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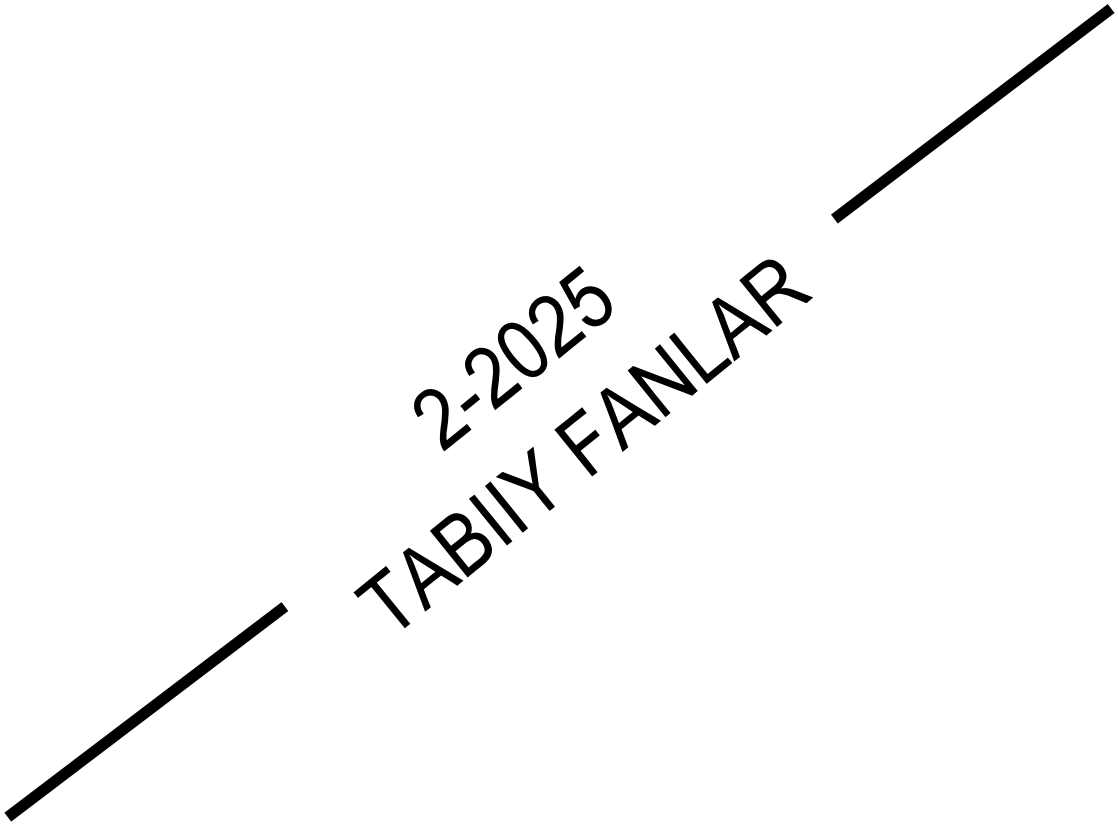

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FIRST RECORDED GEOGRAPHICAL DISTRIBUTION AND BIOLOGY OF *EUPROCTIS CHRYSORRHOEA* (LEPIDOPTERA: EREBIDAE) IN THE FERGANA VALLEY, UZBEKISTAN

O‘ZBEKISTONNING FARG‘ONA VODIYSIDA ILK MARTA QAYD ETILGAN *EUPROCTIS CHRYSORRHOEA* (LEPIDOPTERA: EREBIDAE) TURINING GEOGRAFIK TARQALISHI VA BIOLOGIYASI

ПЕРВОЕ ЗАРЕГЕСТРИРОВАННОЕ ГЕОГРАФИЧЕСКОЕ РАСПРОСТРАНЕНИЕ И БИОЛОГИЯ EUPROCTIS CHRYSORRHOEA (LEPIDOPTERA: EREBIDAE) В ФЕРГАНСКОЙ ДОЛИНЕ, УЗБЕКИСТАН

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Abstract

This study provides the first confirmed record of Euproctis chrysorrhoea Linnaeus, 1758 (Brown-tail Moth) in Uzbekistan's Fergana Valley, thereby extending its known distribution into Central Asia. Field surveys at multiple sites in Quvasay (Kokilon – ~40°18'21"N, 71°54'50"E; Sufon – ~40°22'37"N, 71°57'11"E), Fergana District (Satkak – ~40°24'24"N, 71°41'59"E), Kuva District (Akbarobod – ~40°32'59"N, 71°55'27"E), and Mingbuloq District (~40°24'24"N, 71°41'59"E) revealed adult moths on economically important fruit trees (e.g., Prunus cerasus, Prunus domestica, Malus domestica, and Pyrus communis). A total of 71 adult specimens (51 males, 20 females) were collected, from which 7 were selected for detailed morphological analysis. Simple descriptive statistics of key traits (e.g., wingspan, 37.6 ± 1.7 mm) indicate consistency with established descriptions. Observations of the species' life cycle and host plant damage suggest successful adaptation to the region's continental climate and orchard ecosystems, emphasizing the need for integrated pest management (IPM). While these findings provide critical baseline data, multi-year studies and broader geographic sampling are essential to evaluate long-term population dynamics and ecological impacts more thoroughly.

Annotatsiya

Ushbu maqolada Euproctis chrysorrhoea Linnaeus, 1758 (Brown-tail Moth) turining O‘zbekistonning Farg‘ona vodiysida birinchi marotaba topilgani baён этилган. Shu bilan birga, turning ma'lum tarqalish doirasi Markaziy Osiyogacha kengaygani ta'kidlangan. Quvasoy (Kokilon – ~40°18'21"N, 71°54'50"E; Sufon – ~40°22'37"N, 71°57'11"E), Farg‘ona tumani (Satkak – ~40°24'24"N, 71°41'59"E), Quva tumani (Akbarobod – ~40°32'59"N, 71°55'27"E) va Mingbuloq tumani (~40°24'24"N, 71°41'59"E) hududlarida o‘tkazilgan dala kuzatuvlari davomida mazkur kapalakning iqtisodiy ahamiyatga ega bo‘lgan mevali daraxtlarda (masalan, gilos – Prunus cerasus, olxo‘ri – Prunus domestica, olma – Malus domestica, nok – Pyrus communis) keng tarqalganligi aniqlangan. Jami 71 ta voyaga yetgan namuna (51 ta erkak, 20 ta urg‘ochi) yig‘ilgan, shundan 7 tasi batafsil morfologik tahlil uchun tanlab olingan. Asosiy belgilar (masalan, qanot kengligi 37,6 ± 1,7 mm) bo‘yicha o‘tkazilgan oddiy statistik tahlillar turning oldindan ma'lum tavsiflariga mos kelishini ko‘rsatgan. Turning hayot sikli va zarar keltiradigan o‘simliklarga ta'siriga oid kuzatuvlar uning mintaqaning kontinental iqlimi va bog‘dorchilik ekotizimlariga muvaffaqiyatli moslashganligini tasdiqlagan hamda integratsiyalashgan zararkunandalarga qarshi kurash (IPM) zarurligini қайд etgan. Ushbu topilgan namunalar turni o‘rganish uchun muhim dastlabki ma'lumotlarni taqdim etsa-da, ko‘p yillik tadqiqotlar va kengroq geografik doirada kuzatuvlar turning uzoq muddatli populyatsion dinamikasi hamda ekologik ta'sirini chuqur baholash uchun muhim sanaladi.

Аннотация

*В данном исследовании представлена первая подтвержденная регистрация **Euproctis chrysorrhoea** Linnaeus, 1758 (Златогузка) в Ферганской долине Узбекистана, что расширяет известный ареал данного вида в Центральную Азии. Полевые обследования, проведенные в нескольких точках Кувасая (Кокилон – ~40°18'21"N, 71°54'50"E; Суфон – ~40°22'37"N, 71°57'11"E), Ферганского района (Саткак – ~40°24'24"N, 71°41'59"E), Кувинского района (Акбаробод – ~40°32'59"N, 71°55'27"E) и Минбулакского района (~40°24'24"N, 71°41'59"E), выявили присутствие взрослых особей на экономически важных плодовых деревьях (*Prunus

cerasus, Prunus domestica, Malus domestica, Pyrus communis*). В общей сложности было собрано 71 взрослое насекомое (51 самца, 20 самок), из которых 7 экземпляров были выбраны для детального морфологического анализа. Простая описательная статистика ключевых признаков (например, размах крыльев – 37,6 ± 1,7 мм) показывает соответствие установленным описаниям. Наблюдения за жизненным циклом и повреждениями растений-хозяев указывают на успешную адаптацию вида к континентальному климату и садово-аграрным экосистемам региона, что подчеркивает необходимость внедрения интегрированной системы защиты растений (IPM). Несмотря на значимость полученных данных, необходимы многолетние исследования и более широкий географический охват для полноценной оценки динамики популяции и экологических последствий.*

Key words: *Euproctis chrysorrhoea, Brown-tail Moth, Fergana Valley, Uzbekistan, invasive species, Lepidoptera, pest management, orchard ecosystems*

Kalit so'zlar: *Euproctis chrysorrhoea, Brown-tail Moth, Farg'ona vodiysi, O'zbekiston, invaziv turlar, Lepidoptera, zararkunandalarga qarshi kurash, bog'dorchilik ekotizimlari*

Ключевые слова: Euproctis chrysorrhoea, златогузка, Ферганская долина, Узбекистан, инвазивные виды, Lepidoptera, борьба с вредителями, садовые экосистемы.

INTRODUCTION

Euproctis chrysorrhoea Linnaeus, 1758 (Lepidoptera: Erebidae), commonly known as the Brown-tail Moth, is a notorious pest in orchard and forested landscapes due to its larval defoliation activities [1, 5, 6]. In addition to harming economically valuable crops, this moth poses human and animal health concerns; its urticating hairs can cause skin rashes and respiratory irritations [5, 8]. Despite being well-documented in Europe, North America, and Australasia, limited information exists on its distribution in Central Asia [2, 12].

The Fergana Valley in eastern Uzbekistan offers an ideal environment for invasive pests due to its hot summers, cold winters, and extensive fruit orchards [16]. Particularly common host plants—*Prunus cerasus* (sour cherry), *Prunus domestica* (plum), *Malus domestica* (apple), and *Pyrus communis* (pear)—are widely cultivated, making them potential targets for *E. chrysorrhoea* [14]. Given that orchard-based fruit production is central to the local economy, timely detection and control of new pests are paramount.

This study documents, for the first time, the presence of *E. chrysorrhoea* in the Fergana Valley, Uzbekistan. We present details on its morphological characteristics, host plant associations, and life cycle features, offering baseline scientific data for developing integrated pest management (IPM) strategies and guiding future research.

MATERIALS AND METHODS

Field surveys took place in four localities within the Fergana Valley, a region recognized for its fertile soils, diverse agricultural land-use, and a continental climate characterized by pronounced temperature extremes (winter lows below 0 °C, summer highs often exceeding 35 °C). These localities spanned elevations of approximately 400–600 m above sea level:

Kuvasay Town, Kokilon Village (≈\approx≈40°18'21"N, 71°54'50"E; sea level – 394 m; May-august, 2022-2024). A commercial orchard focusing on cherries (*Prunus cerasus*) and apples (*Malus domestica*).

Fergana District, Satkak Village (≈\approx≈40°24'24"N 71°41'59"E; sea level 550 m; May-July, 2023-2024). A mixed-use recreational area containing managed green spaces and smaller orchard plots.

Kuva District Akbarobod Village (≈\approx≈40°32'59"N 71°55'27"E; sea level – 480 m; may-september, 2023-2024).

Mingbuloq District, Terak Village (≈\approx≈40°51'03"N 71°30'52"E; sea level – 430 m; May 17, 2024) A community-managed orchard located in the Terak Population Park, where plum (*Prunus domestica*) and pear (*Pyrus communis*) predominate.

Adult moths were collected by hand during peak daytime activity, guided by visual inspection of fruit trees known to harbor lepidopteran pests. Across the three sampling dates, the following specimens were obtained: Kuvasay Town (Kokilon Village): ♂3, ♀; Fergana District (Satkak Village): ♂2; Mingbuloq District (Terak Village): ♂1.

All specimens were placed in 70% ethanol immediately upon capture, labeled, and transported to the laboratory for morphological analyses. Permits for insect collection were issued

by the local government, and minimal disturbance practices were employed to preserve orchard integrity.

Specimens were identified using a combination of morphological keys and taxonomic descriptions [1, 5, 6, 15]. Key diagnostic traits included: Forewing Patterns – Brown coloration with pronounced transverse markings and lighter spotting. Hindwings – Paler brown, fringed edges aiding flight. Antennae – Bipectinate in males, filiform in females. Urticating Hairs – Notable hair tufts on both adult thorax and abdomen.

Comparisons with voucher specimens from local entomological collections further validated species-level identification. A molecular analysis was not conducted for this initial study but remains a priority for future investigations to confirm introduction pathways.

Botanical surveys at each locality were conducted in tandem with entomological sampling. Suspected host plants were identified in situ using standard field guides, followed by verification with local botanical experts. Recorded hosts included: *Prunus cerasus* L., *Prunus domestica* L., *Malus domestica* Borkh., *Pyrus communis* L.

RESULTS

A database was compiled to track occurrence data, host plant records, and basic morphological measurements (e.g., wingspan). For each specimen, we calculated simple descriptive statistics (mean, range, standard deviation) of key metrics (e.g., forewing length, total wingspan). A Geographic Information System (GIS) was used to visualize sampling sites and assess their overlap with main orchard regions. No advanced inferential statistical tests were performed due to the limited sample size.

While these findings represent a critical first step in documenting *E. chrysorrhoea* in Uzbekistan, the small number of specimens and limited sampling timeframe restrict the extrapolation of broader ecological or genetic trends. Future research should expand both the temporal scope (multi-year surveys) and spatial coverage (additional orchards and natural habitats) to clarify population dynamics and potential genetic variability.

Seven adult moths (♂6, ♀1) were analyzed. Descriptive statistics of measured wingspans showed a mean of 37.6±1.737 \ pm 1.737±1.7 mm (range: 35–40 mm). All displayed: **Forewings –** Brown with distinct transverse lines; lighter spotting aiding in camouflage against tree bark. **Hindwings –** Uniform pale brown shading, fringed margins for flight stabilization. **Antennae –** Strongly bipectinate in males, facilitating pheromone detection; simpler filiform structure in the single female. **Urticating Hairs –** Dense clusters present on thorax and abdomen in both sexes.

These results indicate close morphological alignment with descriptions of *E. chrysorrhoea* from other geographic regions [1, 5, 6]. Significant morphological deviations were not observed, suggesting that the Central Asian population closely mirrors established phenotypes elsewhere.

All specimens were observed in or near fruit-tree canopies, often adjacent to visible larval feeding damage: *Prunus cerasus* (sour cherry), *Prunus domestica* (plum), *Malus domestica* (apple), *Pyrus communis* (pear).

Orchard workers in Kokilon Village and Satkak Village anecdotally reported small patches of leaf skeletonization. Although formal quantitative estimates of defoliation were not conducted, these accounts align with the polyphagous habits of *E. chrysorrhoea*, capable of inflicting moderate to severe leaf damage when populations rise.

Local interviews and field notes revealed that *E. chrysorrhoea* likely completes one generation per year in the Fergana Valley under current climatic conditions: Egg Stage – Clusters of small, spherical eggs are laid on the underside of leaves in late spring. Larval Stage – Larvae feed intensively for approximately 30–45 days through five instars, featuring dense urticating hairs for predator defense. Pupal Stage – Pupation in silk cocoons occurs beneath leaves or in bark crevices, lasting 10–20 days. Adult Stage – Adults emerge in early to mid-summer (June–July) and survive for about one to two weeks, focusing on reproduction and oviposition.

The timing of these stages suggests that the species is well-suited to the valley's continental climate, mirroring life cycle patterns reported in Europe [3, 4, 6, 13].

DISCUSSION

This investigation confirms *E. chrysorrhoea* in the Fergana Valley, marking the first authenticated record in Uzbekistan and expanding the moth's known range into Central Asia. Global trade and the movement of nursery stock are suspected to have facilitated this introduction [2, 6, 9]. Ongoing surveillance will be crucial to detect further spread and inform regulatory measures.

The establishment of *E. chrysorrhoea* in a major orchard region poses significant agronomic risks. Larval feeding can reduce fruit yields, weaken trees, and predispose them to secondary pests and diseases [5, 6]. Additionally, workers encountering larvae may experience dermatitis due to the species' urticating hairs, complicating orchard management. Left unmanaged, *E. chrysorrhoea* could disrupt local plant–herbivore–predator relationships if its population exceeds the regulatory capacity of native enemies [5, 7, 8].

Morphological and phenological parallels with European and North American populations highlight *E. chrysorrhoea*'s flexibility in colonizing diverse climates [10, 11]. However, it remains unknown whether the Fergana Valley population harbors unique genotypes or has adapted local traits. Molecular investigations could elucidate introduction pathways and identify potential genetic differentiation.

Although this study documents a pivotal first record, the data reflect only a limited temporal snapshot and a small sample size. To fully comprehend the moth's potential spread and ecological ramifications, future research should:

- Expand sampling across multiple seasons and additional orchards.
- Incorporate molecular methods (DNA barcoding, population genetics) to clarify introduction routes.
- Quantify defoliation levels and subsequent yield losses to assess economic thresholds more precisely.
- Investigate local predators and parasitoids that may serve as biological control agents.

CONCLUSION

By confirming *Euproctis chrysorrhoea* in Uzbekistan's Fergana Valley, this study not only broadens the known distribution of the Brown-tail Moth but also raises critical concerns about its potential economic and ecological impact on orchard-based agriculture. The pest's successful adaptation to continental climatic conditions, polyphagous feeding behavior, and health risks posed by its urticating hairs underscore the necessity for diligent monitoring and coordinated IPM strategies. Future long-term studies—including molecular analyses, broader sampling, and detailed population assessments—are essential to devise effective control measures and protect the region's vital fruit production systems in the face of escalating global trade and environmental change.

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