

A REVIEW OF RESEARCH ON ALIEN PLANTS IN UZBEKISTAN

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Introduction. At present, the invasion of alien species into ecosystems where they did not occur naturally is a global problem of crucial and increasing importance. The Convention on Biological Diversity (CBD) and International Plant protection Convention (IPPC), as well as IUCN and FAO, have considered invasive alien species (IAS) as one of the main direct drivers of biodiversity loss worldwide (including species extinctions), also causing negative impact on ecosystem functions, human health and economy. Numerous databases with information about the distribution of invasive alien species are available today, as Global Invasive Species Database (GISD) of IUCN ISSG, the International Phytosanitary Portal of FAO, CAB International, Global Invasive Alien Species Information Partnership Gateway and Global Register of Introduced and Invasive Species (GRIIS), etc. These resources were created to be a support to countries in the development of their National Biodiversity Conservation Strategies and Action Plans, National Invasive Alien Species Strategies and Action Plans, targeted control and monitoring.

Flora of vascular plants of Uzbekistan is very rich with a large number of relict, endemic and endangered species. However, approximately 20 % of the area of Uzbekistan (first of all, the valleys of major rivers, oases and foothills) consists of the anthropogenic landscapes with secondary plant communities composed mainly of weeds, including adventive species. A total of 4,148 species is given in the six-volume edition of the “Flora of Uzbekistan” (1941–1962), including 3,663 native and 485 non-native species (alien species together with cultivated crops and ornamentals). Since the publication of this fundamental work, a lot of botanical findings have been made and many new plant species and even genera have been described. Currently, the national checklist counts more than 4,385 species (Li et al., 2020). The intensive extension of new alien species has been noted in different regions of the country as a result of increasing anthropogenic impact (Sennikov et al., 2018). At the same time, some native species of the flora of Uzbekistan (*Euphorbia esula* L., *Impatiens parviflora* DC., etc.) are invasive weeds in other countries (CABI, 2021).

Being a Party to the CBD and IPPC, and recognizing that invasive alien species represent one of the primary threats to biodiversity and food security, the Republic of Uzbekistan has developed national standards, legislative and institutional framework (including a List of Regulated Pests) for the prevention, control and monitoring of biological invasions.

Some studies have been conducted recently to identify taxonomical composition and geographical distribution of alien plant species in Uzbekistan, and the results have been summarized in the national checklist of 228 naturalized and invasive alien species composed within the framework of the Global Register of Introduced and Invasive Species (GRIIS) project (Sennikov et al., 2018). Since the publication of this checklist, a number of new adventive species was recorded as a result of researches devoted to the inventory of the flora of administrative regions of Uzbekistan and publication of a new national edition “Flora”.

Materials and methods. Our field studies were carried out in 2018–2020 in different regions of Uzbekistan using traditional methods. Morphological observations of the newly recorded alien species were performed on living plants and dry specimens. The examined material was deposited in the National Herbarium of Uzbekistan (TASH). We also revised and georeferenced more than 1,000 herbarium specimens of invasive plants stored in TASH, and analysed published and online sources (CABI, 2021; Plantarium, 2007–2021, etc.). The coordinates of plant records were imported into ArcGIS 10.0 and transformed into 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. The photographs of adventive plants taken in their habitats, as well as the information on their localities, have been uploaded into Plantarium web-site (Plantarium, 2007–2021).

Results. The following alien species were newly recorded for the flora of Uzbekistan: *Anthriscus caucalis* M. Bieb. (Apiaceae), *Chenopodium ficifolium* Sm. (Amaranthaceae), *Cynosurus echinatus* L. (Poaceae), *Euphorbia prostrata* Aiton (Euphorbiaceae), *Galinsoga quadriradiata* Ruiz & Pav. (Asteraceae), *Pistia stratiotes* L. (Araceae), *Ranunculus sardous* Crantz (Ranunculaceae), *Rorippa palustris* (L.) Besser (Brassicaceae), *Tragopogon marginifolius* Pavlov (Asteraceae), *Xanthium albinum* (Widder) Scholz & Sukopp (Asteraceae). All these species have invaded the flora of Uzbekistan as a result of significant increase of international trade, tourism and transport networks in the last 20–30 years. Most of them were identified during compilation of the State Cadaster of the Flora of Tashkent region.

Our surveys showed that some of the above-mentioned adventive plants occur even in protected areas (*Cynosurus echinatus* and *Ranunculus sardous* – in Ugam-Chatkal National Park, *Euphorbia prostrata* – in Nuratau Nature Reserve). We also observed the expansion of some of these new alien species in anthropogenic habitats. For example, *Xanthium albinum* almost displaced common cocklebur (*Xanthium strumarium* L.), *Galinsoga quadriradiata* displaced *Galinsoga parviflora* Cav., and *Bidens frondosa* displaced *Bidens tripartita* L. in weed communities in Tashkent region. At present, these species grow mostly in disturbed habitats, but the magnitude of their negative impact on natural ecosystems and biodiversity could increase significantly in the future, and these species can become invasive pests.

Conclusion. The review of research on alien plants (including quarantine pests) and the above-mentioned facts of new invasions showed that the national checklist of adventive species in the flora of Uzbekistan is still incomplete and scientific data on their distribution, abundance and impact is insufficient. Thus, a special study focused on this crucial issue is strongly needed.

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