

Państwowe Gospodarstwo Leśne Lasy Państwowe

# The Kostrzyca Forest Gene Bank

# FORESTS FUTURE 2021

Consequences of Bark Beetle Calamity for the Future of Forestry in Central Europe. On-line meeting March 23rd –24th 2021

Czesław Kozioł Michał Raj

www.lasy.gov.pl



# FOUNDING OF THE KOSTRZYCA FOREST GENE BANK





The Kostrzyca Forest Gene Bank was established as a result of the implementation of the GEF Grant "Conservation of forest biological diversity in Poland" (1992).

The principles of the grant was negotiated by foresters with the World Bank for the purpose of protecting endangered forest ecosystems.





Grant initiated new directions of risk mitigation activities, as well as opened the possibility of implementing new lines of research and practical activities in forestry.



Establishment of the Kostrzyca FGB was financed by the State Forests National Forest Holding, World Bank, National Fund for Environmental Protection and Water Management, Regional Fund for Environmental Protection and Water Management in Wrocław and the European Union under the PHARE program.

**On 13th December 1995** took place the ceremonial opening of the Kostrzyca FGB, and on **1st January 1996** start-up of its activities.





The Kostrzyca Forest Gene Bank



#### FOUNDING OF THE KOSTRZYCA FGB



Beginnings of the Kostrzyca FGB



#### FOUNDING OF THE KOSTRZYCA FGB



Beginnings of the Kostrzyca FGB



#### FOUNDING OF THE KOSTRZYCA FGB



Present appearance of the unit

Arboretum LBG Kostrzyca

# Area of The Kostrzyca FGB the seat of the unit with the arboretum

0 50 100 150 200 m







# • The Kostrzyca FGB location – why here ?

The direct reason why the Kostrzyca Forest Gene Bank was located here is the organizational support for the reconstruction of thousands of dying hectares of spruce forests in the Sudetes in the eighties and nineties.



# • The Kostrzyca FGB – what for ?

The facility was to be a security in the event of a similar type of disaster in the future.

The unit started operating under the national programs for the conservation of genetic resources and breeding of trees





### Seed and tree breeding regulation in Poland

COUNCIL DIRECTIVE 1999/105/EC of 22 December 1999 on the marketing of forest reproductive material

-					
	COUNCIL DIREC	11ME 2	PPH LOUISC		
of 22 Desember 1999 on the marketing of forms reproductive material					
Having mgard to the Trouty studiology the European Community, and in particular Article 37 thereof,			necessary to use reproductive material which is get cally and phenotypically materia to the size and of I		
Having regard to the Proposal itom the Commission (),			quary: totely seek storad liter, where appropri- arian ocurral quality sandards		
Hari	ng regard to the Opinion of the European Parliament (*).		In the context of the consolidation of the inter-		
Having regard to the Opinion of the Romamic and Social Commission (5)		~	market, it is receivery in temore any actual or point barriers in mark which may hinder the two movem of forois reproducive mainful within the Community		
whe (I)	teat Council Directive 66/404/EDC of 14 June 1966 on the		is in the increas of all the Member States it Community rules imposing the highest possible at dards should be established:		
	markesing of forest reproductive material (5 and Council Decisive 71/163/EEC of 30 March 1971 on external quality standards for forest reproductive material	0	Community rules should relier so the phonospic a		
	markeed within the Community (5 have been subsum- tially amended several stress since further subsumid amendments are so be made, the Directives should be		exemal quality of tonsi neproducive material:		
	combined and recass in the ingress of clarity:	(1)	Such rules should apply to marketing both in of Member Scient and an elementic marketing		
A	Foress over a large area of the Community and full a multitunities of role based on their social, economic, environmental, ecological and calmark lanciones there is a med for specific approaches and actions for the different specific approaches and actions for the different specific community both the resolution of the torms in the Community both the resolution of these		forth roles should use accurate of reserved works		
			should apply only to those species and artificial by which are important for foresty purposes in all or of the Community:		
	Intensi and new advession regare a sustailable inten- managements in relation to the Forostry Strategy for the European Union as see out in the Council Resolution of 15 Deamber 1998 (%)	69	In some Member Sugar the use of forms reproduce magnal of the category 'source-dentified, which is not approved for markeing by Directive 64/404/000		
9	Fores reproducive material of two species and artificial hybrids which are reportant for formery purposes deald be artestably stated in the variant species.		radional, compatible with the climate and indeper able for forestry purposes and it is therefore appropri- to approve for marketing such material in Merri		
	tion and of high quality: the construction and enhance- ment of biodiversity of the foress including the genetic diversity of the trees it essential to managedite forest memory-		inpose de marieing is die eid-user of such mare in all Member States		
(1	So far as they miase to plant health, harmonized cond- tions must be consistent with Coancil Directive 77/	(11)	Conain regions of the Community, such as the Alph Mediceranian or Nordic regions, have specific dima conditions or valuenable size conditions which just		
	13/EEC of 21 December 1976 on prescripe measures against the introduction into the Member States of organisms harmful to plants or plant products and		particular requirements for the external quality of for reproductive material of cartain species		
_	aganti tar spirat in the Commandy ():	(12)	According to the General Declaration of the Th		
0000000	1 C 179, L4 C 2797, B. L. optimi defense on T. Bauender 1999 (sort yet published in the head lower). IC 129, 171 (1999), p. 15. U2C 101, 171 (1999), p. 15. U2C 101, U2C 554, p. 2006/st. Discusse as has an ended by the off-dat of Assention.		memory a communic of the Multiplie of following larges of name species and local provenances that well adapted to see conditions should be preferred		
0.00	<ol> <li>J. 27, 41971, p. 14. Discusses as has assessed by the 1994 and Assessment.</li> <li>G. G. 201999, p. 1.</li> <li>G. S. 201997, p. 2.</li> <li>Discusses as has an ended by Commu- in Discuss 1995/MC 2001. 142, 541997, p. 270.</li> </ol>	4.9	Reproducive material intended for exposit or tracep to third committee shead net be covered by the me sets set out in this Directive:		



**European Commission** 







The State Forests National Forest Holding

www.lasy.gov.pl



#### Seed and tree breeding regulation in Poland The Kostrzyca FGB role in the program **COUNCIL DIRECTIVE** 1999/105/EC Act on forest reproductive material **Program of conserving** of 22 December 1999 of 7 June 2001 forest genetic resources on the marketing of and breeding of trees in Poland forest reproductive material for the years 2011-2035 2000 Opracownao an podatowie: t.j. Dz. U. z 2015 r. nov 1092 1893 Dz.U. 2001 Nr 73 poz. 761 USTAWA taring mgard to the Troay stabiliting the European z dzia 7 czerwca 2001 r. leinym materiale rormnotenio a de Centras al de Turanya Pañan o the Opinian of the Romamic and Social Reedział 1 Przepisy ogóła va regulate spraw o on phonoppic and and planes and so the kontroli leinene materialu nodutatomene hould apply to marketing both in othe den nbould sake accounts of practical month and apply only to those species and antificial hybrids its important for foresity purposes in all or part Art. 2. Bekroć w ustawie jest mowa o: ki nasienne – szyszki, owoc do produkcji materialu sadzeniowego części rożlin przeznaczone do produkcji materiału sa c) material sadzeniowy - roiliny wyhodowane z jednostek nasiennych części roślin lub rośliny z odnowieni leśnym materiałe podstawowym – rozumie się urzez to urzezna rodukcji leinego materiału romnożeniowego źródło nasion – drzewa rosnące na określo pobierane ta nationa. ywy 1999-105-WE z dais Dijot. Doute as last mended by the neproducive maartial intended for export or re-export to third countries sheadd net be covered by the meas-ures ret out in this Directive; . 26.21098, p. 1. 31.1.1977, p. 20. Discrive as last amended by Come 1999(53)(IC (OF L 142, SA1999, p. 29). MINISTRY OF THE ENVIRONMENT The State Forests National Forest Holding **European Commission** Forest Seed Office

www.lasy.gov.pl



# THE KOSTRZYCA FOREST GENE BANK ACTIVITY



### The Kostrzyca Forest Gene Bank

Kostrzyca Forest Gene Bank is an organizational unit of the State Forests, which came into being in 1995.

The main activity involves long-term storage of gene resources of forest trees and shrubs as well as the monitoring of the quality of reproductive material, that is seeds from the most valuable seed objects of the State Forests, national parks, nature reserves, nature monuments, which are significant to the environmental protection.





The Kostrzyca FGB has been undertaking a multi-faceted effort to maintain the genetic resources of plants forming the native flora of Polish woods, thus fulfilling the provisions of **Convention on Biological Diversity**, as well as the **Declaration of the Ministerial Conference on the Protection of Forests in Europe**.

The preservation of the genetic diversity, both *in situ* as well as *ex situ*, refers to:

- The preservation of gene pool of the most valuable objects from the area of the State Forests for commercial purposes.
- The preservation of gene pool of both the oldest indigenous forest stands and the individual conservation trees.
- The preservation of gene pool of protected and endangered plants.
- Implementation of individual species restitution programmes, aimed at trees, shrubs and herbaceous plants.



As at 2020 in the Kostrzyca FGB there are:

- 8303 seed lots in cold rooms (-10 and -20°C),
- 1521 seed lots in cryogenic storage.
- 271 species.







1. Species and objects indication for seed harvest, environmental monitoring.





# Activity2. Seed harvest coordination.







3. Seed extraction and separation (preparation for storage).







4. Seed testing.























www.lasy.gov.pl





19







5. Long-term storage.











# Activity 6. Crvopreservation





## **Activity** 6. Cryopreservation













# Activity 7. DNA analysis











Państwowe Gospodarstwo Leśne Lasy Państwowe

# Activity

8. Environmental education











----

# Activity 9. Arboretum and clonal archives





# Offered services (the possibility of cooperation)

- Seed harvest of specific species for customers (selected objects, plantations).
- Pretreatment (extraction, separations, thermotherapy, ).
- Seed storage (short and long-term).
- Seed testing.
- Sale of high-quality seeds (selected objects, plantations).
- **Preparation for sowing** (stratification, scarification).
- Production of mycorrhizal vaccine for seedlings (Hebeloma crustuliniforme).
- DNA services:
  - DNA isolation from plant material.
  - Assessment of DNA quality and quantity.
  - Molecular identification of H.fraxineus (formerly Chalara fraxinea) in plant material (Common ash samaras, shoots, tissue).
- Accommodation (guest gooms inside arboretum).
- We are open for cooperation projects.



# **USE OF THE RESOURCES**



# Guidelines for the protection of genetic resources in Poland

"... After the decay of the selected seed stand, there should be a progeny generation.

As far as possible, you should strive to obtain the natural regeneration. In case of the need to apply the artificial regeneration and the lack of the seed supply from the stand, it is possible to use the gene resources from the Kostrzyca FGB... " ZARZĄDZENIE NR 🕹 S DYREKTORA GENERALNEGO LASÓW PAŃSTWOWYCH z dnia 21 marca 2013 roku

w sprawie ochrony leśnych zasobów genowych na potrzeby nasiennictwa i hodowli drzew leśnych.

Znak: ZH - 7132 - 7 /2013

Na podstawie § 6 Statutu Państwowego Gospodarstwa Leśnego Lasy Państwowe, zwanego dalej Statutem, w wykonaniu zadania Dyrektora Generalnego Lasów Państwowych, określonego w art. 33 ust. 3 pkł i sutskwy z dnia 28 września 1991 roku o lasach (Dz. U. z 2011 r. Nr 12, poz. 59, tekst jednolity z późniejszymi zmianami), a także zadań Dyrektora Generalnego Lasów Państwowych, powołanych w § 8 ust. 1 pkł 1 Statutu,

zarządzam, co następuje:

Wprowadzam do stosowania w jednostkach organizacyjnych Lasów Państwowych "Wytyczne dotyczące ochrony leśnych zasobów genowych na potrzeby nasiennictwa i hodowli drzew leśnych" (II nowelizacja), stanowiące załącznik do niniejszego zarządzenia.

§ 2

Zobowiązuję dyrektorów regionalnych dyrekcji Lasów Państwowych do wdrożenia wytycznych w nadzorowanych nadleśnictwach, w terminie do dnia 30 czerwca 2013 r.

§3

Traci moc Zarządzenie Nr 7A Dyrektora Generalnego Lasów Państwowych z dnia 7 kwietnia 2006 r. w sprawie ochrony leśnych zasobów genowych na potrzeby nasiennictwa i hodowli drzew leśnych (znak sp. ZG/7130/7/2006).





# The Kostrzyca Forest Gene Bank preserves gene resources from over **80%** of the selected seed stands in Poland

(species that can be stored traditionally on a large scale)





### **Examples of ecological disasters in Polish forests**

- 1. The effects of the disaster in northern Poland as a result of the storms in August 2017:
  - 80,000 ha area of damaged stands.
  - 40,000 ha area to be renewed.
- 2. The effects of the disaster in Silesian forests as a result of the storms in July 2017:
  - 1 500 ha area of damaged stands.
  - 800 ha area to be renewed.
- 3. Consequences of the ecological disaster in the Białowieża Primeval Forest:
  - 7,200 ha area of declining forest stands.
- 4. The effects of dieback of spruce forests in the Silesian Beskids and Żywiec Beskids in the years 2006-2015:
  - 24,000 ha area of declining forest stands.
- 5. The effects of the hurricane in the Pisz Forest in 2002:
  - 12,000 ha area of damaged stands.
  - 4,000 ha area to be renewed.
- 6. Consequences of the fire in Rudy Raciborskie in 1992:
  - 9,000 ha the area of burnt stands.
- 7. The effects of a fire in the Noteć Forest in 1992:
  - 6,000 ha the area of burnt stands.







- The effects of the disaster in northern Poland as a result of the storms in August 2017:
- 80,000 ha area of damaged stands.
- 40,000 ha area to be renewed.





# Gene resources preserved in the Kostrzyca LBG (regional directorates of state forests affected by wind damage)

Regional Directorate of the State Forests	Number of selected seed stands in FGB	Seed weight (kg) - all species
Gdańsk	34	68
Łódź	44	90
Poznań	33	60
Szczecinek	47	91
Toruń	54	114
Wrocław	80	219



# THE KOSTRZYCA FOREST GENE BANK ACTIVITY IN TIMES OF THE INTENSIFICATION OF ECOLOGICAL DISASTERS

Our observations and influence on our work



Increasing orders from European contractors for the purchase of large quantities of seeds from the Polish seed base, especially from plantations







Increasing orders from European contractors for seed preparation and seedling production services







Increasing the species diversity of seeds collected and stored and prepared for sowing





Dysregulation of the cyclical years of seed crops for specific species (the effect of climate change)





Worsening seed quality, especially in the years apart from good seed crop for specific (the effect of climate change)





Worsening condition of many plant species and stands (including herbaceous plants). Urgent need to preserve and restore many species.





Cooperation with the Czech Karkonosze National Park on harvesting the Sorbus sudetica fruit













Państwowe Gospodarstwo Leśne Lasy Państwowe

# Thank you for your attention

The Kostrzyca Forest Gene Bank Miłków 300, 58-535 Miłków biuro@lbg.lasy.gov.pl tel. +48 75 71 31 048 fax. +48 75 71 31 754

www.lasy.gov.pl