lepidoptera: Crambidae) species complex in rice in Tamil Nadu, India. *Journal of Entomology and Zoology Studies* 5: 1308–1313.
- Santos MM, Soares MA, da Silva IM, Fontes PCR, Zanuncio JC. 2018. First record of the sweet potato pest *Bedellia somnulentella* (Lepidoptera: Bedelliidae) in Brazil. *Florida Entomologist* 101: 315–316.
- Sawicka B, Michałek W, Pszczółkowski P, Danilčenko H. 2018. Variation in productivity of sweet potato (*Ipomoea batatas* L. [Lam.]) under different conditions of nitrogen fertilization. *Emirates Journal of Food and Agriculture* 105: 149–158.
- USDA–National Agricultural Statistics Service. 2021. Sweet potatoes. <https://www.agmrc.org/commodities-products/vegetables/sweet-potatoes> (last accessed on 3 Mar 2023).
- Vendrame LDC, Melo RDC, da Silva GO, Amaro G, Pilon L, Guimaraes J, Pinheiro JB, Pereira R. 2022. BRS Cotinga: nova cultivar de batata-doce de polpa roxa para processamento industrial-produtiva, com ampla adaptabilidade e rica em antioxidantes. Circular Técnica 177. Embrapa, Brasília, Distrito Federal, Brazil. <https://ainfo.criptia.embrapa.br/digital/bitstream/item/230003/1/CT-177-vfinal.pdf> (last accessed 3 Mar 2023).
- Wang YC, Zhang SK, Ren XB, Su J. 2014. Effects of dietary additives in artificial diets on survival and larval development of *Cnaphalocrocis medinalis* (Lepidoptera: Crambidae). *Florida Entomologist* 97: 1041–1048.
- Yang Z, Ullah M, Landry JF, Miller SE, Rosati ME, Zhang Y. 2020. Reassessment of the moth genus *Bacotoma*, with a new species from Hainan Island (Lepidoptera: Crambidae: Spilomelinae). *Insect Systematics & Evolution* 51: 384–407.