

***Amaranthus viridis* L. (Amaranthaceae) – a new invasive species for the flora of Uzbekistan**

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Abstract: As a result of current research carried out in the Bukhara Oasis of Uzbekistan it was found that the flora of the oasis comprises 59 families, 528 species in 294 genera. The existence of a new invasive species *Amaranthus viridis* L. was noted for the first time. In the oasis the content of *A. viridis* L. populations was studied and a map of its current distribution is presented.

Zusammenfassung: Als Ergebnis der floristischen Untersuchungen in der Region Buchara (Republik Usbekistan) wurde festgestellt, dass die Flora dieser Oase aus 59 Familien, 294 Gattungen und 528 Arten besteht. Es wurde zum ersten Mal eine neue invasive Art *Amaranthus viridis* L. für die Flora Usbekistans registriert. Man hat die Struktur der Population der Art *A. viridis* L. in dieser Oase studiert und deren Verbreitungskarte erstellt.

Key words: *Amaranthus viridis*, invasive species, flora, Republic of Uzbekistan, Bukhara Oasis.

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INTRODUCTION

Today much research focuses on the problem of invasive species. These species invade natural populations and as a result of rapid increase they may negatively affect local species. Main territories for invasive species are areas of urbanization. A high potential for multiplication often enables these invasive species to enter and spread in certain territories. Scientists presume a dramatic increase in biological invasion in the near future (HULME 2007; SALA et al. 2000). Therefore, the study of the presence of invasive plants is considered important in floristic research.

MATERIALS AND METHODS

Invasive species research was conducted in the years 2006–2016. More than 30 *A. viridis* L. herbarium samples were collected from the Bukhara oasis and deposited in the Central herbarium (TASH) of the Institute of fauna and flora gene pool. Herbarium samples of *Amaranthus* L. and scientific sources from literature (ABDULLAYEVA, 1971; BUTKOV 1953; KORNILOVA 1960; MEFFERT 1948; SOSKOV 1968; YAKUBOVA 1955) were analysed. Routing method was used to collect plants (SCHERBAKOV & MAYOROV 2006). Distribution maps of *A. viridis* L. in the Bukhara oasis were established using the program ArcGIS 10.



Fig. 1: Population of *Amaranthus viridis* L. in urbanoflora (Bukhara).



Fig. 2: Habitus of *Amaranthus viridis* L.

RESULTS AND DISCUSSION

As a result of research in the Bukhara Oasis *A. viridis* L. has been found in several populations, and was documented for the first time as a new record for flora of Uzbekistan. It was discovered that on the basis of the analysis of scientific sources and plant specimens stored in TASH, this species has not been found in the flora of Uzbekistan until our research discovered it.

A. viridis L. was not mentioned in the works devoted to the flora of Central Asia before (ABDULLAYEVA, 1971; BUTKOV 1953; KORNILOVA 1960; MEFFERT 1948; SOSKOV 1968; YAKUBOVA 1955). However, Y.D. GUSEV (1971) found several *A. viridis* L. herbarium specimens in the Botanical Institute of V.L. Komarov (LE)

which were collected from Central Asia. He emphasized that this species was collected by V. Nikitin and N. Korolev in Tajikistan in 1963, and in Turkmenistan by A. Meshcheryakov in 1968.

A. viridis L. was found for the first time along the ditch in Peshku District of the Bukhara oasis. At that time the dissemination range in the area was narrow. However, over the next 10 years, it spread as the invasive species on the entire territory of the Bukhara oasis, such as along the roadsides, ditches, among crops, in the orchards, ruderal, abandoned and uncultivated land. Also, it can be found in the streets of the city, gardens, and in front of multi-storey buildings. It was found to be a dominant species in plant communities. Population sizes were in the range of 15 to 87 plants per m² (Fig. 1).

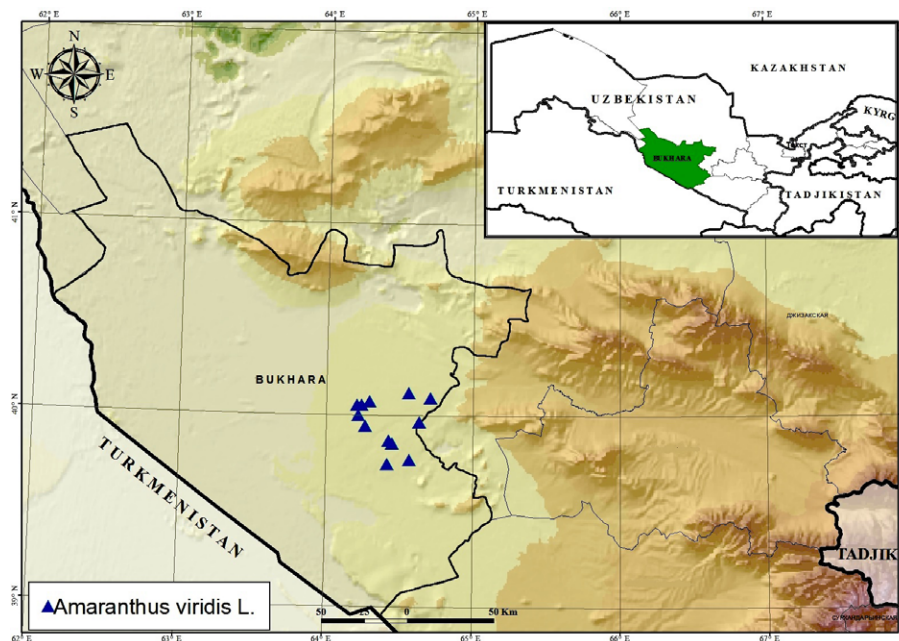


Fig. 3: Distribution map of *Amaranthus viridis* L. in the Bukhara Oasis.

**Brief description of *Amaranthus viridis* L. Sp. Pl.
Editor 2: 1405. 1763 (Fig. 2).**

Annual. Stems usually erect, with sparse short pubescence at the top, bare at the bottom. Leaves ovate, elongate rhombic-ovate, 2-6 cm long, base broadly curved, rounded, apex blunt or slightly emarginated, dark green; petioles 1-5 cm long. Small cymose brushes are collected in narrow and long thin veil racemose inflorescences, forming on the top of the stem a panicle 5-20 cm long. Bracts ovate to lanceolate, acute, usually shorter than tepals; tepals 3, acute, in pistillate flowers oblanceolate, shorter than the fruitcase. Stamens 3. Fruits ovoid, laterally compressed, about 1.5 mm long, indehiscent, in dried form strongly crumpled. Achenes about 1 mm in diameter, with a sharp edge, dark brown, shiny (GUSEV 1971).

During the research, populations of *A. viridis* L. were discovered in different habitats and mapped (Fig. 3).

Along the road: 16 single plants of *A. viridis* L. per m² together with *Alhagi pseudalhagi* (M. BIEB.) DESV. ex B. KELLER et SHAP., *Cyperus rotundus* L., *Echinochloa crus-galli* (L.) P. BEAUV., *Chenopodium album* L., *Ch. rubrum* L., *Portulaca oleracea* L., *Kochia scoparia* (L.) SCHRAD., *Amaranthus retroflexus* L., *Artemisia annua* L., *Eruca sativa* MILL., *Polygonum aviculare* L., *Cynodon dactylon* (L.) PERS., *Digitaria sanguinalis* (L.) SCOP.

Uncultivated land: 47 plants per m² together with *Echinochloa crus-galli* (L.) P. BEAUV., *Portulaca oleracea* L., *Chenopodium album* L., *Ch. rubrum* L., *Kochia scoparia* (L.) SCHRAD., *Cynodon dactylon* (L.) PERS., *Cyperus rotundus* L.

Along the ditch : 19 plants per m² together with *Atriplex tatarica* L., *Cynodon dactylon* (L.) PERS., *Alhagi pseudalhagi* (M. BIEB.) DESV. ex B. KELLER et SHAP., *Cyperus rotundus* L., *Portulaca oleracea* L., *Phragmites australis* (CAV.) TRIN. ex STEUD., *Echinochloa crus-galli* (L.) P. BEAUV., *Persicaria maculata* (RAFIN.) A. et D. LOVE, *Convolvulus arvensis* L., *Bassia hyssopifolia* (PALL.) KUNTZE.

Crop land: 64 plants per m² together with *Setaria viridis* (L.) P. BEAUV., *Cynodon dactylon* (L.) PERS., *Chenopodium album* L., *Phragmites australis* (CAV.) TRIN. ex STEUD., *Lactuca tatarica* (L.) C.A. MEY., *Rumex conglomeratus* MURREY, *Portulaca oleracea* L., *Cxxxxx arvensis* L., *Alhagi pseudalhagi* (M. BIEB.) DESV. ex B. KELLER et SHAP., *Amaranthus retroflexus* L., *Sonchus oleraceus* L.

a) Lucerne field: *Medicago sativa* L., *Phragmites australis* (CAV.) TRIN. ex STEUD., *Cynodon dactylon* (L.) PERS., *Cyperus rotundus* L., *Chenopodium album* L., *Bassia hyssopifolia* (PALL.) KUNTZE, *Atriplex tatarica* L., *Alhagi pseudalhagi* (M. BIEB.) DESV. ex B. KELLER et SHAP., *Kochia scoparia* (L.) SCHRAD., *Polygonum aviculare* L., *Rumex conglomeratus* MURREY, *Echinochloa crus-galli* (L.) P. BEAUV., *Convolvulus arvensis* L.

b) Millet field: *Panicum miliaceum* L., *Cynodon dactylon* (L.) PERS., *Cyperus rotundus* L., *Alhagi pseudalhagi* (M. BIEB.) DESV. ex B. KELLER et SHAP., *Echinochloa crus-galli* (L.) P. BEAUV., *Portulaca oleracea* L., *Xanthium albinum* (WIDDER) H. SCHOLTZ (Fig. 4).

c) Corn field: *Zea mays* L., *Xanthium albinum* (WIDDER) H. SCHOLTZ, *Echinochloa crus-galli* (L.) P. BEAUV., *Portulaca oleracea* L., *Cynodon dactylon* (L.) PERS., *Cyperus rotundus*



Fig. 4: Population of *Amaranthus viridis* L. in millet field.

L., *Chenopodium album* L., *Ch. rubrum* L., *Bassia hyssopifolia* (PALL.) KUNTZE, *Atriplex tatarica* L., *Amaranthus retroflexus* L., *Setaria viridis* (L.) P. BEAUV.

d) vegetable garden field: *Cyperus rotundus* L., *Portulaca oleracea* L., *Convolvulus arvensis* L., *Chenopodium rubrum* L., *Polygonum aviculare* L., *Echinochloa crus-galli* (L.) P. BEAUV., *Rumex conglomeratus* MURREY

e) flower bed: *Setaria viridis* (L.) P. BEAUV., *Cxxxxx arvensis* L., *Portulaca oleracea* L., *Cyperus rotundus* L., *Polygonum aviculare* L., *Cynodon dactylon* (L.) PERS.

Origin of *A. viridis* L. is South America and partly Central America and it spread to other territories as an adventives species (AELLEN 1959). It came to Central Asia from South through the neighboring countries. Most probably it came to Uzbekistan through the bordering countries Tajikistan and Turkmenistan

CONCLUSION

Amaranthus viridis L. came to Uzbekistan as an adventive species after the year 2000 and is probably of antropogene origin. Within a short period it appeared as a dominant species among plants, and is now rapidly spreading in antropogene environments.

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