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## ***Euphorbia davidii* (Euphorbiaceae) – a new invasive species for the flora of Central Asia**

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**Summary.** In this paper, we aim to present one more new invasive non-native plant species for Central Asia. From Uzbekistan (Central Fergana), *Euphorbia davidii* Subils (Euphorbiaceae) has been recorded, the native range of which is subtropical and tropical North and South America. The new location of the species in the Fergana Valley deserves special attention, because, according to available data, the closest habitat of this invasive species is on the western coast of the Caspian Sea.

## ***Euphorbia davidii* (Euphorbiaceae) – новый инвазивный вид для флоры Средней Азии**

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**Ключевые слова:** биоразнообразие, Ферганская долина, флористическая находка, чужеродный вид.

**Аннотация.** В статье мы приводим сведения о новом для флоры Средней Азии инвазивном виде. В Узбекистане (Центральная Фергана) найден *Euphorbia davidii* Subils (Euphorbiaceae), естественный ареал которого ограничивается отдельными районами субтропической и тропической Северной и Южной Америки. Новое местонахождение вида в Ферганской долине заслуживает особого внимания, т. к., согласно имеющимся данным, ближайшее местообитание этого инвазивного вида находится на западном побережье Каспийского моря.

### Introduction

For a long period of time, Uzbekistan and other countries of Central Asia remained poorly studied in terms of taxonomy and geography of invasive non-native plants. Some new data on the findings of alien species for the flora have begun to be published quite recently, and most of the species were registered in the Bukhara region (Esanov, Usmanov, 2018; Esanov, Scharipova, 2020; etc.). The first preliminary checklist of naturalized and invasive non-native plant species in the flora of Uzbekistan (Sennikov et al., 2020; Tojibaev, Esanov, 2021) has been published recently and includes 228 taxa. However, recently some new records of invasive alien plants have been published (Beshko, Gaziev, 2022). This is largely due to the intensity of new floristic research in Uzbekistan, primarily the Flora of Uzbekistan project (Sennikov et al., 2016) and grid mapping of the national flora (Tojibaev et al., 2022).

*Euphorbia* L. is one of the large genera of the flora of Central Asia, with more than 75 species (Nasimova, 1983), 41 of which grow in Uzbekistan (Najmiddinov, Batoshov, 2022). Some of them are alien species (*E. chamaesyce* L., *E. falcata* L., *E. helioscopia* L., and *E. humifusa* Willd.) (CABI, 2024). Recently, a new alien species of *Euphorbia* (*E. prostrata* Aiton) native to subtropical and tropical areas of North and South America has been recorded from different localities of Uzbekistan (Beshko, Gaziev, 2022).

The aim of this study is to present another new invasive plant species of *Euphorbia* for Central Asia, i. e., *E. davidii* Subils. The native range of this species is California to New Mexico, Mexico and North-East Argentina, and it grows primarily in the subtropical biome (Marchessi et al., 2011; POWO, 2024). The species was found in 2023 during field research in the central part of Fergana Valley (Uzbekistan).

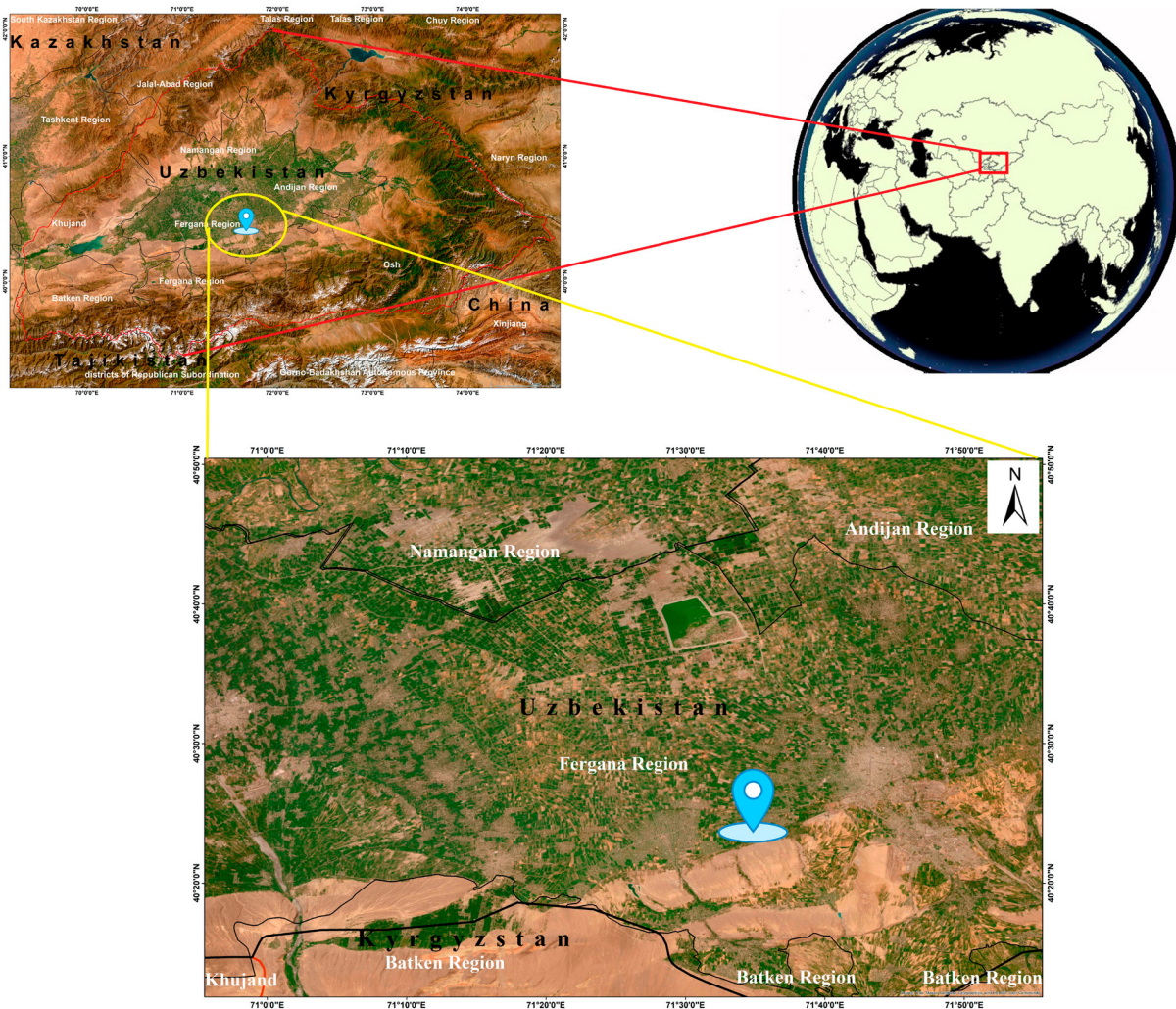


Fig. 1. Growth area of *Euphorbia davidii* identified in Fergana Valley.

## Materials and Methods

Field research was conducted under inventory and grid mapping of Fergana Valley flora. All collected specimens were herbarized and deposited in the National Herbarium of Uzbekistan (Tashkent). Relevant literature was used for plant species determination (Vladimirov, Petrova, 2009; Geltman, 2012, 2020) and subsequent distribution of the species on the far side of its native range (Vladimirov, Petrova, 2009; Oprea et al., 2012; Barina et al., 2013; Purger et al., 2015; Dudas et al., 2019; Tokhtar, Kurskoy, 2019).

The coordinates of plant records were imported into ArcGIS 10.6.1 and transformed to a point map layer. A WGS84 geographic coordinate system was used as a reference datum. Digitizing of the herbarium specimens was done by scanning with HerbScan TM 224 + Epson Expression 11000 XL. An illustration of the plant species was prepared using Photo-shop CS6x64 software.

Assessment of the invasive status of *E. davidii* was evaluated based on the IUCN Environmental Impact Classification for Alien Taxa, EICAT (IUCN, 2020).

## Results and Discussion

### Morphology and habitat

*Euphorbia davidii* Sublis: “Uzbekistan, Fergana Valley, Kokand-Fergana Road, env. Altyaryk vilage, 480 m. 30 V 2023. I. Maltsev” (TASH); “Fergana region, Altiariq district. Zilkha village. Kokand – Fergana highway. Agricultural landscape, apple and apricot orchard. N40.382673, E71.574778, h = 600 m. 31 VI 2023. A. H. Нажмиддинов / A. Najmiddinov. № 22053544” (TASH).

**Worldwide distribution.** The species is native to North America, the Central USA, and NW Mexico (Dragan et al., 2014). The subsequent spread of the species to other continents was described in Vladimirov and Petrova (2009) and Tokhtar and Kurskoy (2019). Currently, the closest location to the population in Uzbekistan is the western coast of the Caspian Sea (Barina et al., 2013; POWO, 2024).

In Uzbekistan, where this species has been recorded for the first time, the individuals in populations occupy only fruit gardens (GPS coordinates: N40.382673, E71.574778) (Fig. 1). This species forms a dense population in an area of 15 hectares. For 1 m<sup>2</sup>, there are about 100–150 plants, and the

local population mainly consists of fruiting plants (Fig. 2). The same characteristics of populations of the species were previously noted for the Central Black Earth Region, Belgorod region, and Russia (Tokhtar, Kurskoy, 2019).

Morphologically, *E. davidii* is an annual plant species with solitary and erect stems, 10–50(70) cm tall. Leaves opposite, with 7–15(25) mm long petioles, blades 1–10 × 0.5–3.5 cm, lanceolate to broadly elliptic, widest in the middle, attenuate at base, bluntly acute to acuminate at apex, with a crenate-dentate margin, dense, shortly strigose on both surfaces. Synflorescence umbellate, ray-leaves narrowly elliptic to lanceolate, shortly petiolate, paler in transection, unevenly tuberculate. Capsules broadly ovoid, glabrous, 3-locular, ca. 4.5–5 mm wide. Seeds ovoid to triangular-ovoid, angulate, ca. 2.4–3 mm in diameter (Vladimirov, Petrova, 2009; Marchessi et al., 2011).

From all other Central Asian annual *Euphorbia* species easily recognized by oppositely branched stems and opposite, clearly petiolate leaves. Close relatives are *E. cyathophora* Murray and *E. heterophylla* L., known as alien species in South-West Asia (POWO, 2024).

The new location of *E. davidii* in the Ferghana Valley is found about 2 km from the Kokand-Margelan railway line, which until the 1990s was connected with a wide network of railways connecting the Ferghana Valley with all of Central Asia and East Europe.

According to the farmer, the first plants of *E. davidii* appeared here about 10–15 years ago. The fact that a population of the species was also identified along the Kokand – Margilan highway fully indicates the penetration of *E. davidii* through the logistics network (Fig. 3).

### Assessment of the invasive status

In accordance with the IUCN Environmental Impact Classification for Alien Taxa, EICAT Categories, and Criteria (IUCN, 2020), *E. davidii* can be assessed as an alien species of minor impact (MN category). In Central Asia, one of the main factors influencing the distribution of plant species is grazing. As it turned out, this plant is not eaten by livestock. In addition, it has a high reproductive potential, and one individual produces from 20 to 100 seeds. This means that the Central Asian population of the species may expand its range, so the plant may change its invasive status in the near future.



Fig. 2. *Euphorbia davidii* illustration; A – general appearance; B, C – fruit; D – stem; E – latex; F, G – leaves and hairs; H – seed; I – herbarium sample (TASH); J – population and ecology.

### Conclusion

Invasive plants are damaging mainly to stenotopic species because they change the ecotopes in which they grow and lead to the isolation of populations, resulting in the genetic, taxonomic, and cenotic loss of natural plant cover, which, through competition

with native taxa, can lead to a certain threat to the flora of the area and lead to complete control of the habitat in the new growth areas. It was noted that almost 80 % of invasive species entered Europe through the logistics network (Bang et al., 2022). New growth areas of *Euphorbia davidii* identified in the flora of Uzbekistan confirm this once again.

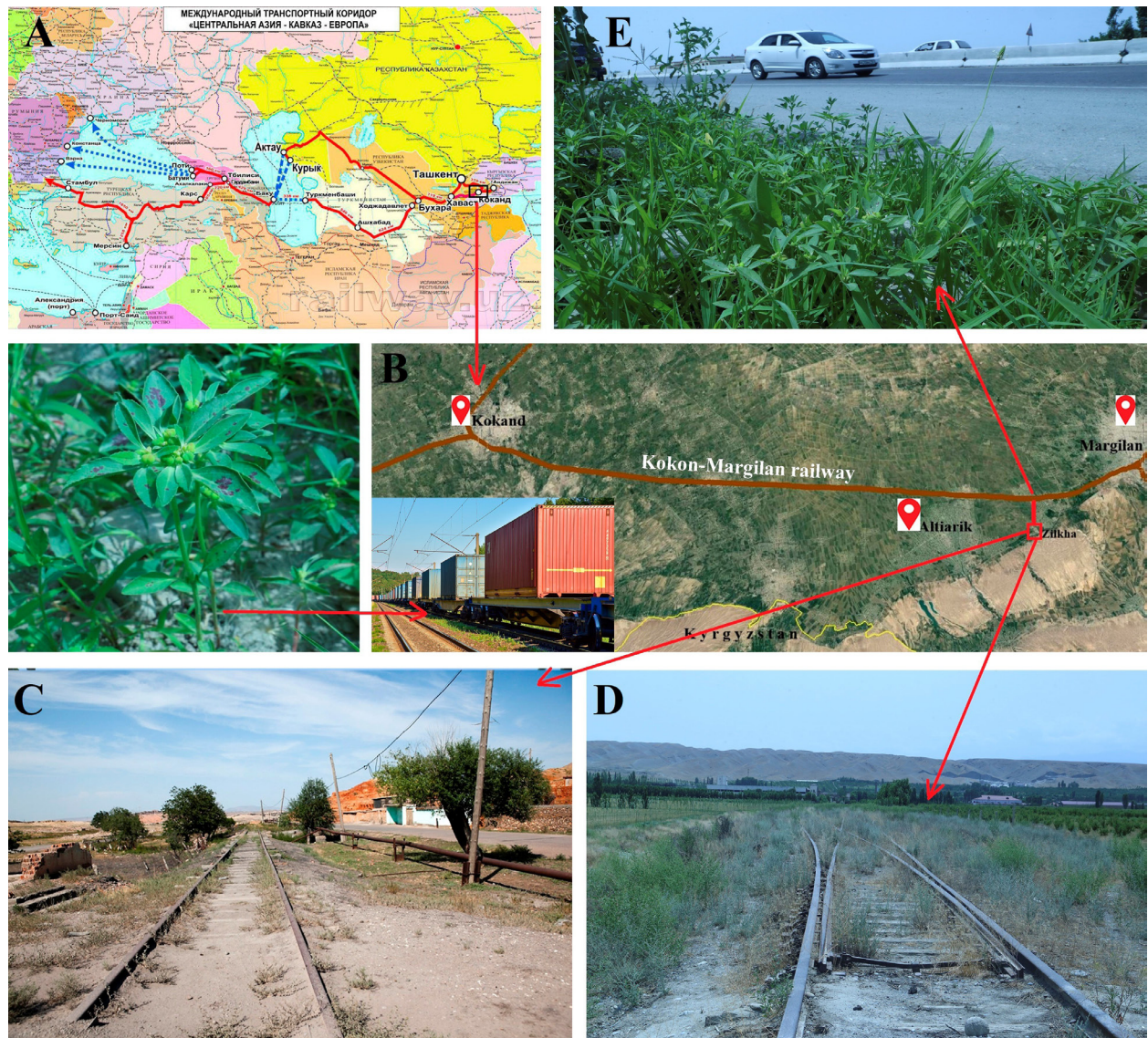


Fig. 3. *Euphorbia davidii* chronology of the introduction of the species into the flora of Uzbekistan: A – railway connecting Fergana Valley with Central Asia and Europe; B – Kokand – Margilan railway; C, D – an additional railway to the industrial zone (Zilkha Village); E – Kokand – Margilan highway.

*Euphorbia davidii* is a new invasive non-native plant species from Central Asia with a high potential threat to agricultural landscapes. The location of the new population near large logistics lines indicates penetration through the logistics network. Currently, the species does not pose a threat to local biodiversity, but at the same time, it is highly likely that in the near future it may spread more widely, covering new habitats along irrigation canals and orchards.

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