BRIEF REPORTS

English Yew (*Taxus baccata* L.) in Forests of Baltic States and the Main Reasons for Its Distinction from Lithuania

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The results of study on *Taxus baccata* in native stands of Baltic states are presented.

Due to undetermined reasons these valuable and long-lived trees *Taxus baccata* L. (reaching 3000 years) disappeared from Lithuania. Three last specimens were fixed in 1863 in the forests of the Trakai environs (i.e. beyond the eastern area of natural yew distribution). In author's opinion, the main reason for yew disappearance was biotic factors: roe-deer browsing of yew shoots, felling with the purpose to avoid poisonous effects for pasturing cattle, cutting branches for baptism or funeral ceremonies, due to fine wood, cutting of bow production. Nevertheless, the final disappearance took place in the midst of 19th century, when the oak stands were felled for production of wood and ash (potash) and their export. After oaks were felled, the yews (*T. baccata*) lost their shade and could not survive in the changed ecological conditions.

Key words: English yew, autochtonous, dendroflora, biotic factors, ecological conditions.

Introduction

The Place of European Yew in Plant Systematics: division – *Pinophyta*, class – *Pinopsida*, row – *Taxales*, family – *Taxaceae*.

During development of autochthonous dendroflora from the very start of the second millennium, we know no tree plant that had become entirely extinct. Unfortunately, there is an exception - European yew (*Taxus baccata* L.). It is a paradox, but a terrible fate befell on this conifer tree and finished it off in Lithuania at the end of the 19th century, when even greatly sensitive plants (such as e.g. *Hedera helix* L. 'Hibernica', which often does not set blossoms or does not give a harvest) survived the coldest winters and now flourishes in the forests of yhe Kaunas and Alytus counties and in the maritime zone of the Baltic Sea; at the same time *Carpinus betulus* L. slowly spread northwards and now approached Vilnius; at the same time *Sambucus nigra* L. crossed the state border (that coincided with the northern boundary where it is near the limits of climatic tolerance) and gradually settled in south and south-west Lithuania. Curiosity of botanists, dendrologists and foresters in disclosing the enigma of the interrupted genealogy of yew family is especially fostered by the fact that yews have disappeared in that period, when numerous parks were being established in Lithuania, where dozens of introduced warm-climate trees and bushes were adapted successfully. Number of adventive species among trees and shrubs grew so rapidly, that they exceeded local species by several times, except for the European yew.

I make no pretensions to prove the unquestionable death of yews. To do this is hardly possible, in general having in mind that the mystery is covered by 130-140-year oblivion.

There were various hypotheses. One of the latest reviews was done by Dr. M. Navasaitis in 1993. His logical and interesting affirmations prompted the author of the present paper to go deeper into the sorrowful fate of this species enlisted in the Lithuanian Red Data Book under the category of autochorology.

Wide spreading area, few tree stands

The spreading area of European yew is rather wide - from North-west Africa (Algeria), the Pyrenean penin-

sula, Asia Minor and the Caucasus in the south to British Islands (Scotland), from the west and east, via Poland, Baltic and Nordic countries it goes to the Scandinavian peninsula (including Norway). In the Alps, the Carpathian and the Caucasus mountains the area climbs to the heights of 1.5 kilometres or even more. In the biology of the yew it is interesting to note that even within its spreading area, the distribution of forest stand areas, rate of growth, life forms, size and age are greatly different. Generally speaking, in Europe, there are few zones with pure (or with a low admixture of other species) tree stands. In the Caucasus (Georgia) there are stands covering areas of 400 ha. They grow very slowly there and reach the quantitative maturity at about 100 years of age. There is a unique Paterzelle yew stand (80 ha) near Munich, Bavaria, where the first layer of the stand is occupied by beech, fir and spruce trees, whereas the second layer is predominated by 30-cm (in diameter) 10-12-m high spontaneously sown yew trees. Their age is thought to exceed 500 years, or even 1,000 years in some cases (Paltanavičius, 1999). In Slovakia, in the valley of Harmanech there is a stand of 160 thousand trees, in Hungary the Bakansk forest contains about 45 thousand trees, in Poland several thousand yews grow in the Wyczolkowskiego Reservation and in other places.

As we have already mentioned, there are no native spontaneous stands of yews in Lithuania. However, the palaeocarpologic analysis data obtained in Būtėnai, Gailiūnai and Neravai outcrops show that *Taxus baccata* L. grew in Lithuania during the Būtėnai Interglacial (approx. 350-240 thousand years BP). One of the fathers of the written Lithuanian language K.Sirvydas in his Polish-Latin-Lithuanian Dictionary (issued in 1677) mentioned the Lithuanian name of this tree "nuomedis". Hence, it grew in Lithuania at that time. After 230 years the yew seems to be very rare, since botanists at the start of the 19th century mentioned only three habitats of yew: forests at Prienai, Raseiniai and Švėkšna (Vailionis, Dagys, 1938; Polevskij, 1891- in rus.). Perhaps, the most accurate data on yew distribution in the Baltic region were given by B. Hryniewiecki (1933), who had compiled a map with the eastern boundary of *T. baccata* area and its habitats. The boundary was drawn as going from the south along the Nemunas eastern margin, then south of Kaunas it turns westwards and close to the sea (without reaching Švėkšna and Vėžaičiai) stretches towards Latvia. In Lithuania, there were six yew habitats fixed: Švėkšna, Vėžaičiai, at Raseiniai, Prienai pinewood, forests at Balbieriškis and at Lake Vištytis, one more habitat was in the east beyond its main area - at Trakai and Aukštadvaris. In Latvia yew habitats were shown near the Lithuanian border at Barta settlement and Lake Papa.

Head of Dendroflora Department of National Botanical Garden of Latvia dr. I. Bondare informed us, that the database "Dižkoki" of Latvian monumental trees contains about 50 *Taxus baccata*, some of them locations of protected plants. There is rich collection of 56 species, varieties and forms of genus *Taxus* in National Botanic garden of Latvia.

South of Lithuania yews were mentioned having grown in Polish Margalova and Pfeil locality at Olsztyn, as well as in Prussia north of Pregola River in Gertlaukis of the former Lobshevski district.

Zelentsov in his "Review of Vilnius Climate" (Zelencov, 1910 – in rus.) gives a reference that in 1863 three yews were detected in the Tyszkiewicz forest, where the clearings were cut in order to make easier the hunting of rebels. It seems to be the last mention of growing yews in Lithuania. It looks like this was the same site, eastwards from the main area, mentioned by Hryniewiecki (1933). Other sources also wrote about yews, but they seem to be the introduced ones from abroad. So Gukovskij (Gukovskij, 1891-in rus.) indicated that yews were growing at that time in Kaunas town and its surroundings. "Lithuanian Botanical Dictionary" (Vailionis, Dagys, 1938) resumed that the yew, "which grew in Lithuanian forests in the 19th century, now seems to have been disappeared, and is found only in some parks". An assumption can be made that yews were not so frequent in Lithuania in older times either, because it was distinguished from other forest trees and especially protected. So, Polish King and Grand Duke of Lithuania Vladislavas Jogaila, who also titled himself as the lord of Russian lands, declared a decree: "If somebody goes to the forest, where the trees, of great value such as yew or similar ones grow, he can be arrested by the owner or his vicegerent, whereas those, who ask in case of need should be allowed to bring away" (Seneta, Dolatowski, 1997).

Going northwards the age and size decrease

So, having been convinced the yews were not abundant, the fact of their disappearance becomes not so startling, moreover that they were growing significantly more slowly than pinewoods (or even more slowly than deciduous trees) - 10-year old they reach only 1-m height and begin cropping later (at 35-70 years,

although in Byelorussia, there are specimens cropping at age 8 years). Therefore, yews feel difficult to stand up against trees, which are evolutionary younger and better adapted to the environment. Their vitality was not also high. Literature sources indicate a rare feature of this tree - it is difficult to believe its fantastic longevity: Yew can reach 3 thousand years of age. But such specimen are mentioned only in South Europe. The oldest yews known for us grow in the Caucasus and Crimea, where there are trees aged 1,000 years, as well as in Poland – 1,250 years (Henrykow Lubanski), 783 years (Bystrzyca), and 721 years (Henrykow) (Seneta, Dolatovski, 1997). In Latvia and Estonia they are a bit older than 100 years. In the Botanical Garden of Vilnius University the European yew was planted by Prof. S.B.Jundzill; unfortunately, in 1842, the Botanical garden was closed and the plants sold out, no one yew tree remained here (Navys, 1993; Skridaila, 1996).

Going from the South to the North, the dimensions of the yew trees also decrease. So, the height of yew stands in the Crimea and of some trees in the Caucasus reaches 32 m with 1.5 m diameter. In Poland the yew height is only 15 m (there is a tree 18.5 m high) with 1.1 m diameter (one tree's diameter is 1.63 m). Information about *Taxus baccata* L. in Latvia was published by Thomas G. (1902). In the northern part of Curonnian peninsula, the Sliteres reservation and Rucava environs, yews, 13 m high and 60 cm in diameter, grew a hundred years ago; now there are trees only 11 m high. Information about *Taxus baccata* in Estonian was published by Baggo E. (1904). In the Estonian Saarema island and especially in the nearby smaller islands, the highest yew trees are about 11 m. In Lithuania (Janušauskaitė-Lukaitienė, 1936), two yews having grown in the Šateikiai park dried out about 25 years ago. Now yews growing in the Šateikiai and Švėkšna parks (grown from shoots) are about 40 cm in diameter.

First version – the reason for their disappearance is frosting

The climate of Lithuania and adjacent Baltic states (the eastern area of natural distribution) is not favourable for yews. The best one for these trees is maritime humid climate with mild winters and not very hot summers (e.g. Great Britain). Cold winters bring them damage not only in Lithuania, but also to the south of it (Russian Kaliningrad Region and Poland).

Evaluating the consequences of the cold winter of 1928/1929, Janušauskaitė-Lukaitienė (1936) wrote: In the Kėdainiai county, the Dotnuva Agriculture Academy Park, young *Taxus baccata* L. trees, which had been frosted, gave shoots and are growing now very well. In the Kretinga county, the Šateikiai estate park, two trees are about 8-9 m high and 1.74 m round (at 1 m from the ground). In the Šiauliai estate park a tree that was frosted during the winter of 1928/1929 gave new shoots from the base of the trunk. In the Tauragė county, the Vilkėnai estate park, one yew tree, about 2 m high, grows well".

There are also other data showing that during the above-mentioned winters of 1928/1929, 1940/1941 and 1955/1956, yews were frosted above the snow cover in the parks of Klaipėda, Priekulė (Šilutė district) and Kalnėnai (Skuodas district). In Estonia and central and eastern parts of Latvia the yews are affected by frost rather often. In the parks and dendrologic collections of Parnu district there are numerous European yews grown, but because of frosting they grow as bushes and do not exceed 2 m height; the highest one reached 2.7 m (Sander, 1999). In Tallinn and its surroundings there are fewer yews growing, but they are higher - from 3.3 to 5.8 m high (Sander, 1998; Paivel, 1996). The literature sources show that in Riga's parks yews are frosted above the snow cover. Nevertheless, knowing the biological fact that frosted yews give viable shoots, nobody brings himself to say that yews disappeared because of frosting.

Popular version – death caused by pasturage

In Lithuania there is a more popular version raised - when herds were pastured in the forests (a traditional thing in the past), the yews were devastated because of their branchlets, needles and poisonous seeds. These parts of the yew plant contain poisonous alcaloid (0.15-0.16%) a deadly toxine for horses, cows and goats. A mortal dose for a horse is 0.2 grams of yew branchlets with needles, for other animals - 2 g, and for a man 1 g per 1 kilogram of live weight. Only roe-deer are not sensitive to it; they like to nibble the yew branchlets and make tangible damage to theses trees. However, the yew, as no other conifers, is greatly resistant to the nibbling. Even after a yew is cut down, green shoots appear from the stump. In order to exterminate a yew, it should be dug out with roots. It is hardly possible that people used to do it, since the root system is very deep and wide. Moreover, if the roots are dug out, there are numerous seeds left; birds like

very much these orange/red very sweet seed-boxes and spread them in the area (the seeds have a protective coat, hence, they remain undigested). Germinating power of yew seeds comprises about 90%. They germinate after a year, two, or even four. Nowadays we also find numerous young trees nearby the female yews (they are dioecious) grown in the parks. By the way, the branches resting on the ground often get rooted. Thus, this version also cannot be considered as axiomatic.

One more version – felled for valuable wood and nibbled for light needle branchlets

Yew wood is especially valuable. Its sap-wood is yellowish narrow, with dominating yellowish red or reddish brown yew nucleus. Due to narrow, bright, winding annual rings and shining heart rays, the texture of the nucleus is beautiful; moreover, the wood is dense, hard, and difficult to be split, soaked in water it attains black colour. Because of its colourful shining wood - used for highest quality furniture, it is called redwood in West Europe and Asia Minor, or Caucasian redwood in Georgia. The yew wood remains unaffected in soil or water, so it is often used in wooden bridge construction of various size. Till the middle of the 19th century in Lithuania yew wood was used for carving and turned into wooden articles, for decorative details in the churches, sculptures, encrusted parquet floor, sickle hafts, wooden details of weapons, spears, arrows, and bows. By the way, for arrows and bows the best yew trees were not those growing in South Europe, but those growing slower and bushing, considerably more elastic ones. There are data showing that yew rods were exported from the then Lithuanian-Polish state to the country of their origin - England.

Since it is a poisonous plant, we doubted for some time the so-called *'pypkė kukavinė'* (*kukava* /yew/ pipe) used to be produced of yew wood. However, the doubts were dispelled after we read a description given in the book "Naturalis historia" by Gaius Plinnius Secundo senior (who was born in 23 A.D.) that yew had been considered to be the tree of death or even the tree of hell and that ancient poets mentioned yew torches in the hands of furies. We believe that Lithuanians could use the wood having no resin capillaries and difficult to set burning for pipes. This presumption is supported lingvistically - in the past the Lithuanians used to call the yew *'kukomedis'*. this word is closer to another word *'kukava'* that is used to make an adjective *'kukavinė'*.

From prehistorical times supernatural power was attributed to the yew. In Lithuania there was an opinion that dark-needle branchlets protect people from evil. The whole life of man - from the birth to the death - was closely related to this wonderful plant. So, the yew branches were used to deck the baptism procession (especially horses and carts); any wedding or funeral were impossible without yew branches. It was good that their needles are mild and do not fall out as the branches wither.

The fatal loss of the giants' worship

Let us sum up. Regularly appearing frosting and cutting branchlets for ceremonies, as well as yew tree felling for irreplaceable wood, or maybe, digging roots out in some pasture forests, undoubtedly, influenced gradual decrease of these trees in rather scanty and not very stable formations. Nevertheless, we think that this legendary plant of life and death vanished due to other factors. We observed that yew requiring shady conditions grew usually as insignificant admixture in deciduous forests, mainly oak-tree glades or in the lower forest layers. Moreover, the felling of oaks in the 19th century was so expansive that their wood prevailed in Lithuanian export. The final stage of yew disappearance in Lithuania coincided in time with enormous demand for oak wood in the 1840s, and its high prices prompted clear cutting of oak-forests. At the end of the 19th century oak export decreased, since few oak stands were left. After the oaks were felled the yews growing in the open clearings endured not only the changed temperature regime (higher fluctuations of temperature and more severe frosting), but especially changed insolation intensity. It is well known that changes in light conditions are dangerous for many conifers; more over they are fatal for long-lived and shade-loving Tertiary relict. As M. Navasaitis (1993) wrote, with spring approaching the needles begin to grow, but roots in a frozen soil are not able to provide the needles with water, hence, a yew dies.

So Lithuanian oaks turned into timber and were brought to Koenigsberg, Gdansk or Riga ports, and then transported to the rest of Europe turned into ship hulls or barrels. Together with these forest giants the yews having accompanied them disappeared without a trace.

We shall try to restore the typical species

Dendrologists of Vilnius University Botanical Garden now cultivate three yew species and 31 morphological forms and try to spread it as a decorative plant

of gardens and homesteads. Their plasticity (ability, in young age, to adapt themselves to grow both in the shade and open sites, followed by resistance to trimming) makes it possible to grow them as single trees, or in clumps, as well as hedges. We saw that in some European countries, especially Denmark, Netherlands, Belgium, etc. the yews represent the main species used for hedges surrounding the individual homesteads.

It is a gratifying circumstance that in Lithuania the tree, which disappeared in the past from the maps together with Lithuania's statehood, now is reviving together with the nation and attracts growing attention. A yew tree planted by Seimas Chairman Prof. Vytautas Landsbergis on the hill of most prominent Lithuania's people in the Botanical Garden of Vilnius University , although planted in summer, took well and grows vigorously. We believe that enthusiasts come and implement the dream of late Dr. V. Ramanauskas, founder of Lithuanian Dendrologists Society and its first board chairman, to plant entire grove of yews in Lithuania, in such a way strengthening the return of this long-lived tree home. We think the best conditions for yew grove varied with oak-trees are in the maritime zone of the Baltic Sea coast, as well as the region of old Lithuanian capital Trakai beyond the main yew growth area. We give such a proposal having in mind rather mild climate conditions affected by the lakes of Bernardinai, Galvė, Totoriškės, Akmena and Skaistis; moreover, this event would remind of the last yews, which grew here in the natural forests of Lithuania. However, in order to implement this goal, the gene fund of undersized forms collected in the Botanical Garden of Vilnius University, as well as in other areas of Lithuania, does not fit this purpose. We hope to get a new generation of yews from autochthonous specimens of typical species, which survived in Estonia and Latvia, if the colleagues agree to share their seeds with us.

Conclusions

1. Disappearance of European yew at the margin of its eastern area was caused by biotic factors.

2. In the midst of the 19th century the yews disappeared in Lithuania finally due to intensive felling of oaks, which had provided shade for yews; the felling caused changes in ecological conditions for yews.

3. It is expedient to begin restoration of yew stands in two areas of Lithuania (maritime and Trakai environs) by growing a new generation of yews from the seeds obtained in Estonia and Latvia, where the autochthonous yews survived in the conditions of negative influences.

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ТИС ЯГОДНЫЙ В ЛЕСАХ БАЛТИЙСКИХ СТРАН И ОСНОВНЫЕ ПРИЧИНЫ ЕГО ИСЧЕЗНОВЕНИЯ В ЛИТВЕ

Э. Навис

Резюме

В статье обсуждаются в стране распространенные версии возможных причин гибели долговечного и жизнеспособного лесного вида тиса ягодного: рубка в связи с пастьбой скота из-за ядовитости надземных частей, использование для венков, вымерзание, рубка для изготовления лугов.

Ареал тиса ягодного – *Taxus Baccata* L. с Северо-восточной Африки (Алжира), Пиренского полуострова. Малой Азии и Кавказа (Грузия) простирается на север через центральную Европу и страны Балтии до Скандинавского полуострова (учитавая Норвегию).

Однако во второй половине XIX века (последние экземпляры обнаружены в 1863 г.) этот автохтон (существовавший в Литве около 300 тыс. лет) исчез из лесных сообществ, хотя в более северных Балтийских странах – в Латвии и Эстонии – растёт до сих пор.

Выдвигается гипотеза, что главной причиной исчезновения тиса ягодного является существенное изменение экологических условий в связи с вырубкой дубовых лесов, под которых покровом росли эти теневыносливые, влаго- и теплолюбивые низкорослые растения.

Ключевые слова: тис ягодный, автохтон, дендрофлора, биотические факторы, экологические условия.