ANA PETROVA, VLADIMIR VLADIMIROV, VALERI GEORGIEV

INVASIVE ALIEN SPECIES OF VASCULAR PLANTS IN BULGARIA
**Amorpha fruticosa** L.
Desert false indigo

**Fabaceae – Pea family**

- Included in List of “Worst invasive alien species threatening biodiversity in Europe” (Annex 1. 2007) and in the list of the invasive species of the European and Mediterranean Plant Protection Organisation (EPPO 2012).

**Morphological description**
Deciduous, much branched shrub, 2–5 m high; bark smooth, gray-black or brown. Leaves alternate, imparipinnate; rhachis 10–20 cm long, pubescent; leaflets 9–35, 10–50 × 5–30 mm, ovate or elliptical, on short petiolules, broadly cuneate at base, obtuse or slightly emarginate at apex, entire, dark green above, gray-green beneath, pubescent to glabrescent, sparsely red glandular-punctate. Stipules 4–5 mm long, lanceolate-subulate, caducous. Flowers up to 6 mm long, numerous, in terminal, 7–15 cm long ±compact spikes or groups of spikes; pedicels (3)5–6 mm long. Calyx campanulate, 2.0–2.5 mm long, almost actinomorphic to slightly bilabiate. Corolla blue to violet-purple. Standard up to 5 mm long, abruptly narrowed at base, glabrous; wings and keel undeveloped. Fruit a legume, 7–9 × 3 mm, brown, glabrous, red glandular-punctate, usually 1(2)-seeded. Seeds 5.0 × 1.8 mm, oblong-ovoid, smooth, brown.

**Biology and ecology**
Pollinated by insects, mainly bees; blooms from May to July, but flowers can be formed again later in summer; fruiting from August to October; sometimes fruits remain on the bush until next year and can be seen from a distance. It develops extensive root system. Propagated by seeds, which are produced in large quantities and have high germination rate, and vegetatively (through stem shoots and root suckers, green cuttings, layering). Seeds are spread most com-
monly by water currents, but animals are also involved in their distribution. Prefers moist places, but tolerates both prolonged droughts and prolonged flooding, as well as salinity. It grows best in deep, fertile soil, but it is not demanding of its soil type. It develops in acidic, neutral and alkaline soils. Successfully adapted to infertile, dry and sandy soils, withstands extreme conditions. It prefers sunny locations with well-drained sandy soils, but tolerates shade. Thanks to symbiotic relationships with nitrogen-fixing microorganisms it has the ability to fix atmospheric nitrogen, so it can grow on very poor soils. Wind-resistant species. Fully frost-hardy for the climatic conditions of Bulgaria, quickly recovering with stem shoots and root suckers if any damage by frost occurs. It forms dense and very large monodominant groups. In its native distribution area it is found in riparian habitats and sparse floodplain forests.

In Bulgaria it most frequently inhabits riparian and coastal habitats, roadsides, bushes, often as undergrowth in poplar plantations along rivers. It forms monodominant, dense communities along the river Danube, replacing native species and altering the structure of native plant communities, and in forests, where it is assumed as a weed species and outcompetes the other young trees due to its rapid growth. It produces insecticides, which explains the lack of herbivorous insects feeding on the species in the areas outside its native range. Cultivated as an ornamental, melliferous and erosion control plant. All parts contain a substance, the main ingredient of which is amorfin, with repulsive and highly toxic effect on insects, and because of this, desert false indigo is attacked only by several more or less specialized insects. For this reason, in China it is used against forest and agricultural pests.

**Origin and distribution**

Native to the south-eastern North America (east of the Rocky Mountains and north of Mexico).

In Bulgaria, it was introduced in the early 19th century for ornamental purposes and erosion control. After afforestation with the species in many places, it escaped in the wild, the first evidence of which was reported in 1898 and now it is widespread in the whole country.
Extensive stands of desert false indigo are developed along the Danube, reaching in some places up to 90% of the vegetation cover, where it forms dense, impenetrable communities, with a limited number of species in the undergrowth. Widespread along roads, railway lines, in different parts of the country along rivers and canals. In areas where there are no rivers and wetland areas found in rocky places, scrub, dry grassland, secondary and disturbed habitats, invading also undisturbed protected areas.

Distributed in all floristic regions of the country, up to about 1200 (1500) m a.s.l.

In Europe, it was first introduced in England in 1724 as an ornamental, and then transferred to the rest of the continent. Naturalized in much of Central, Southern and Eastern Europe, and Asia (temperate areas), where it is grown on a large-scale.

**Control**

No specially developed methods to control desert false indigo. Prevention includes stopping of the use of the species for erosion control of degraded areas and along roads, and as decorative and melliferous plant in riparian and coastal habitats. With the possible establishment of a melliferous crop, the owners to exercise strict control to prevent the spread of the species (including seeds) out-
side the cultivated area, and compulsory destruction of the culture, cleaning and restoring the site upon cessation of use. Seedlings and small suckers can be uprooted. Larger individuals are cut to the ground and the remaining transversal cuttings are treated with herbicide, e.g. glyphosate. Spraying with glyphosate on the green leaves is also very effective.

References