***Pinus thunbergii* Parl. Japanese Black Pine**

Syn. *Pinus thunbergiana* Franco, nom. illeg.

TAXONOMY

Family Pinaceae

Pinus thunbergii is a small evergreen tree that can reach heights of about 6-9 m tall and about 6-11 m wide in cultivation. It can reach the height of 40 m in its natural range. The needles are in fascicles of two with a white sheath at the base, 7–12 cm long; female cones are 4–7 cm in length, scaled, with small points on the tips of the scales, taking two years to mature. Male cones are 1–2 cm long borne in clumps of 12-20 on the tips of the spring growth. Bark is gray on young trees and small branches, changing to black and plated on larger branches and the trunk; becoming quite thick on older trunks (Gilman and Watson 1994).

Sometimes confused with *Pinus nigra* which is also not native to North America. *P. nigra* is found in central Massachusetts on forest edges and scrub thickets. *P. nigra's* growth form is relatively uniform with an unbranched main stem whereas *P. thunbergii* has irregular growth habit and forked main stem and branches (Haines 2011).

NATIVE REGION OR RANGE

P. thunbergii is native to northeastern China and coastal areas of Korea and Japan. *P. thunbergii* prefers full sun and can tolerate a wide range of soil types. It is tolerant to both drought and high salinity. It can be found in anthropogenic, forest edges, shrublands or thickets. The pinewood nematode, *Bursaphelenchus xylophilus*, was accidentally introduced to Japan (native to North America) and is threatening the *P. thunbergii* in its native range.

HISTORY

P. thunbergii was introduced to the US from Japan in 1855. It was planted in some coastal areas for its salt tolerance and tolerance to dry, sandy conditions. It was used for stabilizing soil, providing a wind break, and for its fast-growing properties.

In Massachusetts, *P. thunbergii* was first planted on Nantucket, Martha's Vineyard, and Cape Cod in the late 1800's for a combination of its fast growth and its dune stabilizing capabilities. It is well-adapted to dry, sandy soils and grows well in full sunlight; ideal conditions for these coastal communities.

BIOLOGY

Life Form – evergreen tree

Naturalized - YES

Dispersal – wind, animals, gravity

Massachusetts habitats – Anthropogenic (man-made or disturbed), forest edges, shrublands or thickets. Coastal dune communities. *Pinus thunbergii* stands of the northeastern coastal region occurs on well-drained to xeric sandy soils, usually on sand dunes or near-coastal glacial tills.

Biological potential – *P. thunbergii* occurs in coastal sites, disturbed sites, sand dunes, and dry scrubland. It grows well in full sun. On Nantucket specifically, it is seen as an ecological threat to native grasslands of Massachusetts and the globally rare sandplain grasslands of coastal Massachusetts and the islands.

In North America *P. thunbergii* is subject to mortality by the native pinewood nematode, *Bursaphelenchus xylophilus*, spread by means of beetle vectors; primarily turpentine beetle, *Dendroctonus terebrans*. Subsequently, blue stain fungus, *Leptographium* sp., invades the plant, leading to a rapid decline and death. Standing dead become fire hazards and hazards for human health.

REPORTED INVASIVENESS

P. thunbergii is reported as **invasive** by Delaware. It is on the watch list for Rhode Island. There are EDDMapS records of *P. thunbergii* from 5 states – MA, RI, DE, MD, and NY (EDDMapS 2021).

According to Natureserve, *P. thunbergii* plantations occur on Cape Cod National Seashore and Boston Harbor Islands National Recreation Area, Massachusetts; Block Island, Rhode Island; and Fire Island National Seashore and Gateway National Recreation Area, New York.

P. thunbergii has been designated as a highly invasive, non-native species on Nantucket by the Invasive Plant Species Committee of the Nantucket Biodiversity Initiative, a consortium scientists, landscapers, and concerned citizens that conduct collaborative invasive species removal projects and public education efforts on the island. It was added to the Town of Nantucket's Conservation Commission list of invasive plants as Highly Invasive (https://www.nantucket-ma.gov/DocumentCenter/View/1008/Conservation-Commission-Wetland-Regulations-2013-PDF).

In Rhode Island, *P. thunbergii* was frequently planted on Block Island for wind breaks and dune stabilization. It was noted to be naturalized and spreading in RI by at least the 1990's if not earlier.

P. thunbergii is found all along Suffolk County on Long Island, NY. This county is climatically similar to coastal Massachusetts particularly the south coast and islands.

DISTRIBUTION

Massachusetts Counties

	BE	FR	HS	HD	WO	MI	ES	SU	NO	BR	PL	BA	DU	NA
			X				X					X	X	X

USDA Plants database reports this taxon in Massachusetts

EDDMapS. 2021

iNaturalist 2021

Additionally, Mike Whittemore, The Nature Conservancy, reported *Pinus thunbergii* from a species list for their Bamford property on Martha's Vineyard.

SPREAD & IMPACTS

In addition to Massachusetts *P. thunbergii* is reported from SC, NC, TN, VA, OH, MD, NJ, NY, CT, DE, and RI on the eastern US (USDA 2021, EDDMapS 2021).

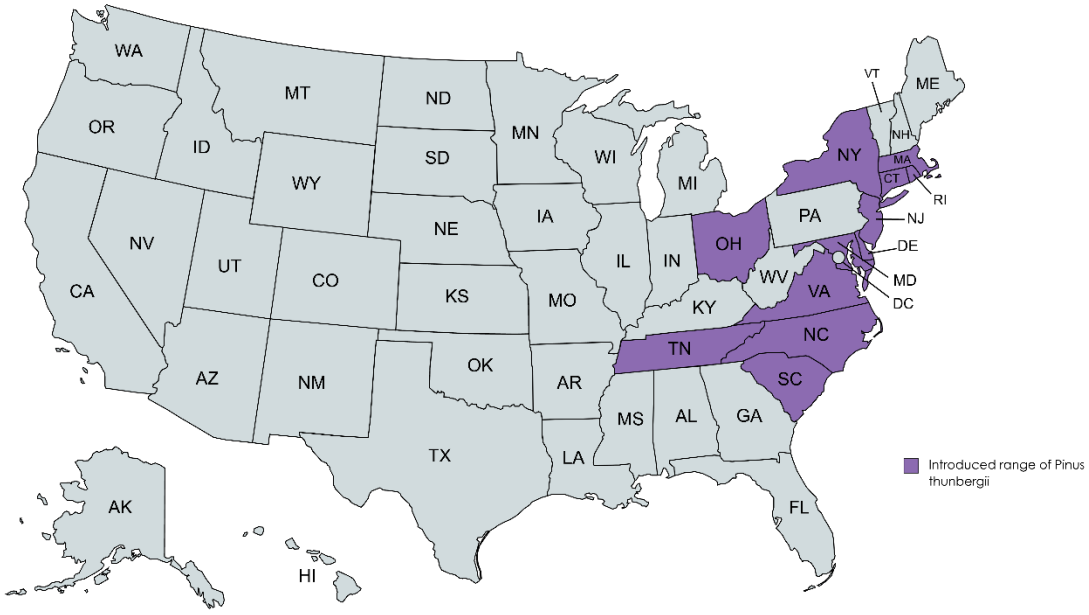

Figure 1: Introduced range of *Pinus thunbergii* in U.S. (based on EDDMapS, iNaturalist, and USDA data).

As of 8/17/21, EDDMapS lists 58 observations from Massachusetts predominantly from Cape Cod and Nantucket. It is important to note that in EDDMapS, one observation point can

represent multiple individual plants or an area. On Nantucket alone, the 58 points represent at least 500 trees. These records were predominantly found in minimally managed habitats – conservation lands, town-owned open spaces, bike paths, and road edges (Bois 2021).

For the past 10 years in Delaware, *P. thunbergii* trees were actively removed due to impeded native vegetation. Post World War 2, over 50,000 *P. thunbergii* trees were planted along the Delaware coast and spread from those initial plantings. Now the trees are being removed in a decades-long project at Cape Henlopen State Park among others (according to local news reports in Delaware: https://www.capegazette.com/article/state-rids-parks-japanese-black-pines-make-room-native-species/6810).

In 2009, Rob Line, head of Delaware's Environmental Stewardship program for the Division of Parks, said aerial surveys show Japanese black pines dominated 30 percent to 40 percent of Delaware's coastline.

At the Linda Loring Nature Foundation on Nantucket, the land trust has been working to remove invading *P. thunbergii*. Since 2018 they have cleared approximately 12 acres of *P. thunbergii*, but the effective area, the area that will benefit from the treatment, is estimated to be over 50+ acres as natural ecosystem processes are reinstated (Bois 2021). Some of this work was funded with a Massachusetts State Wildlife Habitat Management Grant.

The Nantucket Conservation Foundation, the largest land owner on Nantucket Island, has been managing stands of *P. thunbergii* at several properties across the island. Sandplain grassland and heathland habitats occur immediately adjacent to the project areas, and representative species of these habitat types are present in the understory. Removal of the *P. thunbergii* was done to prevent further the spread and establishment of non-native, invasive pines into the surrounding rare sandplain grassland and heathland habitats and reduce the risk of standing dead trees creating a wildfire hazard.

This species is still sold and planted in the horticultural trade. It is utilized in coastal areas and seashore plantings, reclaiming dunes, and for erosion control/wind breaks. Of concern is that this species is found within and on the edges of sandplain grasslands and coastal dune communities where several globally rare endangered plants are found.

On Nantucket where this species is being targeted for documentation of *P. thunbergii*, there has been an increase in population sightings in natural areas, conservation lands and other open space. *P. thunbergii* is found across the whole of Nantucket Island from east to west, north and south with the largest populations present on the western end of the island. These stands started from plantings in the early 1900's and have spread from there in the last 100 years. Since they were planted at wind breaks, they have been effective at reducing the natural ecological processes that helped shape the island flora, namely salt spray and winds. Removing these trees helps restore these regimes and reclaim the sandplain grassland and heathland plant communities.

P. thunbergii stand before (a) and after (b) management on Nantucket. Post management you can see the grassland and heathland habitat that was restored after the removal of the *P. thunbergii* stand. The stumps of the trees are still visible.

P. thunbergii stand (some standing dead, some live) on Nantucket.

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