

# SEED NETWORK IN VET

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### **Estonian native seeds, trees, grasses, berry bushes, fruits and vegetables**

The Republic of Estonia is one of the Baltic countries in the northern part of Europe. In Estonia the average annual air temperature is 5°C. The air temperature in summer is somewhat lower than the average for the latitude, but considerably higher in winter. Nevertheless, the lowest air temperature recorded in Estonia is -43.5°C. The vegetation period generally lasts for 170-185 days, the period of active plant growth is 120-130 days. The annual amount of precipitation (550-650 mm) exceeds evaporation approximately twofold.

The principal soils are soddy calcareous soils (26.3% of all arable lands) and soddy clay soils (32.3%). Soils influenced by erosion make up 18.9%. Bog soils constitute 7.7%. The major part of agricultural land needs reclamation, primarily drainage: 63% of the soils are excessively wet. 44% of the soils are acid.

One third of the total area of Estonia is arable land, one fourth is under cultivated meadows, pastures and other lands. 35% of the area is under forest. Main crops grown are barley, rye, wheat, oats, legumes, vegetables, potato, field grasses, annual fodder crops. The need of the country is to be entirely supplied from the local production.



Higher quality wheat is needed for pasta (macaroni) products and white bread. 3/4 of the field production is used to feed livestock. Estonia does not produce any following minor crops of local diet: buckwheat, maize, millet and rice. Fields and grasslands are sown with selected seed, chiefly with those bred at the (Estonian) Jõgeva Plant Breeding Institute. Fruit is mostly grown in small backyard gardens and fruit growing supplies 3040 kg per capita consumption.

10.3% of the inhabitants were active in the agricultural sector, hunting and forestry. 37.7% of the workers were active in food processing industry.

## Forest trees

Coniferous trees are predominant (about 64%). The species composition is as follows: pine (*Pinus sylvestris*) 41%, birch (*Betula pendula* and *Betula pubescens*) 28%, spruce (*Picea abies*) 23%, speckled alder (*Alnus incana*) 4%, aspen (*Populus tremula*) 2% black alder (*Alnus glutinosa*) 1.5%, oak, ash and others 0.9%.

During the last 70 years the area afforested by planting and sowing is 520,000 ha which is 1/4 of the forest land of today. The main species planted are pine and spruce. This results in the fact that on better sites the major part of spruce and pine stands younger than 50 years are man-made. The plantation area of the other native tree species (silver and swamp birch, black and gray alder, oak, ash) is not remarkable, the stands of these tree species are of natural origin.



Pine stands planted in the 20th century mainly originate (90%) from the seed collected in Estonia. Nearly all birch stands are of natural origin (all together 571,000 ha, less than 10,000 ha of these stands are planted but the local seed is used). All stands of gray alder (79,000 ha) and aspen (30,000) are of natural origin. There are a few plantations of black alder, oak and ash which are planted with local material. All the stands of hardwood species are in good condition and not endangered. In some places damages by local air pollution are detected in pine and spruce stands but this is not dangerous to the genetic resource as a whole.

## Indigenous plant genetic resources

There is a unique genetic diversity of economically important qualities in the wild of Estonia that has never been utilized in the development or improvement of the cultivated varieties. There are some wild progenitors or wild relatives of current or potentially important commercial agricultural (including pasture) plants among the natural vegetation of Estonia. They are still available in the wild and are not threatened by human activity.

These species are the following:

Gramineae from genus *Agrostis* - *A. canina*, *A. gigantea*, *A. stolonifera* *A. tenuis*, *A. vinealis*

*Festuca* - *F. arundinacea*, *F. gigantea*, *F. pratensis*, *F. rubra*

*Koeleria* - *K. glauca*, *K. grandis*

*Phleum* - *P. berolonii*, *P. phleoides*, *P. pratense* *Poa pratensis*

Papilionaceae

*Lotus* - *L. corniculatus*

*Medicago* - *M. falcata*, *M. lupulina*



They have outstanding winter hardiness and are adapted to different soil conditions, e.g. to superfluous soil moisture (*Agrostis* sp.), alkaline or acid soils, strong draught (*Medicago* sp.). Some above-mentioned species have been used in the Estonian breeding programmes during the last decades.

There is a **cranberry** species (*Vaccinium oxycoccus*) in the Estonian bogs. It has become adapted to the climate of Estonia and is already used in cultivar breeding. Some bogs have been demolished entirely but 760 samples of the Estonian cranberry have been planted into a collection at the Nigula Nature Reserve.



## Landraces

There have been many "farmers' varieties" in Estonia but only a few are still maintained and very few are used by farmers at the present time. In the 1950ies and 1960ies many farmers' varieties and old (bred 70 years ago) cultivars of the Estonian breeding programmes have for conservation purposes been given into the collections (elementary gene bank) of the N. Vavilov Institute of Plant Industry (St. Petersburg, Russia). Lately, the situation in Russia has changed, so dramatically that the possibility to save the cultivars is getting threatened. Fortunately, Estonia got the germplasm (seeds

of old varieties) back from Russia in 1994. Although the germination of the seeds is very low, there is hope to revive these cultivars and landraces during the forthcoming years.



Some landraces of apple, pear, plum, cherry and berry plants are still used by farmers because of their very good winter hardiness and good adaptation to the local soil and climatic conditions. At present the old Estonian grain cultivars are winning back their importance as the use of mineral fertilizers has decreased abruptly; the old cultivars can better be adapted to extensive farming than the newest. There are still some unique old cultivars as **the rye (*Secale cereale*) cultivar 'Sangaste'** (120 years old), which has shown an extraordinarily good winter hardiness not only in Estonia but also in Canada and other places.



### Conservation activities

In situ conservation is mainly used in the wild nature reserves for the conservation of biological diversity and in special landscape reservations (see Annex: Estonian forest genetic resources). Only in a few cases the agriculturally important species or their progenitors are taken for in situ conservation. The island Saaremaa is one protected area to maintain a natural grove of **wild apple (*Malus sylvestis*)**. Some very old trees (for example Oti apple-tree) are being protected as single objects.



The apple was the only fruit known to ancient Estonians; crab trees (wild apple trees) can still be found in different parts of the country, mostly on the islands.

There is no national gene bank in Estonia. But the Estonian Plant Biotechnology Research Centre, EVIKA, situated in Saku, approximately 20 km from the capital city Tallinn, has a major in vitro collection of 350 potato cultivars of which 40 are Estonian. Besides 500 **potato** mericlones, this Centre has also an in vitro collection of chrysanthemum, carnation, plum, sweet cherry and various berries. The potato collections may be considered as global collections including many old cultivars. The Centre has excellent tissue culture facilities and offers to carry out contractual work on virus eradication for various crops. The staff of the centre has 15 employees, 5 of whom are researchers.



The other plant genetic resources collections are housed at the Jõgeva Plant Breeding Institute (field, pasture, and vegetable crops), at the Polli Experimental Station (fruit trees and berry bushes), and at the Tallinn Botanical Garden (decorative plants).

The Jõgeva Plant Breeding Institute was founded in 1920 and has 99 employees 25 of whom are researchers. The working collection of barley includes 620 accessions, there are 45 accessions in the wheat collection, 30 accessions in the rye collection, 190 accessions in the collection of oats, potato 320 accessions in the potato collection, 450 accessions in the collection of forage grasses and, vegetables 125 accessions in the collection of vegetables.

### **Plant genetic resources and regeneration**

The Estonian national collections of genetic resources are frequently used in national breeding programmes. During the last years the main crops used for breeding are the following: barley, oats, wheat, rye, bean, pea, tomato, fodder plants, apple, pear, plum, cherry, strawberry, cranberry, and



**currant.** There is only one institution per each crop requesting and being provided with material; in case of field and pasture crops it is the Jõgeva Plant Breeding Institute, and in case of fruit crops it is the Polli Experimental Station. Only one professional breeder, in case of some crops two or three breeders use the genetic resources of a certain crop. They are all government-funded.



The Tallinn Botanical Garden which was established in 1961, has 8000 taxa of living plants, 2000 of which are tropical and are grown under glass. The Garden has 85 employers of which 12 are researchers. The Garden is essentially involved in plant introduction, having some additional limited activities in the field of the conservation of rare species. A computerized list of all the taxa present in the garden has been developed.

Estonia is a too small country with insufficient financing possibilities to have a national gene bank. Therefore an agreement with the Nordic Gene Bank to store our plant genetic resources is under consideration. The Nordic Gene Bank has initiated cooperation between the three Baltic countries to support the establishment of a computerized centre and to train the Baltic researchers in the documentation of the material.

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