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Scientific Note

Noctuid Caterpillars (Lepidoptera) associated with medicinal *Cannabis sativa* L. crops in a protected cultivation system in São Paulo, Brazil

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Abstract. *Cannabis sativa* L. (Rosales: Cannabaceae) cultivation has expanded rapidly in Brazil, particularly for medicinal purposes, while crop protection studies and pest management strategies related to this plant species remain limited. During a field visit conducted in a protected cultivation system in São Paulo state, noctuid larvae were found associated with *C. sativa* plants. Specimens were identified as *Spodoptera androgea* (Stoll, 1780), *Spodoptera frugiperda* (J. E. Smith, 1797) (Lepidoptera: Noctuidae), in addition to Heliothinae larvae morphologically consistent with *Chloridea* cf. *virescens* (Fabricius, 1777). Larvae were mainly associated with apical inflorescences, where feeding activity resulted in internal tissue damage, entry perforations, frass accumulation, and desiccation of floral structures. To our knowledge, this is the first report of noctuid larvae associated with medicinal *C. sativa* cultivation in Brazil. The occurrence of the highly polyphagous *S. frugiperda*, a species of recognized economic importance in several agricultural crops, indicates the need for further investigation of its association with *C. sativa* under Brazilian cultivation conditions. In addition to direct damage, concealed infestations within inflorescences may compromise sanitary quality and hinder early management interventions. These findings highlight the need for systematic monitoring protocols and integrated pest management strategies adapted to medicinal cultivation systems under tropical conditions.

Keywords: Polyphagous pests, plant protection, inflorescence damage.

The expansion of *Cannabis sativa* L. (Rosales: Cannabaceae) cultivation in Brazil has outpaced the development of crop protection studies, particularly those focused on pest management. Although cultivation by patient associations has been established for nearly a decade (Souza et al. 2022), scientific advances remain limited due to historical bureaucratic barriers and restricted access to plant material for research (Dias et al. 2025). This knowledge gap is especially concerning given the rapid growth of the national market, which reached an estimated value of US$ 190.37 million in 2025, with projections of US$ 250.15 million by 2027 (Kaya Mind 2025).

With the recent approval of a new regulatory framework for *Cannabis sativa* in Brazil (ANVISA 2026), a substantial expansion of cultivated areas is expected in the coming years. In this scenario, the combination of tropical biomes, high biodiversity, soil and climate conditions favorable to crop development (Rocha 2020), together with the close proximity of cannabis cultivation to agricultural landscapes dominated by large-scale commercial crops, may facilitate the colonization and establishment of well-known polyphagous pests in this emerging agroecosystem.

Among agricultural pests, species belonging to Lepidoptera are notable for their high polyphagy, rapid reproductive cycles, and strong dispersal capacity, which favor their establishment across diverse agroecosystems (Pogue 2002). In *C. sativa*, several lepidopteran species have been reported feeding on different plant structures, including inflorescences (Corner et al. 2020; Hansen et al. 2020; Villanueva et al. 2020; Schreiner & Cranshaw 2021; Murray et al. 2022; Patiño-Moscoso et al. 2023; Ahmed et al. 2024). Such infestations may compromise yield and the quality of plant-derived medicinal products (Arey et al. 2022; Jackson et al. 2023). Here, we provide the first report of noctuid larvae associated with medicinal *C. sativa* cultivation in Brazil, including *Spodoptera frugiperda* (J.E. Smith, 1797) (Lepidoptera: Noctuidae), a highly polyphagous species of recognized economic importance in several agricultural crops.

The cultivation area visited in March 2025 consisted of a protected cultivation system located in the state of São Paulo, where approximately 1,500 plants were cultivated under controlled photoperiod, with mechanical ventilation provided by fans and exhaust systems, fertigation using biological inputs and no insecticide applications. The cultivation area was enclosed by a 3-meter-high concrete wall and surrounded by horticultural crops. A single field visit was conducted, during which the entire cultivation area was visually inspected. Larvae were photographed, manually collected, individually placed in ventilated plastic specimen containers with lids covered with voile mesh, and transported to the Laboratory of Conservation and Biological Control at the Federal University of Lavras (UFLA). Larvae were reared individually under controlled laboratory conditions (25 ± 2 °C, 70 ± 10% relative humidity, 12:12 h photoperiod) on an artificial diet (Greene et al. 1976). Emerged adults were mounted on entomological pins, whereas pupae and larvae that did not complete development were preserved in 75% ethanol and sent to specialists for taxonomic identification.

Larval infestations concealed within apical inflorescences were observed throughout the cultivation system. Three noctuid species were identified, *Spodoptera androgea* (Stoll, 1780) (Lepidoptera: Noctuidae) (Figs. 1A-B, 2A-B), *S. frugiperda* (Figs 1C-D, 2C-D), in addition to *Chloridea* cf. *virescens* (Fabricius, 1777) (Lepidoptera: Noctuidae) (Fig. 2E-F). Identification of *Spodoptera* species was based on diagnostic larval morphology and, primarily, on examination of male and female genitalia, using specialized taxonomic keys (Pogue 2002).

Regarding *C.* cf. *virescens* (Fig. 2E-F), no individuals reached the adult stage, which precluded genitalia examination and required the assessment to rely exclusively on external larval characters. The larvae collected on cannabis corresponded to a light-green morph, characterized by a pale green dorsum and a conspicuous whitish lateral stripe delimiting a darker green ventrolateral abdominal region. Although Rodríguez-Espinosa et al. (2018) worked on tobacco, their findings demonstrate a high degree of intraspecific chromatic variation in *C. virescens*, within which the morph observed on cannabis falls.

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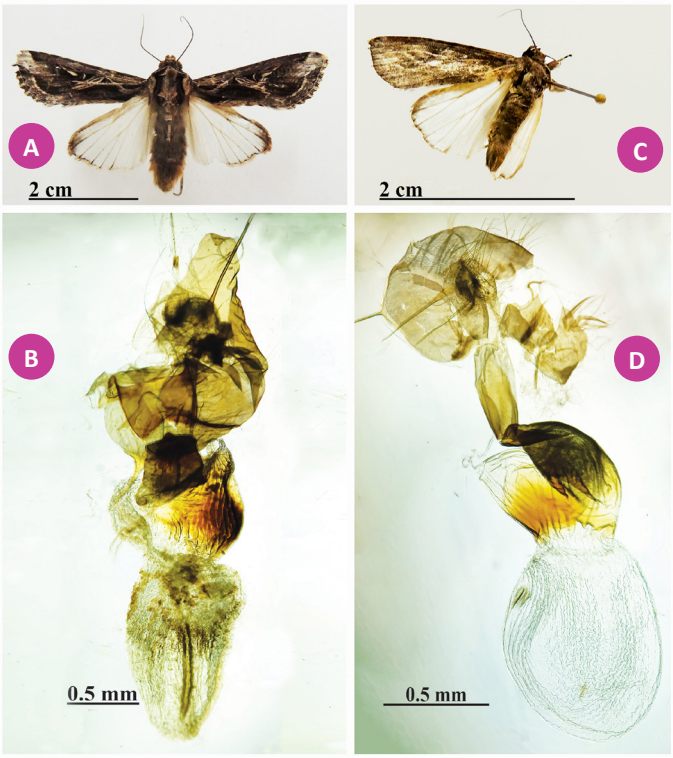


Figure 1. Noctuid species associated with medicinal *Cannabis sativa* L. cultivation in São Paulo state, Brazil, in 2025. (A-B): *Spodoptera androgea* (Stoll, 1780) (Lepidoptera: Noctuidae), adult female and genitalia. (C-D): *Spodoptera frugiperda* (J.E. Smith, 1797) (Lepidoptera: Noctuidae), adult female and genitalia.

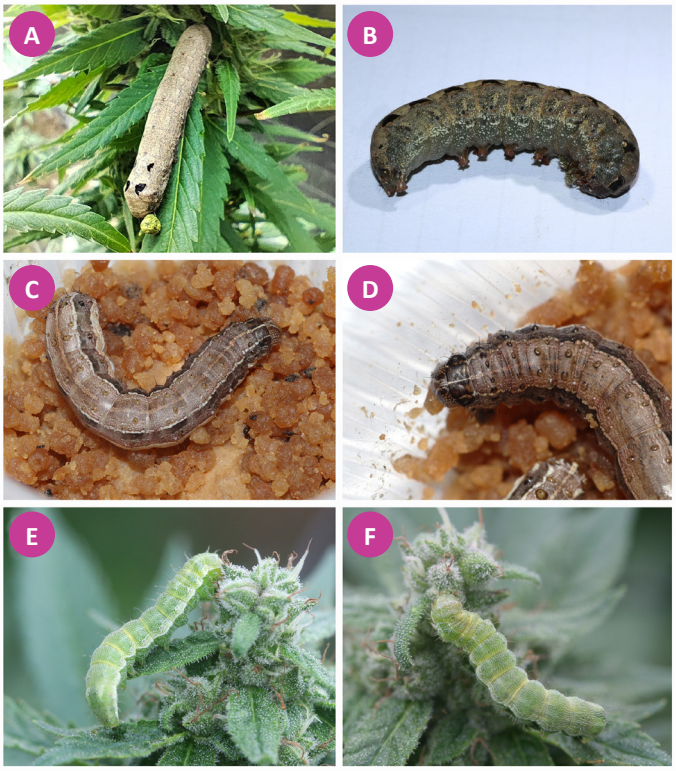


Figure 2. Noctuid larvae associated with medicinal *Cannabis sativa* L. cultivation in São Paulo State, Brazil, in 2025. (A) *Spodoptera androgea* (Stoll, 1780) on the inflorescences, field record. (B) *S. androgea* reared on artificial diet under laboratory. (C–D) *Spodoptera frugiperda* (J.E. Smith, 1797) (Lepidoptera: Noctuidae), approximately fourth instar, collected in the field and reared on artificial diet until pupation. (E–F) *Chloridea* cf. *virescens* (Fabricius, 1777), (Lepidoptera: Noctuidae) green phenotype observed on *C. sativa* inflorescences.

Larvae and feeding injuries were observed on several plants at different flowering stages within the inspected cultivation area, with feeding occurring on apical inflorescences. Manual opening of floral structures was required for larvae detection and removal. Feeding injuries were characterized by entry holes, frass accumulation, and desiccation of floral tissues (Fig. 3), indicating active internal feeding.

Advanced instars of *S. androgea* were observed attached to the basal region of the inflorescences, near the bract insertion point (Fig. 2), whereas *S. frugiperda* was observed feeding inside the inflorescences. In contrast, the externally exposed behavior observed for *Chloridea* cf. *virescens* larvae may favor earlier visual detection in *C. sativa* cultivation systems (Fig. 2E–F).

The presence of surrounding horticultural crops provides a potential source of alternative hosts for noctuid within the production landscape. The observation of *Spodoptera* larvae inside inflorescences suggests a cryptic infestation pattern that may hinder field detection and delay management interventions (Jarić et al. 2019).

Internal feeding activity may increase tissue damage and could potentially favor secondary fungal colonization of inflorescences, potentially compromising the sanitary quality of medicinal cannabis products (Arey et al. 2022; Jackson et al. 2023). Additionally, previous studies have suggested that caterpillar herbivory may alter cannabinoid concentrations in *Cannabis sativa*, potentially affecting compliance with regulatory THC thresholds (Jackson et al. 2023). Consequently, the occurrence of highly polyphagous taxa such as *S. frugiperda* reinforces the need for systematic monitoring protocols and further studies to assess their potential impact on medicinal *C. sativa* cultivation in Brazil.



Figure 3. Injury caused by noctuid larvae on medicinal *Cannabis sativa* L. inflorescences in São Paulo state, Brazil, in 2025. (A): Entry holes in apical inflorescences. (B-C): Desiccation of floral tissue and frass deposits. (D–E): Minimal leaf damage caused by early larval stages.

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Authors' Contributions

AUNL: Conceptualization, Formal analysis, Investigation, Methodology, Writing – original draft, Writing – review & editing; KH: Conceptualization, Funding acquisition, Methodology, Supervision, Writing – review & editing; FJS-D: Conceptualization, Data curation, Formal analysis, Methodology, Validation, Visualization, Writing – review & editing; LCPS: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Writing – original draft; Writing – review & editing.

Conflict of Interest Statement

The authors have no competing interests to declare that are relevant to the content of this article.

Ethical Approval

Not applicable.

Data Availability

The data that support the findings of this study are available on request from the corresponding author.

Generative AI Statement

No generative AI was used for content creation, data processing, or scientific reasoning in this study. AI tools were used only for language refinement and proofreading of selected English passages. The authors take full responsibility for the accuracy and originality of the work.

References

Ahmed; M. Z.; McKenzie; C. L.; Osborne; L. S. (2024) Arthropod and mollusk pests of hemp, Cannabis sativa L. (Rosales: Cannabaceae), and their indoor management plan in Florida. *Journal of Integrated Pest Management*, 15(1). doi: 10.1093/jipm/pmad028

ANVISA (Agência Nacional de Vigilância Sanitária) (2026) Resolução da Diretoria Colegiada (RDC) nº 1.023, de 11 de maio de 2026. Diário Oficial da União, Brasília, DF. https://in.gov.br/web/dou/-/resolucao-da-diretoria-colegiada-anvisa-n-1.023-11-de-maio-de-2026-705088567 Access on: 22.v.2026.

Arey; N. C.; Lord; N. P.; Davis; J. A. (2022) Evaluation of hemp (Cannabis sativa) (Rosales: Cannabaceae) as an alternative host plant for polyphagous noctuid pests. *Journal of Economic Entomology*, 115(6): 1947–1955. doi: 10.1093/jee/toac163

Corner; K.; Kesheimer; K., Sikora, E.; Kemble, J. (2020) Diseases and insects of hemp in Alabama. In: Gauthier, N. (Ed.), *Science of hemp: production and pest management*. University of Kentucky Agricultural Experiment Station, Lexington, pp. 11–15. (Special Report SR-112). https://plantpathology.mgcafe.uky.edu/files/sr112.pdf. Access on: 26.v.2026.

Dias, J. M. C. de S.; Henz, G. P.; Vieira, R. de C. M. T.; Pereira, V. da F. (2025) Cannabis sativa: uso, regulamentação nos países e perspectivas para cultivo e pesquisa no Brasil. Brasília, DF: Embrapa, 43 p. Brasília, DF. (Documentos 3). http://www.infoteca.cnptia.embrapa.br/infoteca/handle/doc/1178471. Access on: 26.v.2026.

Greene, G. L.; Leppla, N. C.; Dickerson, W. A. (1976) Velvetbean caterpillar: a rearing procedure and artificial medium. *Journal of Economic Entomology*, 69(4): 487–491. doi: 10.1093/jee/69.4.487

Hansen, Z.; Bernard, E.; Grant, J.; Gwinn, K.; Hale, F.; Kelly, H.; Stewart, S. (2020) Hemp disease and pest management. University of Tennessee Extension, Knoxville. (Special Report W 916). https://hemp.tennessee.edu/wp-content/uploads/sites/183/2020/12/Hemp_Disease_and_Pest_Management_W916.pdf. Access on: 26.v.2026.

Jackson, B.; Gilbert, L.; Tolosa, T.; Henry, S. A.; Volkis, V. V.; Zebelo, S. (2023) The impact of insect herbivory in the level of cannabinoids in CBD hemp varieties. *Research & Reviews: Journal of Botanical Sciences*, 11(7): 13–23.

Jarić, I.; Heger, T.; Castro Monzon, F.; Jeschke, J. M.; Kowarik, I.; McConkey, K. R.; Pyšek, P.; Sagouis, A.; Essl, F. (2019) Crypticity in biological invasions. *Trends in Ecology & Evolution*, 34(4): 291–302. doi: 10.1016/j.tree.2018.12.008

Kaya Mind (2025) Anuário da Cannabis Medicinal no Brasil: edição 2025. Kaya Mind, São Paulo. https://kayamind.com/anuario-da-cannabis-medicinal-2025/. Access on: 22.v.2026.

Murray, M., Evans, M., Nischwitz, C., Taylor, A.; Zesiger, C. (2022) Pests of hemp in Utah: diseases and arthropod identification guide. Utah State University Extension, Logan (Report IPM-030-22). https://digitalcommons.usu.edu/extension_curall/2281/. Access on: 22.v.2026.

Patiño-Moscoso, M. A.; Vergara-Navarro, E. V.; Betancourt-Vásquez, M.; Rodríguez-Yzquierdo; G. A. (2023) Artropofauna asociada al cultivo de Cannabis sativa L., 1753 (Urticales: Cannabaceae) medicinal en Antioquia, Colombia. *Revista Chilena de Entomología*, 49(1): 131–144.. https://doi.org/10.35249/rche.49.1.23.15

Pogue, M. G. (2002) A world revision of the genus *Spodoptera* Guenée (Lepidoptera: Noctuidae). Memoirs of the American Entomological Society, 43: 1–202. https://www.biodiversitylibrary.org/page/38416712. Access on: 22.v.2026.

Rocha, S. B. F. (2020) Cannabis medicinal e industrial no Brasil: potencial para cultivo. ADWA Cannabis / UFV, Viçosa, MG. https://adwacannabis.com.br/relatorio-completo/. Access on: 22.v.2026.

Rodríguez-Espinosa, F. L.; Santana-Baños, Y.; Martínez-Rivero, M. A.; Gómez-Leyva; J. F. (2018) Variability in patterns of coloration and larval ornamentation of *Chloridea virescens* (Fabricius) on different host plants. Revista de Protección Vegetal, 33(2): 1-8.

Schreiner, M.; Cranshaw, W. A. (2021) A survey of the arthropod fauna associated with hemp (Cannabis sativa L.) grown in Eastern Colorado. *Journal of the Kansas Entomological Society*, 93(2): 113–131. doi: 10.2317/0022-8567-93.2.113

Souza, M. R. de; Henriques, A. T.; Limberger; R. P. (2022) Medical cannabis regulation: an overview of models around the world with emphasis on the Brazilian scenario. *Journal of Cannabis Research*, 4(1). doi: 10.1186/s42238-022-00142-z

Villanueva, R.; Anderson, S.; Guffey, C.; Fox, S. (2020) Arthropods collected in industrial hemp fields in Kentucky in 2019. In: Gauthier, N. (Ed.), *Science of hemp: production and pest management*. University of Kentucky Agricultural Experiment Station, Lexington, pp 26–30. (Special Report SR-112). https://plantpathology.mgcafe.uky.edu/files/sr112.pdf. Access on 22.v.2026.