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SHORT COMMUNICATION

Is the Japanese walnut (*Juglans ailantifolia*, Juglandaceae) native to Sakhalin Island?

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ABSTRACT

The Japanese walnut (*Juglans ailantifolia* Carrière) is considered a very rare native tree species to Sakhalin Island. There is no information about *J. ailantifolia* records in the natural broad-leaved mixed forests of the island. The valleys of the Uglegorka and the Nadym Rivers in the Uglegorsk administrative district were noted as the main habitats areas of *J. ailantifolia* in several sources. We found that all walnut trees from these locations belong to artificial forest stands over 95 years old. We conclude that *J. ailantifolia* is a non-native species to the modern flora of Sakhalin and was introduced from Japan at the beginning of the XX century.

Keywords: *Juglans ailantifolia*, Japanese walnut, non-native species, forest plantation, Sakhalin

РЕЗЮМЕ

Корзников К.А., Петренко Т.Я., Дзизюрова В.Д. Является ли *Juglans ailantifolia* (Juglandaceae) аборигенным видом для острова Сахалин? Орех айлантолистный (*Juglans ailantifolia* Carrière) считается очень редким видом флоры Сахалина, хотя каких-либо достоверных сведений о его находках в составе хвойно-широколиственных лесов острова не имеется. В ряде литературных источниках упоминается, что естественные места произрастания *J. ailantifolia* располагаются в речных долинах рек Углегорка и Надым в Углегорском административном районе. Мы обнаружили, что все деревья в указанных местонахождениях принадлежат искусственным лесонасаждениям, их возраст более 95 лет. Мы пришли к выводу, что *J. ailantifolia* не принадлежит к числу видов современной природной флоры острова и был интродуцирован на Сахалин в начале XX столетия из Японии вместе с рядом других видов деревьев.

Ключевые слова: *Juglans ailantifolia*, орех айлантолистный, инорайонный вид, лесные культуры, Сахалин

The Japanese walnut (further abbreviated to JW) or *Juglans ailantifolia* Carrière (= *J. sieboldiana* Maxim.) is a deciduous tree species common in temperate broad-leaved and mixed forests of Japan. The closely related species *J. mandshurica* Maxim is distributed in the continental part of northeast Asia. Some botanical sources noted that the JW is also native to Sakhalin Island, which is located north of Japan and belongs to the boreal zone. In this short communication, we want to show that there is no reliable information about the growth of the JW in the native plant communities of Sakhalin. All information about this species relates to cultivated or naturalized plants.

Schmidt (1869) studied the flora of the island in detail for the first time and did not find *Juglans*. Maximowicz (1873) made a description of *J. sieboldiana*. He described the distribution of *J. sieboldiana* only to the Japanese Archipelago, and its widespread cultivation by the locals in Hokkaido. Krasnov (1894, 1895, 1987) wrote about a small grove of 50 *J. mandshurica* plants in the valley of the Naiba River and indicated that walnut trees were not found anywhere else on the island. This plantation was clearly artificial in origin and has not survived to this day. Later, Krasnov's information was mistakenly interpreted as evidence of the existence of the JW's native populations (Taran & Rogazinskaya-Taran 2019). Kudo (1934) wrote about the presence of the taxon *J. sieboldiana* var. *sachalinense* Miyabe et Kudo in the Toyohara floristic district in southern Sakhalin (currently the vicinity of Yuzhno-Sakhalinsk): "the size of the nut of the Saghalin variety is smaller, measuring 2.4–3.0 cm in length and 1.85–2.2 cm in width; they are generally ovateorbicular and acute at the apex, and the rugoseness is shallower and less conspicuous". Sugawara (1939) indicated the presence of *J. sieboldiana* var. *sachalinense* in the territory of the current Uglegorsk administrative district, the basin of the Uglegorka river (Fig. 1). The catalog of herbarium materials of Sakhalin Island (Smirnov 1999) contains information about several specimens of the JW collected in the Uglegorsk district in 1949–1962. According to the "Flora of the Soviet Far East" (Kharkevich 1989), the JW was recognized as a native and very rare species for the southern part of Sakhalin and Kunashir. Also, pollen grains of *Juglans* were found in the deposits of warmer periods of the Holocene (Igarashi & Zharov 2011, Razzhigaeva et al. 2014).

The Global Biodiversity Information Facility (GBIF) contains several records of the JW in the Sakhalin Region. One of them corresponds to the photo observation made by K.A. Korznikov using iNaturalist application in the valley of the Nadym River, a small tributary of the Uglegorka Ri-

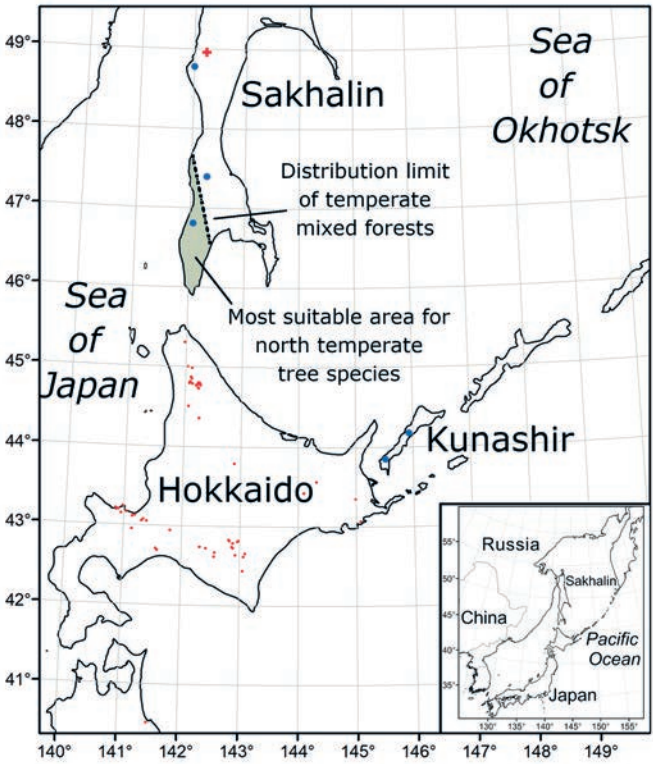

Figure 1. The GBIF occurrence data of *Juglans ailantifolia* Carrière at the northern limits of its range. Red dots indicate records in Japan; blue circles indicate records in Sakhalin and Kunashir Islands based on local floras (see Bochkov & Seregin 2022), average coordinates of floristic districts were used; the red cross indicate the location of Uglegorka and Nadym river valleys in Uglegorsk district where we found artificial stands of *J. ailantifolia*

ver. Other locations refer to the dataset "Local floras of Russia: records from literature" (Bochkov & Seregin 2021), which digitized floristic data published in 1975–2021 in hardly available journals, serials, monographs, dissertations, and technical reports written in Russian. The locations were taken from two sources (Barkalov & Taran 2004, Barkalov 2008) and presented as average coordinates of floristic districts (Fig. 1).

The JW was included in several issues of the Red Data Book of the USSR, the last issue of the Red Data Book of Russia (Taran & Barkalov 2008), and the last issue of the Red Data Book of the Sakhalin Region (Taran & Rogazinskaya-Taran 2019). In both sources, the forest stands of the JW in the Uglegorsk district are noted as native and very rare. Other occurrences of the JW in Sakhalin and Kunashir were described as belonging to cultivated plants.

Since the end of the 1930s (Sugawara, 1939), the basin of the Uglegorka river in the Uglegorsk district was noted as the main habitat area of the JW (Tolmachev 1956a,b). However, the existence of isolated native populations of the JW in the Uglegorsk region seems unlikely. The distribution of other broad-leaved tree species co-growing with the JW in north-temperate forests, such as *Kalopanax septemlobus*, (Thunb.) Koidz. and *Phellodendron sachalinense* (F. Schmidt) Sarg., is limited to southwest Sakhalin Barkalov & Taran 2004, Tolmachev 1956a) (Fig. 1). Also, we never found the JW during our research in the riparian forests of south Sakhalin (Korznikov & Popova 2018).

In the summer of 2021, we visited the valleys of the Uglegorka (48.9221°N 142.2599°E) and the Nadym (48.9624°N 142.2599°E) Rivers in the Uglegorsk district, which were described as the main localities of the JW (Taran & Barkalov 2008). We found the monodominant forest stands of the JW about 5 and 10 ha respectively. We recognized these stands as artificial forests because trees were formed in lines and had the same ages. The age of the plantation is more than 95 years, which we found after counting a number of tree rings in the samples taken from the 1.3 m height from 10 randomly selected trees. Both plantations were located in hill footslopes, south exposures. Trees were flowered, and fruits were abundant on the soil surface. Saplings and young trees of the JW were quite common in the canopy gaps and in open habitats close to the edges of plantations. We did not find the JW in other parts of river valleys, including natural riparian forest patches.

Thus, there is no reliable data on the existence of the JW native populations in Sakhalin. The species occurrences from the literature sources and herbarium specimens were made in the vicinity of settlements from cultivated plants used in gardening or from artificial forest stands. At the same time, there is no information about the records of the JW in the southern west Sakhalin, where climatic conditions are more suitable for north temperate deciduous tree species. Based on this, we conclude that the JW is not a native species in Sakhalin. From the beginning of the XX century, the Japanese settlers massively created forest plantations of Japanese tree species in southern Sakhalin, such as *Larix kaempferi* (Lamb.) Carrière, *Pinus densiflora* Siebold & Zucc., *Pinus thunbergii* Parl. (Korznikov 2016).

The plantations of the JW demonstrate successful growth, regular flowering and fruiting in the climate condition of Sakhalin at a latitude close to 49°. The JW is applicable for local reforestation practices, especially taking into account current trends of global warming and the shift of species distribution ranges.

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