

A Naturalised Population of *Larix decidua* Mill. (Pinaceae) in the Rhodope Mountains, Bulgaria

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Abstract: The European larch (*Larix decidua*) is grown as an ornamental or timber tree in many parts of the world. In Bulgaria, it was planted for the first time at the end of the 19th century as an ornamental tree in Sofia and Samokov. Records for an afforestation of small plots date back to the beginning of the 20th century. By 1980 some pure stands or mixed plantations were established in many forestry departments. A case of a naturalised population near the village of Vodni Pad, Devin Municipality, in the Rhodope Mountains is reported here. The parent individuals were planted as ornamental trees in the yard of a border observation post about 40 years ago. A successful seed reproduction was observed with a progeny of different ages (one – app. 20 years), the oldest ones used to produce strobili and seeds for 3-6 years.

Key words: European larch, naturalised alien, South Bulgaria

Introduction

The planting of alien trees, firstly in gardens and parks, later on in forests, has a long history. This activity results in a diversity of the green systems around us, new scientific knowledge, new products that help the life of the local populations, economic incomes, etc. In Bulgaria, the introduction of alien trees as ornamentals became more or less a regular practice at the end of the 19th century; the forest plantings of alien trees started at the beginning of the 20th century (DIMITROV & STEFANOV 1928). Beside benefits of this practice, many of the introduced trees may become invasive and problematic, even dangerous for the native biodiversity (BRUNDU & RICHARDSON 2016).

The more intensive studies on the alien plants in Bulgaria are comparatively recent. Some of the intentionally introduced ornamental and/or forest trees that are reproducing successfully in the wild for more than a decade are reported only recently. Respectively, they are not included as naturalised

in the recent general sources of the Bulgarian flora (KOZHUHAROV 1992, DELIPAVLOV & CHESHMEDZHIEV 2011, ASSYOV & PETROVA 2012) or in the summaries of the alien and invasive plants in Bulgaria (PETROVA et al. 2012 a, b). Such an example is the European larch (*Larix decidua*).

Here we report a case of a naturalised population in the Rhodope Mountains, thus formally we report the presence of the species as an alien in the Bulgarian flora.

Materials and Methods

The field work was carried out in 2016 in the Rhodope Mountains. The identification was done with relevant keys (KRÜSSMANN 1972, AMARAL FRANCO 1993). Data about the population and habitat of the species were based on visual observations. The herbarium specimen gathered is deposited in the herbarium (SOM) of the Institute of Biodiversity

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Results and Discussion

Pinaceae

Larix decidua Mill., Hort. Kew. 172/4 (1768).

Monopodial tree up to 40 m; trunk with a reddish-brown fissured bark; twigs glabrous and yellowish. Leaves deciduous, 20-30 mm, thin, soft, growing in bunches of 20-30 on old twigs or single on young shoots, light green, turn yellow before autumn's fall. Monoecious, male cones yellow with reddish margins, 5-10 mm; female cones ovoid, 2-2.5 cm, red to purple when immature, turn to light green at anthesis. Scales 40-50, rounded, softly pubescent, stay straight (AMARAL FRANCO 1993).

The native distribution covers the Alps and Western Carpathian Mountains, from 650 to 2500 m a.s.l., with an isolated part of the range in south-central Poland at lower altitudes. The species is light-demanding, fast-growing, tolerant to cold winters, with high production of light seeds that are easily dispersed by winds and shows pioneer abilities (DA RONCH et al. 2016).

Its wood is strong, durable and characteristically coloured, so it is used for weather-proof constructions, furniture, etc. The species has been widely used for forest plantations in Europe since the 16th century (DA RONCH et al. 2016). It is reported as alien in at least 16 countries in Europe; according to the European Invasive Alien Species Gateway (DAISIE 2017), in six of them (Great Britain, Latvia, Lithuania, Luxemburg, Norway, and Sweden) the *Larix decidua* is established.

Distribution in Bulgaria

Personal collection: Rhodope Mountains (Central): above Vodni Pad Village, in and around the yard of a former border observation post, N 41.55094°; E 24.38404°, 1390 m a.s.l., KG 80, 21.05.2016, leg. A. Petrova & I. Gerasimova (SOM 172808).

Here, *L. decidua* was planted as an ornamental tree in the yard of the border observation post. There were groups of parent trees, about 40 years old (Fig. 1A). Beside them, nearby, at an area of 0.25 ha, on a comparatively flat terrain, recently without any management, we counted more than 40 young saplings and trees, up to 20 years old (Fig. 1B) although those that were 2-5 years old prevailed.

Many of the young individuals were on local spots with traces of disturbance (near the road, on the places from where the fence poles or other structures were removed). Single young individuals

were observed also at about 300 m apart, in the grasslands and among the remote houses of the Vodni Pad Village. The older individuals of the progeny were with strobils, yielded at least since 2013. Other woody species that self-established here and there were *Betula pendula* Roth and *Pinus sylvestris* L.

Vodni Pad was a small mountain village near the Bulgarian-Greece border. For the last five years there have not been any permanent inhabitants. It is in the belt of the coniferous forest of *Picea abies* (L.) H. Karst., *Pinus sylvestris* and *Abies alba* Mill. There are mountain grasslands used for extensive grazing and mowing in summer. In the past, local people used to cultivate small-size cereal and potato fields. The activity of the former border observation post was significantly limited 20 years ago and it was completely abandoned around 2005.

It deserves to be mentioned that there were ten other small forest plantings (0.1-1 ha) of *L. decidua* on the territory of Trigrad Forest Department, usually younger and in mixed plantations. According to the local foresters, there was no self-reproducing (BAKLAREVA, personal communication).

Other data: GANCHEV & PROKOPIEV (1959) briefly summarised the results of the introduction of the species during the first half of the 20th century. The first plantings were dated back to 1890 in the area of Knyazhevo, near Sofia, where the saplings were planted as ornamental trees. Soon after, small plot or single trees plantings were done in Vitosha Mountain, and in the areas of Borovets, Rila Monastery and Belmeken in Rila Mountain. There were no observations of self-reproduction for that period. Later, a detailed study of the cultivation of *Larix* species in Bulgaria was done by MILEV (1996). He found that the most intensive were the forest plantings during the period 1962-1987. During that period, *L. decidua* was planted mostly as groups of 200-300 saplings per 0.1 ha in mixed plantations. At the end of that period, about 1000 ha mixed, rarely pure forest plantations with *Larix* species were established, predominately in the beech belt in western Bulgaria. The Japanese larch, *L. kaempheri* (Lamb.) Carr., and very rarely the Siberian larch, *L. sibirica* Ledeb., were planted as well. After that period, there was a strong decline in the afforestation with *Larix* species in the country.

In the 1990s, MILEV (1996) observed and analysed about 580 plantings. He reported regular development of strobils on 8-10 years old plants and good quality seed production at an age of about 15 years. He observed successful self-reproduction only in seven plantings, all in open places (not specified).

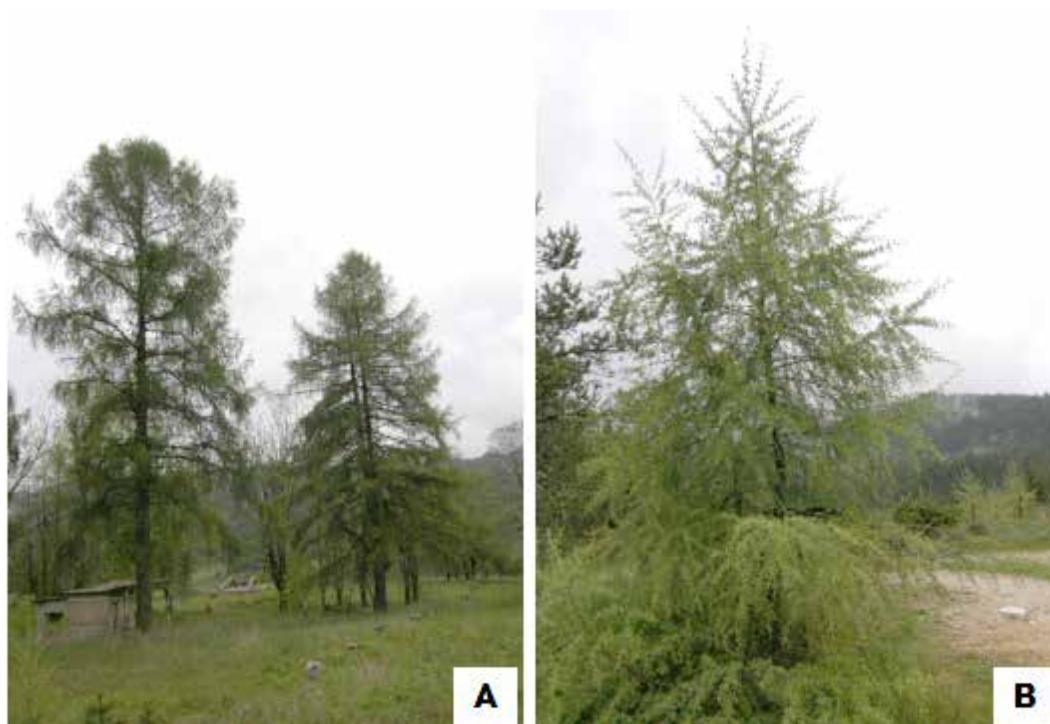


Fig. 1. *Larix decidua* Mill. above Vodni Pad Village. A. A group of the parent trees; B. A self-reproduced young individual. (Photos: A. Petrova)

Conclusions

A naturalised population of *L. decidua* is reported with fertile individuals among the progeny. The parent trees were planted for ornamental purposes at a locally open mountain area with high humidity and precipitation. The process of naturalisation apparently started after the abandonment of the place and ceasing of the grass mowing.

This population is in Natura 2000 site (BG0001031) with rich biodiversity and further spread of *L. decidua* potentially may have negative

influence on the native biodiversity. Earlier observations of the first author on a 60-year old plantation of *L. decidua* in the Rilska River valley (PETROVA 1973, MSc Diploma Thesis, unpublished) showed low diversity of the forest floor plants, with only very common species represented.

Further studies are needed for determining the actual status and distribution of the European and Japanese larches in Bulgaria.

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