CzechGlobe Global Change Research Institute CAS

Eastern white pine (*Pinus strobus* L.) in the Czech Republic

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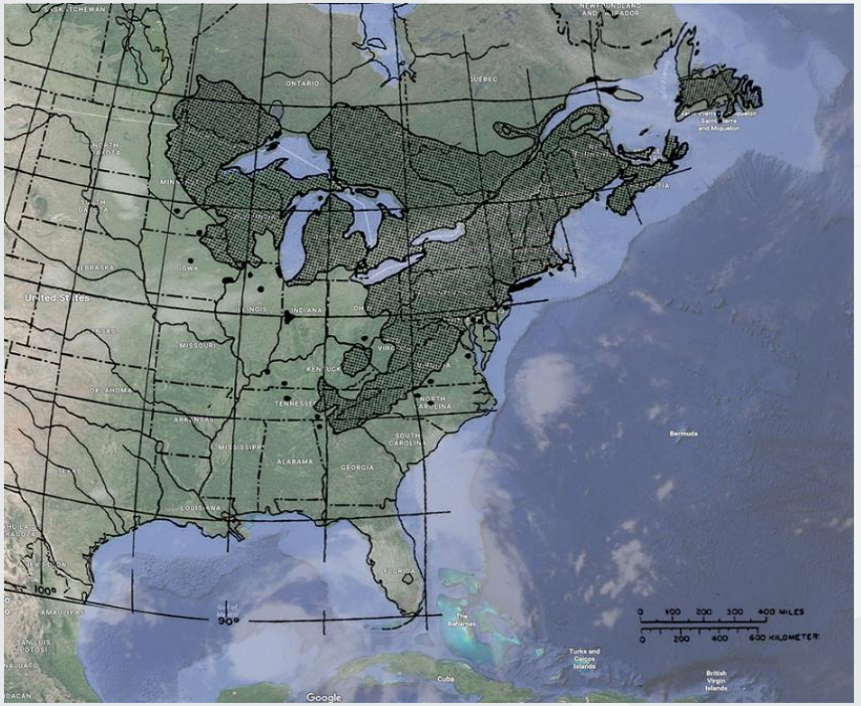
Origin

Eastern white pine is native to eastern part of North America

in its homeland it exceeds ***large coherent area*** reaching *from <u>boreal</u> New Foundland* to *<u>subtropical</u> northern border of Georgia (USA)*

(with refugees of *Pinus strobus* var. *chiappensis* on Yucatan)



Introduction to Europe

it was first established **in Europe in 1705** in the southern part of England (Weymouth Estate)

in the landscape of today's **Czech Republic** it was first planted at the **turn of 18th and 19th century** (in central Bohemia around Hluboš – *1812*; according to other sources the first planting took place even in *1785* in Lány Chateau)

up to the end of 19th century it was presented in forest stands only on a few places (max. 10), especially close to the city of Dečín (northern Bohemia)

EWP began to be planted more widely at the end of 19th century, after heavy affect of native Scots pine by needle blight (*Lophodermium* sp.)

Important ecological characteristics

It appears to be **resistant to emissions** (especially to SO_2) and this trait brought attention to EWP during the period of **high emission in 1970s and 1980s** when many native tree species stands (mainly Norway spruce) were rapidly dying.

EWP does not tend to suffer frost damage and tolerates high summer temperatures

EWP tolerates shade (as opposed to light demanding Scots pine) and is labeled as semi-shade tolerant tree species.
It plays an important role in natural regeneration under a canopy.

Wood properties

The timber of EWP does **not reach the quality of many native species** in terms of strength properties and wood density and is usually used for *specialised products* (e.g. pencils, beehives).

However, its properties **enable to use it as construction timber** for wooden houses and for furniture or for OSB desks.

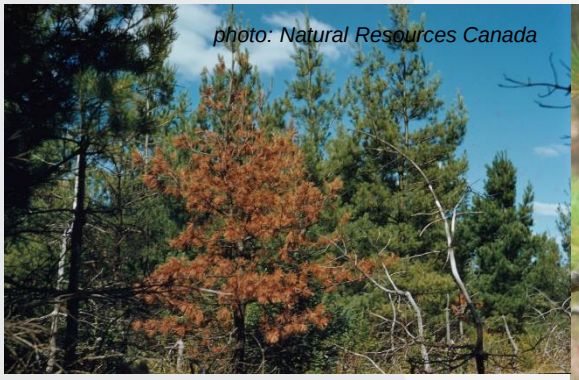
The best features are its physical and dimensional *stability* after drying and its suitability for machining and gluing.

A disadvantage is its short *durability*.

flexural strength is slightly lower (71 – vs 78 Mpa for Norway spruce),
density is lower (ca 400 kg/m^3 vs 470 kg/m^3 for Norway spruce)

Diseases

The only disease that causes serious damage is white pine blister rust (*Cronartium ribicola* J.C.Fisch.)



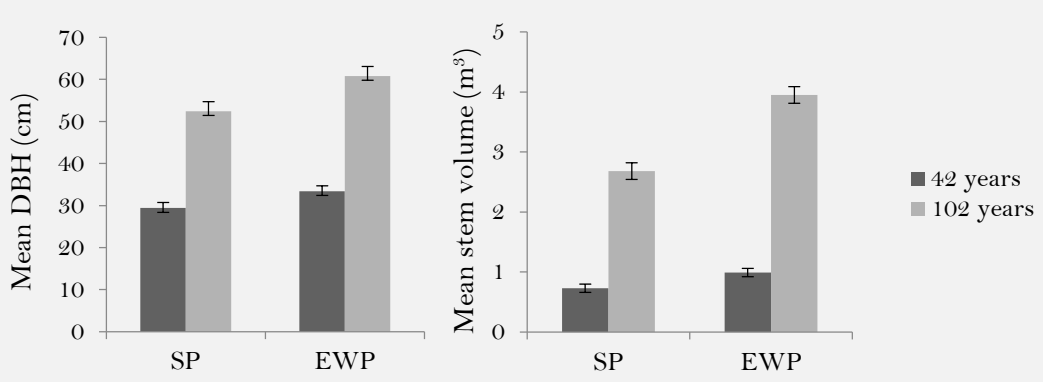
Disease causing noticeable damage to EWP within Czech forests is *Meloderma desmazieri* (Duby) Darker.

Commercial timber production

A comparison of introduced *EWP and native Scots pine* concluded that EWP has **higher volume production** than Scots pine, which was particularly pronounced in nutrient-poor and acidic soils.

The finding of EWP increment exceeding that of native Scots pine was *concluded elsewhere in Europe*.

Mean DBH and mean stem volume for Scots pine (SP) and eastern white pine (EWP) from stands in eastern Bohemia. Data for 10 largest trees in the experimental plot (42 and 102 years).
(source: Vaněk and Bednář 2013)



Impact of EWP on habitats

EWP deposits a thick layer of **needle litter that is acidic and nutrient poor** *causing soil acidification*.

this triggers substantial *changes to the herbal layer* consequently *affecting* native *biodiversity* and modifies *plant communities*

(in northern Bohemia was reported suppression of blueberry (*Vaccinium myrtillus* L.), lingonberry (*Vaccinium vitis-idaea* L.), heather (*Calluna vulgaris* (L.) Hull) and wild rosemary (*Ledum palustre* L.) due to the shade casted by natural regeneration of EWP).

Disruptions as such are undesirable as they have negative impacts on the natural succession and dynamic development of the native habitat.

Invasive behaviour of EWP

Its *invasive spreading* was observed **on acidic soils** – *Genisto gemanicae-Quercion* and **on dry acidic soils** – *Dicrano-Pinion*,

whereas e.g. *on wet or water-logged* sites or *on acidic sites with a greater proportion of European beech* its natural regeneration is **rare**.

Although both EWP and Scots pine are able to grow *on nutrient poor sites*, EWP *grows faster than Scots pine* on such sites. However, the natural regeneration of *Scots pine outcompetes* that of EWP *on more nutrient rich soils*.

The ecological feature of EWP to tolerate shade plays an important role in natural regeneration under canopy.

General conclusions

EWP *in commercial forests* on nutrient poor sites *enables cost-free natural regeneration* under forest canopy without additional planting costs.

However, *the presence of its natural regeneration* in the České Švýcarsko National Park is considered to be a problem and *eradication measures in order to avoid its spread represent significant costs*.

In commercial forest is an advantage its *high production* and *rapid growth* particularly with respect to its *timber qualities*.

General conclusions

EWP is also *considered to be used* as a part of *pioneer vegetation for afforestation* of marginal agricultural land on *nutrient poor and dry sites*.

EWP *needle litter is acidic and nutrient poor* causing soil *acidification* and in addition with natural regeneration shade EWP can *affect native synusia of herbal layer*.

EWP could been considered as an *alternative to native tree species whose natural range has been shifting due to climate change*. Some studies from its native range reported that the *importance of EWP* will substantially *increase due to enlargement of its ecological optima* under climate change.

Thank you for your attention