

THE STRATEGY
for the development of the Plant Genetic Resources System of
Ukraine
for 2024–2028

TABLE OF CONTENTS

GENERAL PROVISIONS	3
1. ANALYSIS OF THE PLANT GENETIC RESOURCES SYSTEM OF UKRAINE (PGRSU) DEVELOPMENT STATE AND PROBLEMS	5
2. TRENDS IN THE DEVELOPMENT OF PLANT GENETIC RESOURCES SYSTEMS IN THE WORLD	13
3. ANALYSIS OF STRENGTHS AND WEAKNESSES, OPPORTUNITIES AND RISKS OF THE DEVELOPMENT OF THE PLANT GENETIC RESOURCES SYSTEM OF UKRAINE	14
4. VISION, MISSION AND PRINCIPLES OF BUILDING THE PLANT GENETIC RESOURCES SYSTEM OF UKRAINE	15
5. STRATEGIC, OPERATIONAL GOALS AND OBJECTIVES OF THE DEVELOPMENT OF THE PLANT GENETIC RESOURCES SYSTEM OF UKRAINE	16
ANNEXES	23
Annex 1. Legislation on the PGRSU	23
Annex 2. Statistical information about the PGRU collection.....	26
Annex 3. PGR stored <i>ex situ</i> in Ukraine: priority collections for urgent duplication.	27
Annex 4. PGR collected in Ukraine and stored outside its borders.	28
Annex 5. Scheme of the plant genetic resources system of Ukraine	36
Annex 6. List of scientific research institutes of the NAAS and partner institutions that take care of the PGRU collection	36
Annex 7. Map of the location of research institutes of the National Academy of Agrarian Sciences and partner institutions that manage the PGRU collection.....	45
Annex 8. Areas of activity of PGRSU.....	45
Annex 9. Resources of the PGRSU.....	51
Annex 10. Operational plan for the implementation of the Strategy (can be implemented only if funds are available).....	58
Annex 11. Provision on the Coordination Committee for the Development of the System of Plant Genetic Resources of Ukraine.....	63
LIST OF ABBREVIATIONS AND CONVENTIONS	636
TERMS AND DEFINITIONS	67
INFORMATIONAL REFERENCES	71

GENERAL PROVISIONS

The Strategy defines the directions of the development of the Plant Genetic Resources System of Ukraine (PGRSU) at the current stage of development of the country's society and economy and defines its main principles, which must be formed by the end of 2028. To implement the goal of this Strategy, strategic and operational goals and objectives are provided with relevant indicators of achievement (fulfilment), expected results, measures for monitoring the implementation of this Strategy at each stage and resource needs.

The Strategy is based on important international and Ukrainian program documents, in particular:

- The Strategy corresponds to the Kunming-Montreal Global Biodiversity Framework (GBF), especially to Goal A for 2050 related to the 2050 Vision for biodiversity:
 1. The integrity, connectivity and resilience of all ecosystems are maintained, enhanced, or restored, substantially increasing the area of natural ecosystems by 2050.
 2. Human-induced extinction of known threatened species is halted, and by 2050, the extinction rate and risk of all species will be reduced tenfold, and the abundance of native wild species is increased to healthy and resilient levels.
 3. The genetic diversity within populations of wild and domesticated species is maintained, safeguarding their adaptive potential.

GBF's targets of 4, 10, and others by 2030 align with the Strategy.

- The Strategy is in line with the Plant Genetic Resources Strategy for Europe, namely the objectives:
 - iii) consolidated and sustained European *ex situ* PGR conservation, which envisages that by 2030, genetic resources in European genebanks will be securely conserved and available for sustainable use through increased efficiency and effectiveness of the European genebank infrastructure;
 - iv) promoted sustainable use of European plant genetic resources (PGR), which includes, inter alia, ensuring access to well-documented genetic resources stored both *ex situ* and *in situ* in Europe;
 - v) a strengthened germplasm information system that supports better conservation and use of European PGR for food and agriculture;
 - vi) development of a system for monitoring the conservation and sustainable use of PGR in Europe.
- The Strategy is aimed at achieving the Sustainable Development Goals of Ukraine for the period up to 2030, approved by the Decree of the President of Ukraine dated 30 September 2019 No. 722, namely Sustainable Development Goal 2 on overcoming hunger, achieving food security, improving nutrition and promoting sustainable development of agriculture, as well as Sustainable Development Goal 17 on protecting and restoring land ecosystems and promoting their rational use, rational forest use, combating desertification, stopping and reversing the process of land degradation and stopping the process of biodiversity loss.
- The Strategy corresponds to the Human Development Strategy approved by the Decree of the President of Ukraine dated 2 June 2021 No. 225, namely Strategic Goal 2. Building an educated, virtuous, inclusive and innovative society in which every citizen has equal opportunities for learning and development, and science is a component of economic

growth, Operational Goal 2.6. Creating conditions for the professional realisation of Ukrainian scientists, their development and integration into the world scientific space.

- The Strategy must help Ukraine become an equal member of the European community, and the defined strategic and operational goals must help us fulfil the country's obligations under the Association Agreement between Ukraine, on the one hand, and the European Union, the European Atomic Energy Community and their member states, on the other hand (hereinafter — the Association Agreement), ratified by the Law of Ukraine dated 16 September 2014. No. 1678-VII. In particular, in accordance with Article 376 of Chapter 9. Cooperation in the field of science and technology, the Strategy contains envisaged ways of cooperation.
- The Strategy also considers the current cooperation framework established by the Agreement on cooperation in the field of science and technology between Ukraine and the European Community, ratified by Law No. 1673-IX dated 15.07.2021.

The Strategy was prepared by a working group of specialists who work in the Plant Genetic Resources System of Ukraine under the leadership of Mykola Roik, vice-president of the National Academy of Agrarian Sciences of Ukraine (NAAS), and Viktor Riabchun, deputy director for scientific work with plant genetic resources of the Plant Production Institute named after V. Ya. Yuriev of the NAAS. A significant contribution to the preparation of the Strategy was made by the Global Crop Diversity Trust – a non-profit international organisation dedicated to preserving crop diversity and making it available worldwide.

1. ANALYSIS OF THE PLANT GENETIC RESOURCES SYSTEM OF UKRAINE (PGRSU) DEVELOPMENT STATE AND PROBLEMS

Plant genetic resources play an important role in ensuring the food, economic, environmental, and social safety of humanity as a whole and of each country in particular. World experience has proven that the most effective way of preserving, enriching and using plant genetic resources is the creation and maintenance of genebanks, which concentrate accessions of genera, species and forms of cultivated plants, their wild relatives, which carry the hereditary basis of useful traits and properties.

Effective maintenance of genebanks helps preserve genetic diversity, making it available to breeders and scientists. The preserved accessions will serve as raw material for creating improved varieties adapted to different agro-ecological conditions. In this way, the important task of stopping the loss of biodiversity and increasing the productivity and stability of agricultural production is solved to feed the earth's population, whose number will exceed 9 billion people by 2050.

According to FAO data, in 2022, in 116 countries, there were banks of Plant Genetic Resources, including 19 regional and international, which contain more than 5.9 million accessions of seeds, tissues and other plant materials of cultivated plants and their wild relatives [1].

In 2006, under the auspices of the UN, the Svalbard Global Seed Vault was established on the island of Svalbard (Norway), which currently stores more than 1.2 million seed accessions from almost all countries of the world, including 2,780 accessions of wheat, chickpeas, lathyrus, beans, lentils from Ukraine.

National Centre for Plant Genetic Resources of Ukraine (NCPGRU) was organised in 1992 based on the Plant Production Institute named after V. Ya. Yuriev of the National Academy of Agrarian Sciences of Ukraine (NAAS) by involving accessions stored in leading breeding and scientific institutions of Ukraine and other countries. For over 30 years, the NCPGRU has been preserving and expanding seed collections.

Ukraine pays attention to the development of the Plant Genetic Resources System of Ukraine (PGRSU). The Bank of Plant Genetic Resources of the Plant Production Institute named after V. Ya. Yuriev (with the Ustymivka Experimental Station of Plant Production), was registered in the State Register of Scientific Facilities, which is the national achievement of the country according to the Resolution of the Cabinet of Ministers of Ukraine dated 19 December 2001 No. 1709.

The legislation on the functioning of the PGRSU (Appendix 1) is based on the Constitution, Codes and laws of Ukraine, in particular “On Flora”, “On Nature Reserve Fund of Ukraine”, “On Environmental Protection”, etc. The legislation considers Ukraine’s international obligations, in particular the ratified Convention on Biological Diversity and the Cartagena and Nagoya Protocols thereto. Ukraine's legislation also takes into account the requirements of EU directives. Although, as of 1 January 2023, Ukraine has not joined the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), to which 150 countries of the world have already joined, it is recommended to comply with the provisions of this Treaty.

The activities of the NCPGRU are carried out in accordance with the “Regulations on the National Centre for Plant Genetic Resources of Ukraine”, approved by orders of the Ministries of Agriculture and Food of Ukraine, Forestry of Ukraine and the Ukrainian Academy of Agrarian Sciences in 1994. A few provisions, recommendations, and standards regulating the functioning of the PGRSU have been developed and put into effect by the scientists of the NCPGRU.

The GeneBank of Ukraine is among the top ten genebanks in the world in terms of the volume and variety of accessions stored in it. Its collection consists of more than 154,300 accessions of 2,002 species (Appendix 2), of which about 16% are local forms, 5.9% are wild relatives of agricultural crops, and the rest are modern varieties and breeding and genetic lines. About 42% of the local varieties and 27% of the wild relatives of agricultural crops in the collection originate from Ukraine. A significant part of the accessions was collected during more than 40 expeditions, many of which were conducted with scientists from other countries — Poland, Slovakia, Moldova, the USA, Canada and the Republic of Korea. *Ex situ* collections of wheat, barley, peas, chickpeas, sunflower, and forage/fodder crops collected and stored in the GeneBank of Ukraine (Appendix 3) are of world importance.

56,900 accessions of Ukrainian origin are stored in the genebank of Ukraine, and about 13,000 accessions of Ukrainian origin are stored in national and international genebanks in 30 countries (Appendix 4). 2,780 accessions are stored in the Svalbard Global Seed Vault. This indicates that accessions of Ukrainian origin are largely unique and insufficiently duplicated.

Structure of PGRSU:

The Plant Genetic Resources System of Ukraine is subordinated to the National Academy of Agrarian Sciences of Ukraine and consists of the National Centre for PGRSU (NCPGRU) and PGRS institutions (Annex 5). The PGRSU comprises 34 research institutions subordinated to the National Academy of Agrarian Sciences of Ukraine and 3 partner institutions (Annexes 6 and 7). Due to the Russian aggression, 4 research institutions were annexed in 2014, and 2 were occupied in 2022, so since 2022, 28 institutions have been operating in the system.

The NCPGRU is the scientific and methodological centre of the PGRSU, which maintains the information system on PGR and organises the development of methods for the formation of collections, classifiers of traits, catalogues of samples and other scientific and methodological publications. The centre houses the main long-term storage facility.

The NCPGRU is a subdivision of the Plant Production Institute named after V. Ya. Yuriev, which legally concludes contracts and supports the activities of the Centre.

The Centre is governed by the Statute of the Plant Production Institute named after V. Ya. Yuriev and the Regulations of the National Centre of Plant Genetic Resources of Ukraine. The Centre is headed by the Director, who is also the Deputy Director of the Plant Production Institute named after V. Ya. Yuriev and is appointed and dismissed by the Presidium of the National Academy of Agrarian Sciences.

The PGRSU institutions that manage seed and field collections coordinate plans, programmes and reports with the NCPGRU. Each PGRSU institution:

- develops PGR collections of crops in which it specialises, according to the distribution approved by the PGR Coordinating Council;
- create passport databases of these collections in the format and structure established by the NCPGRU and transfer them to the Central Database;
- following its specialisation, grows and transfers seeds of samples for long-term storage in the National Repository and maintains collections of crops reproduced vegetatively.

Among the 28 institutions of the PGRSU as of 2023, 7 institutions (Institute of Potato Growing, L.P. Symyrenko Experimental Station of Pomology, Institute of Horticulture, National Scientific Center (NSC) ‘V.Ye. Tairov Institute of Viticulture and Winemaking’, Prydnistrovska Experimental Station of Horticulture, NSC ‘Institute of Experimental and Clinical Veterinary Medicine’ (laboratory of silk production and technical entomology),

Podilska Experimental Station of Horticulture keep their collections alive in the form of field collections (over 18 thousand samples).

The scientific activity of the NCPGRU is carried out in accordance with the research programme 17 of National Academy of Agrarian Sciences ‘Formation and use of the plant genetic resources bank’, which consists of 2 subprogrammes: 01 ‘Genetic resources of agricultural crops’, which focuses on the study of genetic diversity of field crops and grapes, and 02 ‘Expansion and conservation of genetic diversity of fruit, berry, nut and ornamental crops (Pomology)’.

The main areas of activity of the PGRSU (Appendix 8):

- Storing accessions.
- Maintaining and managing accession databases.
- Regenerating accessions.
- Increasing collections of accessions, including the involvement of valuable accessions of genetic diversity.
- Studying and revealing the potential of valuable traits of accessions.
- Using accessions, including exchange of information, accessions.
- Participating in international cooperation programs related to PGR.

Main resources of the PGRSU (Appendix 9), which ensure its effective work:

- HR;
- assets;
- funding.

HR:

Five institutions have dedicated laboratories for plant genetic resources with more than 50 employees: the Plant Production Institute named after V. Ya. Yuriev (PPI), the V.Ye. Tairov Institute of Viticulture and Winemaking, the Institute of Oilseed Crops, the Institute of Vegetable and Melon Growing, and the Institute of Potato Growing. Other institutions have laboratories that combine the maintenance of plant genetic resources collections with pre-breeding work and breeding of specific crops. They employ over 100 people.

To train specialists in plant genetic resources, the NCPGRU of the PPI developed and approved a curriculum for higher educational institutions based on the course “Plant genetic resources”, which is taught in universities of Ukraine. At a higher level, training is conducted through postgraduate studies in this direction.

During the functioning period of the PGRSU (32 years), using the collections of the National Plant Genebank and methodological developments, 88 graduate students and doctoral students were trained in the specialities “Plant Breeding”, “Plant Production”, “Genetics”, and others. In 2023-2024 11 people are completing postgraduate studies in the institutions of PGRSU in related scientific fields.

Annual advanced training courses, “Formation, maintenance, effective use of plant genetic resources collections”, are held at the NCPGRU for scientific and pedagogical workers.

In 2023, an internship of the PGRSU scientists was carried out during a joint meeting with FAO and Crop Trust with the assistance of international donor organisations. In 2023, an internship of specialists of PPI, Ustymivka Experimental Station of Plant Production (UESPP),

and Institute of Agriculture of Carpathian Region (IACR) in the management of PGR information systems in Sweden, NordGen, was conducted.

There is a need for more active scientific exchange with genetic banks in other countries, particularly the internship of employees in scientific and educational institutions.

Assets of PGRSU:

1. Experimental base for field study and maintenance of gene pool accessions in a living state:

- 1.1. The Plant Production Institute named after V. Ya. Yuriev – a land plot of 40.3 ha, a fleet of agricultural machinery, a complex of premises for storage, threshing and primary analysis of gene pool accessions yield with a total area of 770 m².
- 1.2. The Ustymivka Experimental Station of Plant Production – a land plot of 60.2 ha, a fleet of agricultural machinery, a complex of premises for storage, threshing, sorting out and primary analysis of gene pool accessions yield with a total area of 990 m².
- 1.3. The Institute of Vegetable and Melon Growing – 15 hectares of land, a greenhouse complex with a total area of 1000 m², a fleet of agricultural machinery, a complex of premises for processing, threshing and primary analysis of the harvest of vegetables and melon plants gene pool accessions with a total area of 500 m².
- 1.4. The Institute of Potato Growing – 4 hectares of land, a fleet of agricultural machinery, a complex of premises for accession storage with a total area of 170 m².
- 1.5. The L.P. Symyrenko Experimental Station of Pomology - 40 hectares of land, a full range of mechanisms and tools for the care of gardens and nurseries, storage facilities for rootstock, grafting and planting materials.
- 1.6. The V.Ye. Tairov Institute of Viticulture and Winemaking - 23 hectares of land, including 4 hectares of collection plantations, clone testing areas, micro mother plants of promising introduced and proprietary varieties and forms, a vaccination room (in need of repair), a plot with planting material (1.5 hectares), a minimal agricultural machinery fleet (in operation for over 20 years and a need renewal).
- 1.7. The Plant Breeding and Genetics Institute – National Centre of Seed and Cultivar Investigation - 1.1 hectares of land, a fleet of agricultural machinery, premises in the breeding centre (Dachne village) for storing samples in uncontrolled temperature conditions (70 m² in satisfactory condition).

Agricultural machinery is mostly in working condition but needs to be replenished and updated. The premises need ongoing repair. At the experimental base of the Plant Production Institute, there is damage to the equipment and premises from shelling by the Russian Federation. Therefore, a partial renewal of the equipment and restoration of the premises is required. The soil where perennial plantations are located needs to be improved by applying organic fertilisers. At the V.Ye. Tairov Institute of Viticulture and Winemaking, it is advisable to irrigate some of the plantations, as weather and climate changes lead to the inevitable loss of drought-resistant varieties in the collection.

2. Laboratory base:

2.1. Plant Production Institute named after V. Ya. Yuriev:

- Laboratory complex for determining the genetic potential of winter and frost resistance of winter crops.

- Laboratory-field complex for immunological assessment of plant gene pool accessions.
- Laboratory for grain quality assessment and biochemical identification of gene pool accessions.
- Laboratory of biotechnology for maintaining plant genetic diversity.

2.2. Institute of Vegetable and Melon Growing:

- Laboratory of agrochemical research and product quality to assess biochemical parameters of gene pool accessions.
- Laboratory of Genetics, Genetic Resources and Biotechnology for accelerated reproduction of gene pool accessions.
- Laboratory complex for evaluation of varietal and sowing qualities of gene pool accessions.
- Laboratory equipment for immunological evaluation of vegetable gene pool accessions.

2.3. Institute of Potato Growing:

- Laboratory for assessing the quality of planting material and potato gene pool accessions.
- Biotechnology laboratory for maintaining plant genetic diversity.

2.4. L.P. Symyrenko Experimental Station of Pomology:

- Laboratory equipment for agrochemical soil analysis.
- Laboratory equipment for chemical and technological evaluation of fruit and berry accessions.

2.5. NSC 'V.Ye. Tairov Institute of Viticulture and Winemaking':

- Laboratory of grape genetic resources, sector of ampelography and variety studies; sector of clonal selection and biochemistry of grapes.
- Chemical and analytical laboratory for winemaking to assess the quality characteristics of fresh grapes and wine.

3. Repositories of gene pool accessions:

3.1. National depository of seeds of the gene pool of the Plant Production Institute named after V. Ya. Yuriev:

- 4 rooms with an area of 91 m²; 15 pieces of equipment including dehumidifier MD 600 by MUNTERS (Sweden); refrigerating chamber by HUURRE (Finland); 2 freezers. The premises are in satisfactory condition, in need of repair; the equipment is in working condition but needs to be modernised.
- Storage room with unregulated temperature conditions — 2 rooms with an area of 80 m² - need repair.
- The laboratory for seed viability assessment with equipment — thermostats, scales, and hygrometers - needs modernisation.

3.2. Storage of duplicate collection accession seeds of the Ustymivka Experimental Station of Plant Production

- A unit for storing seeds at an unregulated temperature regime with a total area of 90 m².
- Refrigerating chamber by HUURRE (Finland) equipped with stationary racks for 25,000 accessions and dehumidifier MD 600 by MUNTERS (Sweden);

- Storage for the collection of potatoes and two-year-old vegetable crops with an area of 230 m².

3.3. Storage of the active collection of the Institute of Vegetable and Melon Growing:

- a 50 m² room, a cold storage room to ensure guaranteed medium-term preservation of the seed stock of the collections.

3.4. Storage facility of the Institute of Potato Growing:

- a complex of premises for storing gene pool samples with a total area of 170 m².

3.5. Storage of the L.P. Symyrenko Experimental Station of Pomology:

- storage facilities for rootstock, grafting and planting materials - the premises require current repair.

3.6. Storage of the V.Ye. Tairov Institute of Viticulture and Winemaking:

- storage facility for grafting, rootstock, and planting material, which is in need of repair.

3.7. Storage of the Plant Breeding and Genetics Institute – National Centre of Seed and Cultivar Investigation:

- a room in the breeding centre (Dachne village) for storing samples in uncontrolled temperature conditions, 70 m² in area, in satisfactory condition.

4. Information base:

Plant Production Institute named after V. Ya. Yuriev has 12 modern computers with licensed software, connected to a local network with a permanent connection to the Internet via fibre-optic cable and communication devices. The software and Internet communications equipment are functioning properly. Office equipment and facilities are in good working order.

Institute of Vegetable and Melon Growing: the information database is filled from 1 computer with a permanent connection to the Internet.

The Plant Breeding and Genetics Institute: the information database is filled with 1 computer with a permanent Internet connection.

V.Ye. Tairov Institute of Viticulture and Winemaking: 5 modern computers with licensed software, with a permanent connection to the Internet via fibre optic cable and communication devices. The software and Internet communications tools are working properly. Office machinery and equipment are in good working order.

Libraries:

- Plant Production Institute named after V. Ya. Yuriev of the NAAS (premises with an area of 182 m², book collection of 61,500 volumes). Publishing system (computer with peripheral equipment, laser printer, scanner, copier).
- Ustymivka Experimental Station (room with equipment with an area of 20 m², book collection of 7,000 volumes).

- Institute of Vegetable and Melon Growing of NAAS: the information database is filled with 1 computer with a permanent Internet connection.
- V.Ye. Tairov Institute of Viticulture and Winemaking covers an area of 270 m², is part of the Department of Scientific Research on Intellectual Property and Marketing of Innovations, and contains 110,000 copies, including a collection of rare books of 1,500 titles.

Computer hardware and equipment are in working condition but need modernization and replenishment. It is necessary to purchase licensed software to provide new domestic and foreign editions.

Funding for the PGRSU:

Funding for PGR activities of the PGRSU institutions is provided by the NAAS upon submission of the NCPGRU. The starting points are the crop specifics, the volume and composition of the collection, and, for vegetatively propagated crops, the area under the collection.

Sources of funding:

- from the State Budget through the National Academy of Agrarian Sciences of Ukraine,
- at the expense of commercial activities of the main institute and other institutions of the PGRSU, including the sale of seeds, technical consultations, consulting of farmer groups, etc.,
- through international financial support - grants, projects, etc. 2022-2003, PGRSU received international support from Bioversity International, NordGen and FAO.

The payment of employees (50% of the financing of the PGRSU) is provided at the expense of the State budget, and the costs of operational activities, equipment, and premises (50% of the financing of the PGRSU) are covered by commercial revenues and international financial support.

The negative impact of Russia's war against Ukraine on the PGRSU:

After the start of Russia's full-scale war against Ukraine on 24 February 2022, the genebank of the NCPGRU of the Plant Production Institute named after V. Ya. Yuriev was under threat of destruction. In March 2022, during shelling, part of the infrastructure of the experimental base was destroyed, agricultural machinery and part of the working seed collections at the breeding complex of the PPI was also destroyed. Therefore, to preserve the collection for long-term storage, in March 2023, with the help of FAO (Project GCP/UKR/012/EC) 51,000 accessions were urgently duplicated, exported and placed in temporary storage in the Lviv region in the LTS, and 2,000 accessions harvested in 2022 was prepared for MTS and were transferred to the Ustymivka Experimental Station in the Poltava region.

Due to the occupation of the eastern and southern territories of Ukraine, there is no access to the collections of 6 institutions of the PGRSU, of which 2 are in the occupied territories, 4 - in the annexed Crimea (Appendix 6).

There has been a reduction in personnel, especially in the NCPGRU of the PPI due to the evacuation of part of the personnel abroad and conscription into the army. While more than 200 people worked at the PGRSU in recent years, after 2022 their number has decreased by a quarter.

On 18 March 2022, shelling damaged the building of the Institute of Vegetable and Melon Growing of the National Academy of Sciences of Ukraine, including laboratory facilities and

temporary storage of vegetable gene pool accessions. The staff of the Institute restored the functioning of the laboratory for agrochemical research and product quality and the laboratory for genetics, genetic resources and biotechnology to a minimum level.

The Institute of Potato Growing was in the occupation zone; the equipment and premises were damaged by shelling from the Russian Federation, so partial renewal of equipment and restoration of premises is needed. The soil needs to be improved by applying organic fertilisers; the premises need to be overhauled, and the machinery and equipment are in good condition but need to be modernised and replenished.

To preserve wild, diploid and endemic forms, there is an urgent need to purchase a climate-controlled greenhouse with a total area of 20 m².

In 2023, the allocation from the State Budget was reduced by approximately 60%, and the possibilities of attracting additional funds of special funds were limited. Staff salaries were significantly reduced while the cost of travel to institutions increased, and the cost of living increased significantly. The war and a decrease in salaries has led to the loss of highly qualified specialists and other personnel.

Since at present almost the entire territory of Ukraine is a zone of missile and often artillery fire, all institutions of the PGRSU are in danger. The activity of all institutions was affected by the general reduction of the budget for science, which led to a reduction in the staff and a decrease in the wages of employees, the impossibility of renewing the facilities and resources. The sale of products, mainly seeds, and planting material produced by the institutions of the PGRSU decreased, so their special funds, which largely supported the work with PGR, decreased significantly. Some employees of conscription age have been mobilized to the army. Some people changed their place of residence in Ukraine or went abroad. The introduction has decreased, since it is not possible to conduct expeditions on the territory of Ukraine, the ties with partners abroad have weakened.

Based on the analysis of information on the current state of the PGRSU, the problems of its functioning are of a general nature, and since 24 February 2022, they have deepened in connection with the full-scale military actions of the Russian Federation against Ukraine.

General problems:

- insufficient legislative support for PGR activities;
- obsolete laboratory, technical and refrigeration equipment;
- lack of qualified personnel;
- the presence of problems with collections of perennial crops that reproduce vegetatively: legal uncertainty of the status of land areas designated for collections; lack of funds for establishing and re-establishing collections;
- insufficient supply of means for isolation to maintain the authenticity of cross-pollinated crops;
- low level of application of modern biotechnological and molecular genetic methods for conservation, identification and certification of genetic resources;
- insufficient technical capabilities for the modernization of the Database Maintenance and Management System.
- insufficient level of international cooperation.
- insufficient informing of the authorities, wide circles of specialists and the public about the importance of PGR, their problems and activities to solve them.

Problems related to war:

- lack of access to the collections of 6 institutions of the PGRSU;
- destruction and damage of infrastructure facilities, machinery and equipment;
- decrease in the number of qualified personnel;
- reduction of allocation from the State Budget.

2. TRENDS IN THE DEVELOPMENT OF PLANT GENETIC RESOURCES SYSTEMS IN THE WORLD

In 2022, 868 regional, national, and international institutions worked with the genetic resources of agricultural crops and are engaged in the conservation and sustainable use of plant genetic resources for food and agriculture (PGRFA) [1]. In addition, 711 genebanks and 16 regional/international institutions/centres are in 90 countries, where more than 5.4 million accessions of more than 7,051 genera are stored. The main attention is paid to the preservation of agricultural crops species, particularly their wild relatives, local varieties, modern varieties, genetic and breeding material [5]. Various international treaties have been implemented in harmony with CBD for the conservation, sustainable use, fair sharing of benefits and safe handling of genetic resources.

In addition to the use of genetic resources to create new varieties of agricultural crops by transferring alleles that control valuable resilience and economic traits using traditional breeding methods, methods of genetic engineering (creation of GMOs) and gene editing are becoming widespread in compliance with the requirements of the Cartagena Protocol on Biosafety to the CBD, to which Ukraine joined by the Law of 12 September 2002 [1].

Methods of *in vitro* cultivation of plant cells, tissues and organs are used for reproduction, recovery of plant material, preservation of rare and endangered species through long-term *in vitro* culture and cryoconservation in genebanks. Molecular genetic sequencing methods, marker-assisted selection, gene mapping, including the identification of quantitative trait loci (QTL), are used to identify and verify accessions, to create new sources of valuable traits[2].

At the same time, new methods of phenotyping gene pool accessions are being developed. An important challenge is to improve access to the collections of PGR by disseminating available information about the collections, participating in pre-breeding work, etc. New, more effective methods of information support of PGR are being improved and implemented. One of the priorities of the national and international communities is the proper monitoring of genetic erosion and vulnerability of genetic diversity to protect rare and endangered plant species.

Since no conservation method is perfect, *in situ* and *ex situ* conservation methods are practised, which complement each other. The plant gene pool of each region is an integral part of the global plant gene pool. Therefore, the efforts by the community regarding PGR are aimed at concentrating the seeds of plant gene pool accessions in the Svalbard Global Seed Vault for safety duplication [3].

There is a trend towards closer international cooperation in the field of PGR.

In Europe, this is implemented in the European Cooperative Programme on PGR (ECPGR), the Integrated European Collection (AEGIS), the European Network for the Evaluation of PGR (EVA), the European Catalogue of PGR on the Internet (EURISCO) and other programmes.

There is a growing awareness of the importance of PGR among the broad masses of farmers and local people. The potential of local communities, indigenous peoples, farmers, breeders, extension workers and other stakeholders, including small-scale entrepreneurs, is being harnessed for the management and sustainable use of PGR. In some countries, technical and financial support is provided to farmers and local communities for the proper conservation of

plant genetic resources. The proper assessment, characterisation and documentation of endemic plant species are recognised as a priority [4].

More and more regulations and measures are being developed and implemented for the sustainable conservation of cultivated plants and their wild relatives [5].

An urgent issue is to improve the protection of the rights of owners and authors of plant genetic resource accessions, as well as information about them, for which the International Treaty on PGR for Food and Agriculture and the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity were adopted.

3. ANALYSIS OF STRENGTHS AND WEAKNESSES, OPPORTUNITIES AND RISKS OF THE DEVELOPMENT OF THE PLANT GENETIC RESOURCES SYSTEM OF UKRAINE

Based on the analysis of the dynamics of the development of PGRSU for 1992–2023, taking into account the opinion of international Crop Trust experts and taking into account the global trends in the development of similar systems in the world, the following strengths and weaknesses, opportunities and threats of the external environment that may affect the further development of the system of plant genetic resources of in Ukraine have been determined.

<p>STRENGTHS</p> <ul style="list-style-type: none"> ● Formation and documentation of basic, core, trait, genetic and educational collections. ● Creation and selection of sources and donors of valuable economic traits. ● Great genetic diversity of the collections located in MTS and LTS. ● The methodology of all areas of work with plant genetic resources, which ensures their <i>ex-situ</i> storage and use, has been developed and implemented. 	<p>OPPORTUNITIES</p> <ul style="list-style-type: none"> ● Effective use in breeding, scientific, environmental, production, educational and other programs. ● Creating a duplicate depository, which is an important security measure for genebanks. ● Increasing the number of backup duplicates of accessions of the National Depository ● Regeneration of duplicate accessions under safe conditions. ● Attracting funds through international projects for conservation, introduction and regeneration of gene pool accessions. ● Cooperation with private breeding companies that have deep technical knowledge and capabilities. ● International PGR cooperation through joining and participating in global mechanisms such as the International Treaty on PGRFA and FAO Commission.
<p>WEAKNESSES</p> <ul style="list-style-type: none"> ● The experimental base is broken by Russian aggression. ● Limited budget for specialized methods of regeneration (absence of greenhouses, seedbeds, shadings, 	<p>THREATS</p> <ul style="list-style-type: none"> ● Military operations. ● Reducing the number of qualified employees. ● Deterioration of the growing conditions of vegetatively reproduced crop accessions,

shelters, etc.) for re-adaptation and adaptation of plants when introducing accessions from geographically distant regions. <ul style="list-style-type: none"> • There is no cryopreservation of crops that are reproduced vegetatively - potatoes, fruit, berry and other crops. • Limited use of biotechnology methods for genepool accessions creation, conservation, identification. • Outdated facilities including technical and laboratory equipment. • Refrigerators and freezers for MTS and LTS are 95% full. • Worn drying equipment. 	which can lead to accession loss. <ul style="list-style-type: none"> • Physical wear and tear of agricultural machinery and laboratory equipment. • Physical wear and tear of working premises and cameras for LTS and MTS.
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4. VISION, MISSION, GOALS AND PRIORITIES FOR THE DEVELOPMENT OF PLANT GENETIC RESOURCES SYSTEM OF UKRAINE

Vision of PGRSU: Ukraine, in which PGR as a direct production force is the basis of food security, material and ecological well-being of the population.

Mission of PGRSU: mobilization of PGR for the development of highly productive, economically efficient, ecological agriculture.

The goal of PGRSU: preservation in a viable state, enriching sources of valuable traits, inventory and systematize genetic diversity based on information systems, unlocking the potential of valuable traits through comprehensive study, and provide users with samples of the gene pool based on equitable distribution of benefits.

Development priorities of the PGRSU:

- restoration and development of the material and technical base for the preservation, regeneration, investigation and inventory of gene pool samples, including workspaces, agricultural machinery, laboratory equipment, and gadgets;
- involving new gene pool accessions— sources of valuable economic traits and their combinations to the collections;
- a comprehensive study of gene pool accessions collections with the selection of sources and donors of valuable traits and their combinations, standards of levels of trait manifestation;
- formation and registration of basic, core, trait, special, genetic, educational and other types of collections;
- ensuring collection management and access to genepool accessions by improving and maintaining the information system on plant genetic resources;
- development and improvement of the information system, which accelerates access to collection accessions;
- providing users with gene pool accessions based on a fair sharing of benefits;
- long-term *ex situ* storage of gene pool accessions — seeds in the National Depository, vegetatively propagated crops — in field collections and cryobanks.

- construction and equipping of a modern National Depository of gene pool accessions using storage of seeds in freezers; cryoconservation of vegetative parts and tissues of vegetatively reproduced plants; identification of gene pool accessions based on DNA analysis; monitoring the viability of the stored material;
- legislative support of activities in the field of plant genetic resources.
- International cooperation on plant genetic resources, including membership and active participation in international mechanisms (ITPGRFA, CGRFA, and the ECPGR).

5. STRATEGIC, OPERATIONAL GOALS AND OBJECTIVES OF THE DEVELOPMENT OF THE PLANT GENETIC RESOURCES SYSTEM OF UKRAINE

Strategic and operational goals and objectives are aimed at achieving the goal of the PGRSU, solving the problems, confronting risks and challenges based on the complete use of opportunities and creating the basis for the further development of the PGRSU, taking into account the interests of stakeholders and identifying the main expected results of the implementation of this strategy. Over the next 5 years, the PGRSU sets the following strategic goals:

1. Increasing efficiency of management of the Plant Genetic Resources System.
2. Active integration into the European and global network of plant genetic resources conservation, considering national interests.

5.1. Strategic, operational goals and expected results.

Strategic goal 1. Increasing efficiency of management of the plant genetic resources system.

Operational goals:

1. Guaranteeing the safety of the collections.
2. Ensuring long-term availability and use of collections.
3. Ensuring long-term availability of collection data.
4. Optimisation of the structure and adaptation of the regulatory framework for the functioning of the PGRSU to international standards.
5. Developing and implementing the legislative basis for the functioning of the PGRSU.

Estimated outcome:

- With the help of FAO, a new refrigerating chamber for MTS with a potential volume of 25,000 seed accessions will be put into operation at the Ustymivka Experimental Station of Plant Production of the Plant Production Institute named after V. Ya. Yuriev.
- The laboratory and drying equipment of the PGRSU institutions will be upgraded to meet the requirements of modern international standards;
- With the help of FAO, a new duplicate seed storage for MTS and LTS with a potential volume of 100,000 seed accessions will be put into operation together with a laboratory complex for preparing seeds for storage at the Institute of Agriculture of Carpathian Region, based on which the Duplicate Depository of Plant Genetic Resources of Ukraine (DDPGRU) is organised.
- With the help of FAO, the duplicate collection of 51,000 seed accessions of LTS from the Plant Production Institute named after V. Ya. Yuriev will be placed in the Duplicate Depository of Plant Genetic Resources.

- With the help of FAO, barcoding of the duplicate collection of 51,000 seed accessions of LTS will be implemented in the Duplicate Depository of Plant Genetic Resources of Ukraine.
- With the help of FAO, a system of barcoding of seed samples (duplicate collection, collection of the Plant Production Institute named after V. Ya. Yuriev (Kharkiv), Ustymivka Experimental Station of Plant Production) will be introduced.
- The international database management system for plant genetic resources GRIN-Global is adopted in Ukraine.
- replanting and maintaining the collection of fruit, berry and nut crops in the PGRSU institutions that deal with field collections, including restoration of destroyed and damaged accessions, as well as those accessions that are not available due to the annexation and occupation of the territory of Ukraine.
- Implementation of modern methods of storage and recovery of samples.
- with the help of FAO and donor organisations, the technical facilities at the PGRSU institutions were upgraded to restore germination of the seed material available in the collection (modern laboratory seeders, equipment for threshing and cleaning of seed material).
- Annual plans for the Functioning of the Plant Genetic Resources System for Food and Agriculture in Ukraine are developed and approved at the NAAS based on the operational plan for implementing the Strategy.
- the Law of Ukraine 'On Plant Genetic Resources' will be developed and submitted for adoption by the Verkhovna Rada of Ukraine;
- the National Repository for PGR will be modernised at the Plant Production Institute named after V. Ya. Yuriev, provided the Russian war against Ukraine ends.

Indicators of achieving results:

- Refrigeration camera for MTS at the Ustymivka Experimental Station for Plant Production of the Plant Production Institute named after V. Ya. Yuriev of the NAAS: quantity — one, with a potential volume of 25,000 seed accessions.
- A new seed depository for MTS and LTS at the Institute of Agriculture of Carpathian Region of the NAAS in the Lviv region, together with a laboratory complex for the preparation of the seed for storage (DDPGRU): quantity — one, potential volume — 100,000 seed accessions.
- Implemented barcoding of collection accessions: quantity - 80,000 seed accessions.
- Equipment for growing, threshing and cleaning of seed material.
- The draft Law of Ukraine "On Plant Genetic Resources" developed and submitted to the Verkhovna Rada,
- An *in vitro* laboratory has been set up: 1.
- A collection of fruit, berry and nut crops with a total volume of 1275 samples is maintained, and 575 samples were re-planted within the institutions of the PGRSU that take care of field collections.
- Updated National Depository for NW and DW seeds, quantity - one.

Strategic goal 2. Active integration into the European and global network of plant genetic resources conservation, considering national interests.

Operational goals:

1. Membership and participation in the European Cooperative Program for Plant Genetic Resources (ECPGR).
2. Participation in the FAO Commission on Genetic Resources for Food and Agriculture.
3. Ratification of and participation in the International Treaty on PGRFA.

Estimated outcome:

- With the help of FAO, a contribution was paid for the participation of Ukrainian scientists in the European Cooperative Programme on Plant Genetic Resources (ECPGR).
- Representatives of 6 PGRSU institutions were appointed to the ECPGR working groups.
- An authorized representative has been appointed to participate in the FAO Commission on Genetic Resources for Food and Agriculture.
- The International Treaty on the PGRFA is ratified, and an authorized representative is appointed to the role of Treaty National Focal Point.

Indicators of achieving results:

- An authorized representative appointed to participate in the FAO Commission on Genetic Resources: quantity - one.
- Ratified International Treaty on PGRFA: quantity - one.
- Paid contribution for the participation of Ukrainian scientists in the European Cooperative Program for Plant Genetic Resources (ECPGR): amount — EUR 4,500.
- Appointed representatives of Ukraine in the working groups of the European Cooperative Program for Plant Genetic Resources (ECPGR) — 6 representatives.

5.2. Strategy implementation mechanisms

To implement the Strategy, the National Academy of Agrarian Sciences of Ukraine will establish the Coordination Committee for the Development of the Plant Genetic Resources System of Ukraine (hereinafter - the Coordination Committee). The Coordination Committee (CC) consists of 15 members. Of these, 12 are representatives of NAAS research institutions, including the Vice President of NAAS and the Academician-Secretary of the Plant Production Department of NAAS, and 3 are representatives of the Ministry of Agrarian Policy and Food of Ukraine, the Ministry of Environmental Protection and Natural Resources of Ukraine, and the Ministry of Education and Science of Ukraine (upon agreement).

The Chairman of the Coordination Committee is the Vice-President of the National Academy of Agrarian Sciences of Ukraine, curator of the Plant Production Department. The staff of the Coordination Committee, the Chairman, the Deputy Chairman and the Secretary shall be approved by the Presidium of the National Academy of Agrarian Sciences of Ukraine.

The procedure of the Coordination Committee is determined by the Regulations (Annex 11). The CC meeting shall be held at least 2 times a year.

5.3. Financial resources for the Strategy implementation

- expenditures from the State Budget of Ukraine through the NAAS budget;
- special funds of institutions of the PGRSU;
- charitable assistance of PGR users;
- international grants and programs.

5.4. Stages of the Strategy implementation

Strategic goal 1. Increasing the efficiency of management of the plant genetic resources system.

Planned for 2024 with the help of FAO:

- putting into operation a new refrigerating chamber for MTS with a potential volume of 25,000 seed accessions at the Ustymivka Experimental Station,

- the Plan for the Functioning of the Plant Genetic Resources System for Food and Agriculture in Ukraine for 2025 will be developed and approved by the National Academy of Agrarian Sciences of Ukraine.

Planned for 2025:

- putting into operation the Duplicate Depository (DDPGRU) for seeds for MTS and LTS with a potential volume of approximately 100,000 seed accessions together with a laboratory complex for preparing seeds for storage at the Institute of Agriculture of Carpathian Region (IACR),
- placing the duplicate collection for LTS from the Plant Production Institute named after V. Ya. Yuriev (51,004 seed accessions) in the DDPGRU of the IACR,
- barcoding of the duplicate collection of 51 thousand seed samples stored in the Duplicate Repository of Plant Genetic Resources will be implemented,
- The material and technical base of the PGRS institutions will be repaired and updated, including workspaces, machinery, laboratory equipment, and gadgets.
- Equipment for sowing samples, threshing and cleaning seeds will be purchased to modernise the material base for restoring sample germination,
- The international database management system for plant genetic resources GRIN-Global will be adapted in Ukraine,
- The Law of Ukraine "On Plant Genetic Resources" will be developed and submitted to the Verkhovna Rada of Ukraine for adoption,
- the Plan for the Functioning of the Plant Genetic Resources System for Food and Agriculture in Ukraine for 2026 will be developed and approved by the National Academy of Agrarian Sciences of Ukraine based on the implementation of the 2025 plan.

Planned for 2026:

- a freezer will be installed and equipped at the PPI,
- drying chambers will be modernised at the PPI and the Ustymivka Experimental Station for Plant Production,
- the Plan for the Functioning of the System of Plant Genetic Resources for Food and Agriculture in Ukraine for 2027 will be developed and approved by the National Academy of Agrarian Sciences based on the implementation of the 2026 plan.

Planned for 2027:

- collections of fruit, berry and nut crops in the PGRSU institutions that deal with field collections will be re-located, including the restoration of destroyed and damaged samples, as well as those samples that are not accessible due to the annexation and occupation of the territory of Ukraine,
- an *in vitro* laboratory will be organised,
- the Plan for the Functioning of the Plant Genetic Resources System for Food and Agriculture in Ukraine for 2028 will be developed and approved by the National Academy of Agrarian Sciences of Ukraine based on the implementation of the 2027 plan.

Planned for 2028 subject to the end of Russia's war against Ukraine:

- an updated National Repository at the Plant Production Institute named after V.Y. Yuriev, Kharkiv,
- The Strategy of the Development of PGRSU for 2029-2034 will be developed, reflecting the national agricultural policy.

Strategic goal 2. Active integration into the European and global network of plant genetic resources conservation, considering national interests.

Planned for 2024:

- appointing an authorized representative to participate in the FAO Commission on Genetic Resources for Food and Agriculture,
- signing membership European Cooperative Program for Plant Genetic Resources (ECPGR) agreement and paying the contribution for the participation of Ukrainian scientists in the ECPGR,
- appointing representatives of Ukraine in ECPGR working groups.

Planned for 2025:

- ratifying the International Treaty on PGRFA and appointing representatives of Ukraine as a National Focal Point.

5.5 Monitoring and evaluation of the effectiveness of the Strategy implementation:

Measure	Indicator		Term	Expected result
	units	quantity		
Strategic goal 1. Increasing the efficiency of management of the Plant Genetic Resources System.				
In the UESPP, to put into operation a new refrigerating chamber for MTS with a potential volume of 25 seed accessions.	pcs/ accessions	1 / 25,000	31.12.2024	A refrigerating chamber for MTS has been put into operation in the UESPP
In IACR, to build a new seed depository for MTS and LTS with a potential volume of 100,000 seed accessions, together with a laboratory complex for preparing seeds for storage, on the basis of which to organize the Duplicate Depository of Plant Genetic Resources of Ukraine (DDPGRU)	pcs/ accessions	1 / 100,000	31.08.2025	A seed depository for MTS and LTS was built with a laboratory complex for preparing seeds for storage at IACR in Lviv Region, on the basis of which the Duplicate Depository of Plant Genetic Resources of Ukraine (DDPGRU) was organized
To implement barcoding of collection accessions in IACR.	Accessions	51 000	31.09.2025	Barcoding of collection accessions has been implemented in IACR
In the DDPGRU of the IACR, to place a duplicate collection for LTS from the NCPGRU of the PPI — 51,000 seed accessions.	accessions	51 000	31.09.2025	A duplicate collection for LTS from the NCPGRU of the PPI was placed in the DDPGRU of the IACR.
Procure the equipment for cultivation, threshing and cleaning seed of accessions for PGRSU institutions	pcs.	10	31.12.2025	Equipment for growing seeds samples and bringing them to high sowing conditions was put into operation

To develop and submit to the Verkhovna Rada the draft Law of Ukraine “On plant genetic resources”.	draft law	1	01.05.2026	The draft Law of Ukraine “On plant genetic resources” was submitted to the Verkhovna Rada.
Installation and equipment of a freezing camera in the PPI	pcs/ accessions	1/25 thousand	31.12.2026	The freezing camera is operational
Modernise the drying camera at the PGRSU institutions	pcs.	3	31.12.2026	The drying cameras are put into operation
Buy isolation boxes	pcs.	20	31.12.2026	Accessions isolation is ensured
To preserve wild, diploid and endemic forms of potatoes, purchase climate-controlled greenhouses with a total area of 20 m ² and equipment for cryopreservation.	pcs.	1	31.12.2026	A greenhouse was put into operation, and cryopreservation was established.
To adopt GRIN-Global — a database management system for the collection of plant genetic resources of Ukraine.	Database in GRIN-Global	1	31.05.2027	GRIN-Global — a database management system for the collection of plant genetic resources of Ukraine — has been adopted.
Re-plant the collection of fruit, berry and nut crops (growing of planting material for the collection establishment - 5 plants per 1 collection accession)	Accessions	per 1/ha: pomaceous 200, stone fruits 133; berries 680; nut-bearing fruits 55	31.12.2027	The collection of fruit, berry and nut crops of the has been re-planted
To implement barcoding of collection accessions in PPI and UESPP.	Accessions	100,000	31.12.2028	Barcoding of collection accessions has been implemented in PPI and UESPP.
In the PPI, to modernise the National Depository of plant genetic resources for LTS	pcs/ accessions	1 / 125 000	31.12.2028	The National Depository for LTS has been launched
To develop and approve at NAAS The Strategy of the Development of PGRSU for 2029-2034	strategy	1	01.12.2028	Approved Strategy of the Development of PGRSU for 2029-2034
To develop and approve at NAAS annual Plan for the functioning of the PGRSU	strategy	5	Annually	The annual Plant for the functioning of the PGRSU was developed and approved

Strategic goal 2. Active integration into the European and global network of plant genetic resources conservation considering national interests.				
To appoint an authorized representative to participate in the FAO Commission on Genetic Resources for Food and Agriculture.	Persons	1	31.12.2024	An authorized representative has been appointed to participate in the FAO Commission on Genetic Resources.
To sign a membership agreement for the European Cooperative Program for Plant Genetic Resources (ECPGR) and pay the contribution for the participation of Ukrainian scientists in the European Cooperative Program for Plant Genetic Resources (ECPGR).	agreement/EUR	1/4500	31.05.2025	Agreement signed and contribution for the participation of Ukrainian scientists in the European Cooperative Program for Plant Genetic Resources (ECPGR) has been paid with the help of FAO.
To appoint representatives of Ukraine in ECPGR working groups.	Persons	6	31.05.2025	Representatives of Ukraine in ECPGR working groups are appointed.
To ratify the International Treaty on the PGRFA and appoint a representative to the role of National Focal Point.	agreement/person	1/2	31.12.2026	The ITPGRFA was ratified, and National Focal Point appointed

The operational plan for the implementation of the Strategy, presented in Appendix 9, can be implemented only if funds are available.

ANNEXES

Annex 1. Legislation on the PGRSU

PGRSU is regulated by basic legislative acts:

- Constitution of Ukraine No. 254к/96-BP dated 28 June 1996 (as amended);
- Civil and Customs Codes of Ukraine;
- Land, Forest and Water Codes of Ukraine.

PGRSU is regulated by the laws of Ukraine, developed taking into account the requirements of international and European legislation:

- “On Flora” No. 591-XIV dated 9.04.1999 (as amended);
- “On nature reserve fund of Ukraine” No. 2456-XII, dated 16.06.1992. (as amended);
- “On environmental protection” No. 1264-XII dated 25.06.1991 (as amended);
- “On protection of rights to plant varieties” No. 3117-XII dated 21.04.1993 (as amended), which regulates the spread of varieties in Ukraine, intellectual property rights to plant varieties;
- “On seeds and planting material” No. 411-IV dated 26.12.2002 (as amended),
- “On copyright and related rights” No. 3792-XII dated 23.12.1993 (as amended),
- “On quarantine of plants” N 3348-XII dated 30.06.1993 (as amended);
- “On Ukraine’s accession to the 1979 Convention on the Protection of Wild Flora and Fauna and Natural Habitats in Europe” No. 436/96-BP dated 29.10.1996;
- “On Ukraine’s accession to the Convention on International Trade in Endangered Species of Wild Fauna and Flora” No. 662-XIV dated 14.05.1999;
- “On the Red Book of Ukraine” No. 3055-III dated 7.02.2002 (as amended);
- “On ecological network of Ukraine” No. 1864-IV dated 24.06.2004 (as amended);
- “On state biosafety system for the creation, testing, transportation and use of genetically modified organisms” No. 1103-V dated 31.05.2007 (as amended);
- others related to the Plant Genetic Resources System of Ukraine.

National legislation takes into account international legislative acts and regulations:

- Convention on Biological Diversity. Signed on behalf of Ukraine on 11 June 1992 in Rio de Janeiro, Brazil, and ratified by the Law of Ukraine 257/94-BP dated 29.11.1994. The purpose of the Convention is to preserve biological diversity, sustainably use its components and, on a fair and equal basis, jointly receive the benefits associated with the use of genetic resources and by providing the necessary access to genetic resources and by the appropriate transfer of relevant technologies, taking into account all rights to such resources and technology, as well as through adequate financing.
- Cartagena Protocol on Biosafety to the Convention on Biological Diversity. Ratified by the Law of Ukraine 152-IV dated 12.09.2002. The purpose of the Cartagena Protocol is to contribute to ensuring an adequate level of protection in the field of safe transfer, processing and use of living-modified organisms obtained as a result of the use of modern biotechnology, which may have an adverse effect on the conservation and sustainable use of biological diversity, taking into account also the risks to human health and with a special focus on cross-border movement.
- Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity. Ratified by the Law of Ukraine No. 1926-IX dated 2.12.2021. The goal of the Nagoya Protocol is the fair

and equitable sharing of benefits arising from the use of genetic resources, including by ensuring proper access to genetic resources and proper transfer of relevant technologies, taking into account all rights to these resources and technologies, and through proper financing, thus contributing to the conservation of biological diversity and sustainable use of its components. The Ministry of Environment is designated as responsible for Ukraine's fulfilment of its obligations under the Convention on Biological Diversity and is the central executive body responsible for fulfilling obligations arising from Ukraine's membership in the Nagoya Protocol, including payment of the annual contribution.

- Agreement on cooperation in the field of conservation and use of genetic resources of cultivated plants of the CIS member states. Concluded on 4 June 1999 in Minsk and ratified by the Law of Ukraine 1452-III dated 10.02.2000. In 2023, draft Law No. 0234 was registered in the Verkhovna Rada of Ukraine, which proposes to withdraw from the Agreement on Cooperation in the field of conservation and use of genetic resources of cultivated plants of the CIS member states.

- In order to ensure the conservation and sustainable use of plant genetic resources for food and agriculture for the benefit of present and future generations, and that all benefits arising from their use are shared fairly and equitably, the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) was concluded on 3 November 2001 and entered into force on 29 June 2004(<https://www.fao.org/plant-treaty/overview/texts-treaty/en/>). As of 1 January 2023, 150 countries have already acceded to the Treaty. Although Ukraine is not a signatory, its provisions are in the interests of both Ukraine and the international community. Therefore, when engaging samples from abroad, the NGDC recommends that the provisions of this treaty and the Standard Material Transfer Agreement (SMTA)(<https://www.fao.org/3/bc083e/bc083e.pdf>) as its component be followed.

Along with the international legislation, the PGRSU takes into account the legislation of the European Union, in particular the directives of the European Parliament and the Council:

- 2008/99/EC dated 19.11.2008 on protecting the environment through criminal law;
- 2001/18/EC dated 12.03.2001 on the deliberate release into the environment of genetically modified organisms together;
- 2008/27/EC dated 11.03.2008 making amendments and additions to Directive 2001/18/EC on the deliberate release into the environment of genetically modified organisms, relating to the executive powers granted to the Commission;
- 2015/412 dated 11.03.2015 making amendments and additions to Directive 2001/18/EC regarding the possibility for member states to limit or prohibit the cultivation of genetically modified organisms (GMOs) on their territory;
- 2004/35/EC on environmental responsibility for the prevention and elimination of the consequences of environmental damage dated 21 April 2004;
- others related to the Plant Genetic Resources System of Ukraine.

The activities of the National Centre of Plant Genetic Resources of Ukraine of the Plant Production Institute named after V. Ya. Yuriev are carried out in accordance with the "Regulations on the National Centre of Plant Genetic Resources of Ukraine" approved by the orders of: Ministry of Agriculture and Food of Ukraine No. 1332 dated 5.08.1994; Ministry of Forestry of Ukraine No. 01-2DSP dated 3.08.1994; Ukrainian Academy of Agrarian Sciences No. 21-7/273 25.07.1994.

Scientists of the Plant Production Institute named after V. Ya. Yuriev developed and implemented:

- Regulations on the registration of collections of plant gene pool accessions in the National Centre of Plant Genetic Resources of Ukraine.
- Regulations on the Plant Gene Fund Information System.
- Methodological recommendations for the study of genetic resources of leguminous crops, which are recommended for specialists in plant genetic resources; specialists of breeding and scientific divisions, investigating collection accessions of leguminous crops; and gives a complete description of the Plant Gene Pool Information System. https://yuriev.com.ua/assets/files/knigi/metodichni-rekomendacii_gen_res_z_bob.pdf;
- State standard of Ukraine DSTU 7066.2009 “Plant genetic resources. Terms and definitions of concepts”. Valid from 01.01.2011. The standard establishes terms and definitions of their concepts regarding plant genetic resources. The terms established by this standard are recommended for use in all types of regulatory documentation, scientific, educational and journalistic literature related to plant genetic resources, as well as for standardization work.

Annex 2. Statistical information about the PGRU collection (01.01.2023)

Indicator	Crop groups:														TOTAL
	grain	corn	cereal	legumes	oil	industrial	fodder	medicinal, essential oil	vegetables, melons	Potato	fruit, nut	berries	grape	forest, decorative, flowers, herbs	
Quantity of accessions	46430	14305	11617	22495	4937	5531	6657	3194	9699	3714	13853	1042	4188	6687	154345
<i>of them of Ukrainian origin</i>	12356	9426	5064	5807	1875	2718	3527	1808	4401	1425	6502	477	803	719	56908
including breeding varieties	21946	992	2299	8134	1690	2462	2670	478	5944	1864	8865	747	1708	1996	61795
<i>of them of Ukrainian origin</i>	5260	176	861	1685	371	737	1070	283	2246	432	3015	258	430	458	17282
landraces	1290	1245	6917	6620	1185	1587	1019	527	1801	144	1113	51	1375	63	24937
<i>of them of Ukrainian origin</i>	382	497	2483	2438	288	1273	598	309	1152	131	699	30	114	26	10420
breeding lines	20570	9459	2122	6015	958	820	755	114	1504	473	94	32		7	42923
<i>of them of Ukrainian origin</i>	6051	7049	1552	1426	793	417	610	108	905	403	94	29		7	19444
genetic lines	682	2284	52	66	333	59	57	2	18	385		3			3941
<i>of them of Ukrainian origin</i>	410	2148	7	2	192	26	57	2	13	365					3222
synthetic populations	42	304	56	3	62	189	83	4	62						805
<i>of them of Ukrainian origin</i>	29	67	56	3	62	171	47	4	16						455
hybrids*	–	–	16	–	11	15	33	153	1	77	2831	192	564	300	4193
<i>of them of Ukrainian origin</i>	–	–	16	–	6	15	18	152	–	77	2382	168	19	42	2895
clones*	–	–	–	–	–	3	79	456	–	17	295	2	152	1685	2689
<i>of them of Ukrainian origin</i>	–	–	–	–	–	–	33	165	–	17	154	1	130	1685	2185
wild relatives	445	3	124	1287	324	138	1937	1377	44	754	98	1	28	2506	9066
<i>of them of Ukrainian origin</i>	139		106	168	157	41	1053	737	11		13	1		22	2448
accession status is not determined	1455	18	32	369	374	258	24	83	325		557	14	361	130	4000
<i>of them of Ukrainian origin</i>	91	4	21	45	20	39		69	75		47		11	5	427
* only for vegetatively propagated crops															

Annex 3. PGR stored ex situ in Ukraine: priority collections for urgent duplication.

Methods:

1. Passport data of all accessions available in the PGRSU institutes, downloaded from Genesys (source: Eurisco). Since WIEWS recorded a similar quantity of accessions, it was assumed that these were the same accessions, and only the Genesys data set was used for this analysis.
2. Keyword search was conducted on Global Crop Conservation Strategies.
3. The accessions duplicated in Svalbard were downloaded from the Svalbard Global Seed Vault web portal.

Priority collections:

The table in Appendix 6 shows the institutions of PGRSU by the quantity of accessions. Important crops in the collections are based on the information contained in the harvest strategy and by the quantity of accessions per genus in each genebank:

- wheat collection in UKR001,
- barley collection in UKR001,
- pea collection in UKR001 (included in the 13 largest collections),
- chickpea collection in UKR001,
- temperate forage germplasm collection in UKR008 and UKR004,
- millet collection in UKR001, UKR008,
- tomatoes and peppers collection in UKR021,
- potato collection in UKR026, UKR008,
- apple trees collection in UKR034.

Annex 4. PGR collected in Ukraine and stored outside its borders.

Methods:

Passport data of all accessions collected in Ukraine were downloaded from Genesys and WIEWS by filtering datasets by country of origin in MCPD. The data from the two sources were then combined into a single data set.

Quantity of accessions from Ukraine	INSTCODE Holding Institute	Full name	Top-5 genera {Genus: # accession}
12161	RUS001	N. I. Vavilov Research Institute of Plant Industry	{ <i>'Triticum'</i> : 2236, <i>'Panicum'</i> : 1905, <i>'Zea'</i> : 1306, <i>'Hordeum'</i> : 724, <i>'Fagopyrum'</i> : 709}
2253	POL003	Plant Breeding and Acclimatization Institute	{ <i>'Phaseolus'</i> : 345, <i>'Beta'</i> : 131, <i>'Cucumis'</i> : 120, <i>'Zea'</i> : 109, <i>'Brassica'</i> : 108}
1349	LBN002	International Centre for Agricultural Research in Dry Areas	{ <i>'Hordeum'</i> : 454, <i>'Triticum'</i> : 303, <i>'Lathyrus'</i> : 193, <i>'Cicer'</i> : 156, <i>'Vicia'</i> : 88}
1053	BLR011	Republican Unitary Enterprise 'Scientific Practical Centre of the National Academy of Sciences of Belarus for Arable Farming'	{ <i>'Triticum'</i> : 336, <i>'Triticosecale'</i> : 110, <i>'Hordeum'</i> : 86, <i>'Panicum'</i> : 63, <i>'Pisum'</i> : 47}
834	AUS165	Australian Grains Genebank, Department of Economic Development Jobs Transport and Resources	{ <i>'Pisum'</i> : 203, <i>'Hordeum'</i> : 192, <i>'Triticum'</i> : 148, <i>'Vicia'</i> : 85, <i>'Cicer'</i> : 74}
813	USA029	National Small Grains Germplasm Research Facility, USDA-ARS	{ <i>'Triticum'</i> : 367, <i>'Hordeum'</i> : 242, <i>'Avena'</i> : 111, <i>'Xtriticosecale'</i> : 39, <i>'Aegilops'</i> : 31}
695	USA022	Western Regional Plant Introduction Station, USDA-ARS, Washington State University	{ <i>'Medicago'</i> : 196, <i>'Pisum'</i> : 128, <i>'Phaseolus'</i> : 65, <i>'Trifolium'</i> : 28, <i>'Bromus'</i> : 26}
616	CZE122	Genebank	{ <i>'Triticum'</i> : 504, <i>'Hordeum'</i> : 48, <i>'Phaseolus'</i> : 12, <i>'Triticosecale'</i> : 12, <i>'Fagopyrum'</i> : 8}
558	CAN004	Plant Gene Resources of Canada, Saskatoon Research and Development Centre	{ <i>'Hordeum'</i> : 397, <i>'Avena'</i> : 99, <i>'Linum'</i> : 9, <i>'Elytrigia'</i> : 8, <i>'Secale'</i> : 8}
531	UZB006	Uzbek Research Institute of Plant Industry	{ <i>'Cerasus'</i> : 83, <i>'Triticum'</i> : 75, <i>'Zea'</i> : 70, <i>'Prunus'</i> : 56, <i>'Persica'</i> : 42}

408	DEU146	Genebank, Leibniz Institute of Plant Genetics and Crop Plant Research	{'Hordeum': 107, 'Phaseolus': 35, 'Triticum': 32, 'Nicotiana': 31, 'Vicia': 30}
381	BLR017	Republican Unitary Enterprise 'Institute for Fruit Growing'	{'Prunus': 101, 'Vitis': 84, 'Malus': 77, 'Pyrus': 56, 'Ribes': 28}
346	POL103	Arboretum iZak~ÇadFizjografii w Bolestraszcach	{'Malus': 285, 'Pyrus': 61, 'Ziziphus': 0, 'Diploaxis': 0, 'Datura': 0}
275	BGR001	Institute for Plant Genetic Resources 'K. Malkov'	{'Triticum': 171, 'Cicer': 32, 'Oryza': 20, 'Linum': 10, 'Vicia': 7}
246	SVK001	Plant Production Research CenterPiestany	{'Triticum': 69, 'Phaseolus': 60, 'Armeniaca': 20, 'Secale': 16, 'Xtriticosecale': 15}
200	MEX002	Centro Internacional de Mejoramiento de Maiz y Trigo	{'Triticum': 198, 'Hordeum': 1, 'Xtriticosecale': 1, 'Diploaxis': 0, 'Dasypyrum': 0}
196	MAR088	Centre Regional de la Recherche Agronomique de Settat	{'Hordeum': 163, 'Triticum': 33, 'Dactylis': 0, 'Dasypyrum': 0, 'Datura': 0}
185	MDA011	Institute of Genetics, Physiology and Plant Protection	{'Triticum': 97, 'Glycine': 48, 'Solanum': 34, 'Triticosecale': 4, 'Pennisetum': 1}
164	BLR016	Republican Unitary Enterprise 'Research and Practical Center of the National Academy of Sciences of Belarus for Potato, Fruit and Vegetable Growing'	{'Solanum': 164, 'Dipsacus': 0, 'Datura': 0, 'Daucus': 0, 'Delphinium': 0}
146	USA020	North Central Regional Plant Introduction Station, USDA-ARS, NCRPIS	{'Zea': 21, 'Helianthus': 16, 'Melilotus': 15, 'Cucumis': 14, 'Daucus': 13}
141	POL101	Research Institute of Horticulture	{'Allium': 70, 'Prunus': 56, 'Pyrus': 9, 'Ribes': 2, 'Lycopersicon': 2}
132	MNG030	Plant Science Agricultural Research and Training Institute	{'Hordeum': 50, 'Panicum': 18, 'Secale': 17, 'Lycopersicon': 8, 'Triticum': 8}
102	FRA040	GénétiqueDiversité et Ecophysiologie des Céréales, Plant Biology and Breeding, INRAE Clermont-Ferrand	{'Triticum': 102, 'Ziziphus': 0, 'Dactylis': 0, 'Dasypyrum': 0, 'Datura': 0}
91	AZE015	Genetic Resources Institute	{'Gossypium': 36, 'Ficus': 17, 'Medicago': 9, 'Triticum': 7, 'Lycopersicon': 6}

89	ITA436	Istituto di Bioscienze e Biorisorse, Consiglio Nazionale delle Ricerche	{'Triticum': 88, 'Pisum': 1, 'Dactylis': 0, 'Dasypyrum': 0, 'Datura': 0}
80	UZB036	Uzbek Research Institute of Cotton Breeding and Seed Production	{'Gossypium': 80, 'Ziziphus': 0, 'Dactylis': 0, 'Dasypyrum': 0, 'Datura': 0}
79	KGZ040	Plant Genetic Bank of the Kyrgyz Republic	{'Triticum': 28, 'Hordeum': 18, 'Pyrus': 8, 'Triticosecale': 7, 'Avena': 6}
76	USA016	Plant Genetic Resources Conservation Unit, Southern Regional Plant Introduction Station, University of Georgia, USDA-ARS	{'Trifolium': 59, 'Abutilon': 4, 'Citrullus': 4, 'Bothriochloa': 3, 'Cynodon': 3}
75	CZE050	Faculty of Horticulture, Mendel Agricultural and Forestry University	{'Prunus': 49, 'Cornus': 8, 'Cydonia': 5, 'Glycyrrhiza': 3, 'Vitis': 3}
70	NLD037	Centre for Genetic Resources, the Netherlands	{'Brassica': 23, 'Triticum': 15, 'Cucumis': 10, 'Solanum': 9, 'Allium': 4}
70	USA028	National Germplasm Repository USDA, ARS, University of California	{'Juglans': 47, 'Prunus': 19, 'Vitis': 3, 'Pistacia': 1, 'Datura': 0}
69	USA033	Soybean Germplasm Collection, USDA-ARS	{'Glycine': 69, 'Ziziphus': 0, 'Dactylis': 0, 'Dasypyrum': 0, 'Datura': 0}
69	ARE003	International Center for Biosaline Agriculture	{'Hordeum': 33, 'Triticosecale': 21, 'Lupinus': 6, 'Melilotus': 4, 'Medicago': 4}
62	USA151	National Arboretum-Germplasm Unit, USDA/ARS	{'Acer': 19, 'Crataegus': 5, 'Sorbus': 5, 'Tilia': 4, 'Carpinus': 4}
61	UZB001	Institute of Genetics and Plant Experimental Biology	{'Gossypium': 61, 'Ziziphus': 0, 'Dactylis': 0, 'Dasypyrum': 0, 'Datura': 0}
61	GBR140	Nottingham Arabidopsis Stock Centre	{'Arabidopsis': 61, 'Ziziphus': 0, 'Dipsacus': 0, 'Daucus': 0, 'Delphinium': 0}
53	ROM002	National Agricultural Research and Development Institute — Fundulea	{'Medicago': 22, 'Triticale': 19, 'Linum': 6, 'Helianthus': 4, 'Panicum': 1}
51	USA026	National Clonal Germplasm Repository USDA, ARS	{'Corylus': 13, 'Pyrus': 12, 'Sambucus': 6, 'Chaenomeles': 5, 'Cydonia': 4}

48	HUN003	Institute for Agrobotany	{'Triticum': 29, 'Panicum': 10, 'Capsicum': 2, 'Fagopyrum': 2, 'Aegilops': 2}
46	MDA004	Laboratory of Grapevine Genetic Resources and Breeding	{'Vitis': 46, 'Ziziphus': 0, 'Diplotaxis': 0, 'Dasypyrum': 0, 'Datura': 0}
46	ROM017	Research and Development Institute for Viticulture and Wine Making Valea Calugareasca	{'Vitis': 46, 'Ziziphus': 0, 'Diplotaxis': 0, 'Dasypyrum': 0, 'Datura': 0}
45	BLR015	Republican Unitary Enterprise 'The Institute of Flax'	{'Linum': 45, 'Ziziphus': 0, 'Diplotaxis': 0, 'Datura': 0, 'Daucus': 0}
44	DEU098	Federal Research Centre for Cultivated Plants — Institute for Grapevine Breeding Geilweilerhof	{'Vitis': 44, 'Ziziphus': 0, 'Diplotaxis': 0, 'Dasypyrum': 0, 'Datura': 0}
38	AUS167	Australian Pastures Genebank	{'Trifolium': 11, 'Medicago': 8, 'Melilotus': 4, 'Dactylis': 3, 'Festuca': 2}
36	EST019	Estonian Crop Research Institute	{'Solanum': 11, 'Avena': 10, 'Hordeum': 9, 'Pisum': 3, 'Triticum': 2}
36	ROM007	Suceava Genebank	{'Triticum': 16, 'Triticosecale': 6, 'Hordeum': 4, 'Lupinus': 3, 'Triticale': 3}
34	BLR012	Department of Genetics, Faculty of Biology, Belarussian State University	{'Lupinus': 33, 'Triticosecale': 1, 'Ziziphus': 0, 'Diplotaxis': 0, 'Datura': 0}
33	AZE009	Horticulture and Subtropical Crops Research Institute	{'Amygdalus': 19, 'Ficus': 3, 'Diospyros': 3, 'Malus': 2, 'Armeniaca': 2}
33	ESP004	Centro Nacional de RecursosFitogenéticos	{'Vicia': 8, 'Hordeum': 6, 'Phaseolus': 6, 'Avena': 5, 'Cicer': 3}
33	COL003	Centro Internacional de Agricultura Tropical	{'Phaseolus': 33, 'Ziziphus': 0, 'Diplotaxis': 0, 'Dasypyrum': 0, 'Datura': 0}
33	ROM028	Agricultural Research and Development Station Suceava	{'Triticum': 32, 'Hordeum': 1, 'Dactylis': 0, 'Dasypyrum': 0, 'Datura': 0}
32	BLR026	The Polessye Institute of Plant Growing	{'Sorghum': 10, 'Zea': 9, 'Triticum': 6, 'Helianthus': 3, 'Glycine': 2}
32	MDA010	Laboratory for Plant Genetic	{'Pisum': 11, 'Capsicum': 10, 'Cicer': 3}

		Resources	9, 'Zea': 1, 'Solanum': 1}
31	DEU159	External Branch North of the Department Genebank, IPK, Potato Collection in Gross-Luesewitz	{'Solanum': 31, 'Dipsacus': 0, 'Datura': 0, 'Daucus': 0, 'Delphinium': 0}
27	GBR004	Millennium Seed Bank Project, Seed Conservation Department, Royal Botanic Gardens, Kew, Wakehurst Place	{'Seseli': 2, 'Conium': 1, 'Crithmum': 1, 'Daucus': 1, 'Falcaria': 1}
23	ITA394	CREA-Centro di Ricerca Zootecnica e Acquacoltura, sede di Lodi	{'Pisum': 20, 'Triticum': 3, 'Dactylis': 0, 'Dasypyrum': 0, 'Datura': 0}
22	DEU271	External Branch North of the Department Genebank, IPK, Oil Plants and Fodder Crops in Malchow	{'Medicago': 6, 'Brassica': 6, 'Festuca': 5, 'Phleum': 2, 'Sinapis': 1}
21	AUT001	AGES Linz — Austrian Agency for Health and Food Safety / Seed Collection	{'Phaseolus': 12, 'Aegilops': 3, 'Taeniatherum': 2, 'Avena': 2, 'Secale': 1}
20	ROM008	Agricultural Research and Development Station Simnic-Dolj	{'Triticum': 20, 'Ziziphus': 0, 'Dactylis': 0, 'Dasypyrum': 0, 'Datura': 0}
19	IND002	International Crop Research Institute for the Semi-Arid Tropics	{'Cicer': 15, 'Panicum': 4, 'Ziziphus': 0, 'Diploaxis': 0, 'Datura': 0}
17	ITA383	CREA-Centro di Ricerca Cerealicoltura e Colture Industriali — sede di Vercelli	{'Triticum': 17, 'Ziziphus': 0, 'Dactylis': 0, 'Dasypyrum': 0, 'Datura': 0}
17	POL001	Botanical Garden of the Polish Academy of Sciences	{'Malus': 17, 'Ziziphus': 0, 'Dipsacus': 0, 'Datura': 0, 'Daucus': 0}
17	POL028	Department of Special Crops (Hop), Institute of Soil Science and Plant Cultivation	{'Humulus': 17, 'Dipsacus': 0, 'Datura': 0, 'Daucus': 0, 'Delphinium': 0}
16	MDA005	Laboratory of Gene pool, Breeding and Genetics of Fruit Trees	{'Prunus': 13, 'Malus': 2, 'Pyrus': 1, 'Ziziphus': 0, 'Diospyros': 0}
16	PRT102	Banco de Germoplasma — Universidade da Madeira	{'Raphanus': 10, 'Cucurbita': 4, 'Phaseolus': 2, 'Ziziphus': 0, 'Diospyros': 0}
14	AZE007	Viticulture and Wine-making Research Institute	{'Vitis': 14, 'Ziziphus': 0, 'Diploaxis': 0, 'Dasypyrum': 0, 'Datura': 0}
14	ITA382	CREA-Centro di Ricerca Genomica e Bioinformatica, sede di	{'Avena': 14, 'Ziziphus': 0, 'Dolichos': 0, 'Daucus': 0,

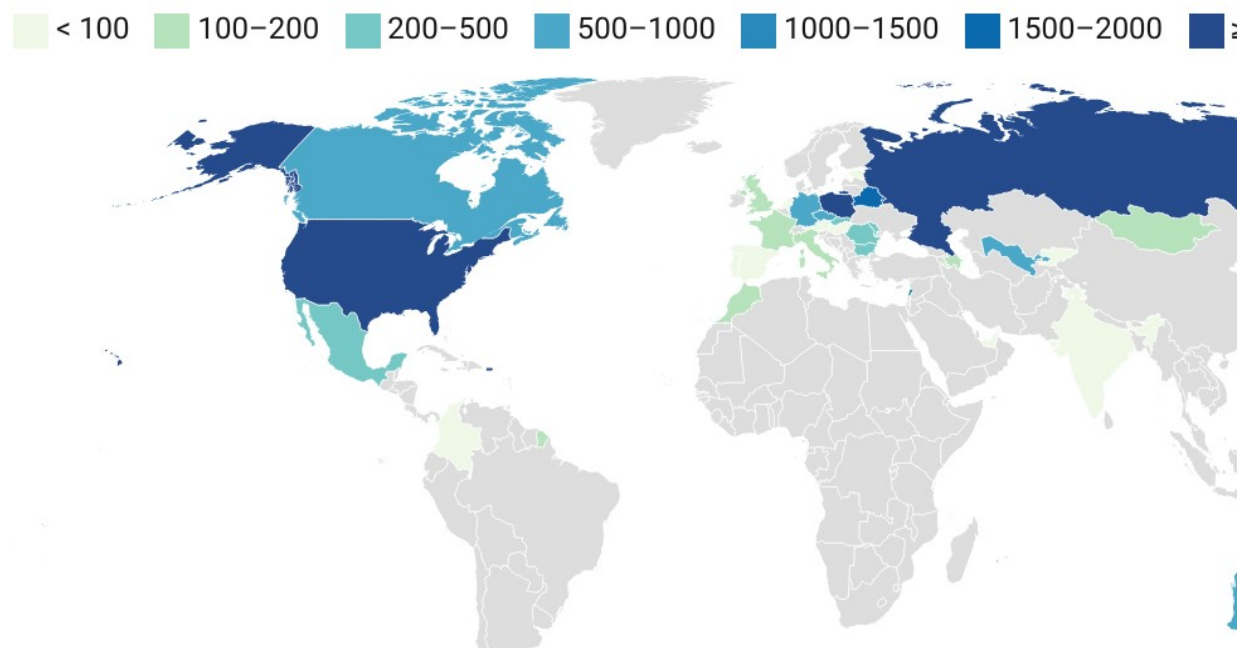
		Fiorenzuola d'Arda	' <i>Delphinium</i> ': 0}
14	CZE112	Hop Research Institute, Co. Ltd.	{' <i>Humulus</i> ': 14, ' <i>Dipsacus</i> ': 0, ' <i>Datura</i> ': 0, ' <i>Daucus</i> ': 0, ' <i>Delphinium</i> ': 0}
13	BLR019	State research institution 'The Central Botanical Gardens of the National Academy of Sciences of Belarus'	{' <i>Cornus</i> ': 11, ' <i>Viburnum</i> ': 1, ' <i>Nigella</i> ': 1, ' <i>Dipsacus</i> ': 0, ' <i>Datura</i> ': 0}
12	GBR247	Germplasm Resources Unit, John Innes Centre, Norwich Research Park	{' <i>Triticum</i> ': 12, ' <i>Ziziphus</i> ': 0, ' <i>Dactylis</i> ': 0, ' <i>Dasypyrum</i> ': 0, ' <i>Datura</i> ': 0}
12	BLR020	State research institution 'Forest Institute of the National Academy of Sciences of Belarus'	{' <i>Cornus</i> ': 11, ' <i>Viburnum</i> ': 1, ' <i>Dipsacus</i> ': 0, ' <i>Datura</i> ': 0, ' <i>Daucus</i> ': 0}
11	UZB031	Uzbek Research Institute of Horticulture, Vine Growing and Wine Making named R.R.Shreder	{' <i>Vitis</i> ': 5, ' <i>Prunus</i> ': 5, ' <i>Malus</i> ': 1, ' <i>Desmodium</i> ': 0, ' <i>Dioscorea</i> ': 0}
11	ITA363	Dipartimento di Biologia Applicata, Università degli Studi Perugia	{' <i>Phaseolus</i> ': 3, ' <i>Triticum</i> ': 2, ' <i>Trifolium</i> ': 1, ' <i>Setaria</i> ': 1, ' <i>Papaver</i> ': 1}
11	USA167	Plant Genetic Resources Unit, Cornell University, New York State Agricultural Experiment Station, USDA, ARS	{' <i>Malus</i> ': 10, ' <i>Vitis</i> ': 1}

The quantity of accessions collected in Ukraine, which are stored in genebanks of the world countries (only countries with more than 10 accessions from Ukraine are indicated).

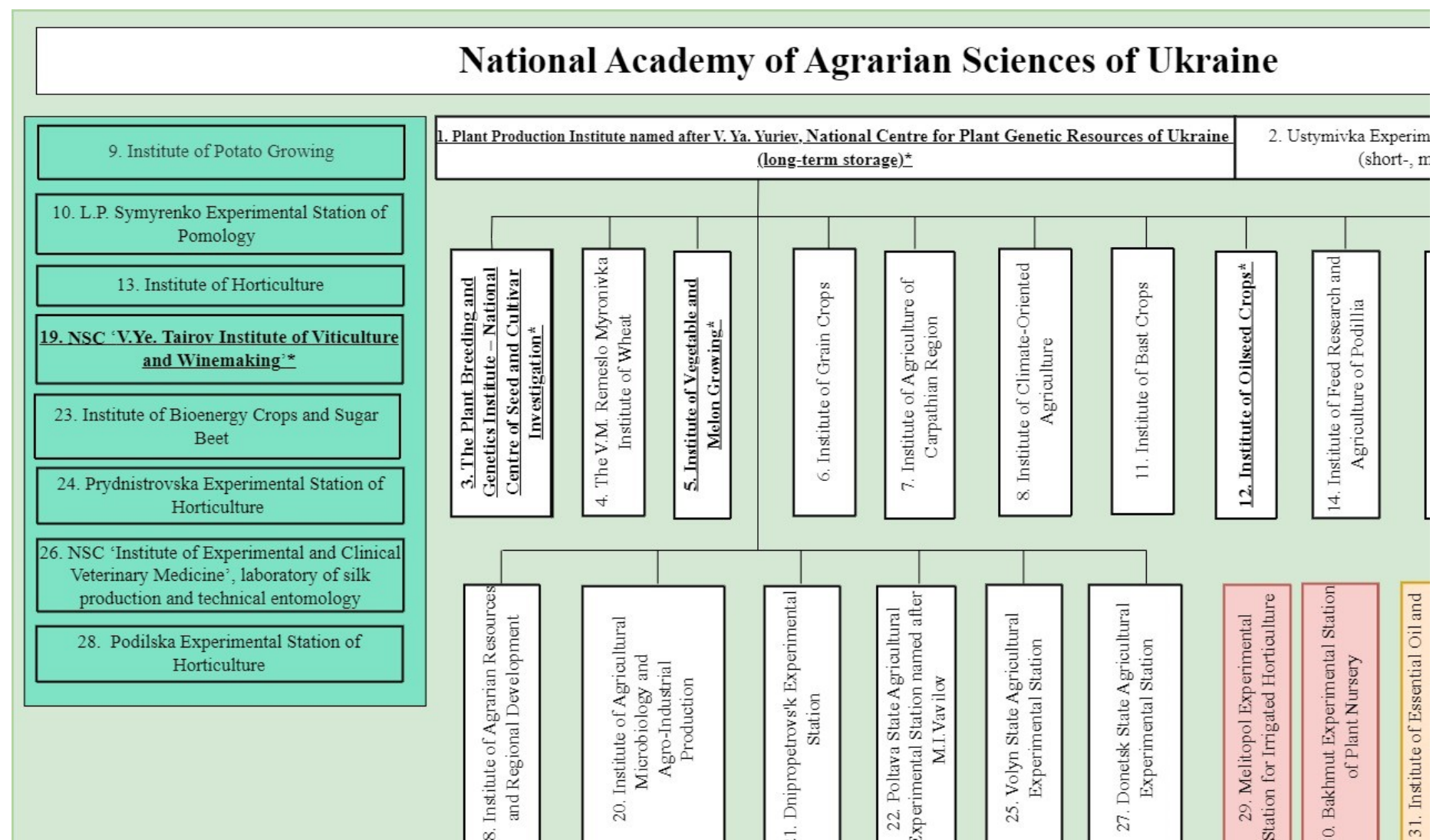
ISO country code	Country of the genebank location of	Accessions collected in Ukraine
UKR	Ukraine	56908
RUS	Russia	12161
POL	Poland	2775
USA	USA	2016
BLR	Belarus	1738
LBN	Lebanon	1349
AUS	Australia	872
CZE	Czech Republic	705

UZB	Uzbekistan	683
CAN	Canada	558
DEU	Germany	528
MDA	Moldova	279
BGR	Bulgaria	275
SVK	Slovakia	255
ROM	Romania	217
MEX	Mexico	200
MAR	Morocco	196
ITA	Italy	178
AZE	Azerbaijan	141
MNG	Mongolia	132
FRA	France	116
GBR	UK	114
KGZ	Kyrgyzstan	79
NLD	Holland	70
ARE	United Arab Emirates	69
ESP	Spain	56
HUN	Hungary	48
EST	Estonia	36
COL	Colombia	33
AUT	Austria	29
IND	India	19
PRT	Portugal	17

Number of accessions collected in Ukraine



Annex 5. Scheme of the plant genetic resources system of Ukraine



Annex 6. List of PGRU institutions - research institutes of the National Academy of Agrarian Sciences of Ukraine and partner institutions that take care of the PGRU collection

No.	Title	Code	Location	Contacts (e-mail address)	Collections of PGRU	Number of accessions as of 01.01.2024.			Institutions of the PGRSU, to which there is no access due to military operations (annexed in Crimea and occupied)
						with the numbers of the national catalogue are transferred to the national repository*	are in the institution		
							total	**according to the type of storage	
SCIENTIFIC RESEARCH INSTITUTES AND RESEARCH STATIONS OF THE NAAS									
1	Plant Production Institute named after V. Ya. Yuriev	UKR001	Kharkiv city	yuriev1908@gmail.com ncpgru@gmail.com	wheat, rye, triticale and related species, corn, barley, peas, chickpeas, soybeans	41,194	76,200	STS – 6,300; MTS – 15,100; LTS – 54,800	
2	Ustymivka Experimental Station of Plant Production of the PPI	UKR008	Poltava region, Ustymivka village	udsr@ukr.net	cereals (wheat and its rare and wild related species and forms, triticale amphidiploids, barley, rye, oats), legumes (beans, china, vetch, lupine, cowpea), corn, millet, buckwheat,	32,762	54,665	AC – 14,800; MTS – 19,200; STS – 12,200; FC – 8,465	

					industrial crops (poppy, mustard, hemp, rapeseed, etc.), fodder (56 crops), vegetables (59 crops), potatoes, tree crops (park formation)				
3	The Plant Breeding and Genetics Institute – National Centre of Seed and Cultivar Investigation	UKR002	Odesa city	sgi-uaan@ukr.net, gen.resursi@ukr.net	wheat, triticale, barley, egilops, spelt	10,604	10,604	STS – 10,604	
4	The V.M. Remeslo Myronivka Institute of Wheat	UKR003	Kyiv region, Tsentralne village	mwheats@ukr.net	wheat, barley	5,987	6,031	STS – 6,031	
5	Institute of Vegetable and Melon Growing	UKR021	Kharkiv region, Selektsiyne village	ovoch.iob@gmail.com	Vegetable and melon crops	5,732	1,400	AC – 250; MTS – 1,150	
6	Institute of Grain Crops	UKR005	Dnipro city	inst_zerna@ukr.net	maize, sorghum	5,157			
7	Institute of Agriculture of	UKR007	Lviv region, Obroshyne	inagrokarpat@gmail.com	legumes, fodder crops	3,840	54,144	STS – 3,144; LTS – 51,000	

	Carpathian Region	UKR084	village					(duplicates)	
8	Institute of Climate-Oriented Agriculture*	UKR006, UKR011, UKR048	Odesa region, Khlibodarsk e village	icsanaas@ukr.net	soybeans, figs, cotton, fodder, melon, aromatic crops	3,261			
9	Institute of Potato Growing	UKR026	Kyiv region, Nemishaeve village	iknaan.ukr@gmail. com	potato	3,044	3,044	FC – 3,044	
10	L.P. Symyrenko Experimental Station of Pomology	UKR034	Cherkasy region, Mliiv village	mliivis@ukr.net	fruit, berry, nut and ornamental crops	2,474	2,474	FC – 2,474	
11	Institute of Bast Crops	UKR015	Sumy region, Glukhiv city	ibc1931@ukr.net	hemp, flax	1,963	183	AC – 183	
12	Institute of Oilseed Crops	UKR012	Zaporizhzhia region, Soniachne village	iocnaas@gmail.co m	sunflower, castor, mustard, sesame and other oil crops	1,411	1,868	AC – 1,868	

13	Institute of Horticulture	UKR028, UKR029	Kyiv city	sad-institut@ukr.net	fruit, berry, flower crops	549	610	FC – 610	
14	Institute of Feed Research and Agriculture of Podillia	UKR020	Vinnytsia city	fri@vn.ua	Forage crops	1,309	446	AC – 290; STS – 156	
15	The National Scientific Center “Institute of Agriculture NAAS”	UKR004	Kyiv region, Chabany village	iznaan@ukr.net	lupine	1,036	839	MTS – 839	
16	Experimental Station of Medicinal Plants	UKR019	Poltava region, Berezotocha village	ukrvilar@ukr.net	medicinal plants	1,039	1,039	AC – 965, STS – 74	
17	Precarpathian State Agricultural Experimental Station	UKR013, UKR075	Ivano-Frankivsk city	nstapv@i.ua kol-dos-st@ukr.net	Cruciferous and less common vegetable crops	1,460	1,392	STS – 1,020; MTS – 372	
18	Institute of Agrarian Resources and Regional Development	UKR027	Transcarpathian region, Velyka Bakhta	insbakta@ukr.net	Tobacco, maize, fruit crops	1,020	1,020	AC – 1,020	

			village						
19	NSC 'V.Ye. Tairov Institute of Viticulture and Winemaking'	UKR0 39	Odesa region, Tairove village	iviv_nnc@ukr.net	grape	831	848	FC – 848	
20	Institute of Agricultural Microbiology and Agro-Industrial Production	UKR0 99	Chernihiv city	isgmav@ukr.net	forage crops	712	811	AC – 153; STS – 658	
21	Dnipropetrovs'k Experimental Station	UKR0 25	Dnipropetro vsk region, Oleksandriv ka village	opytnoe@i.ua	melon, watermelon, pumpkin	769	769	AC – 769	
22	Poltava State Agricultural Experimental Station named after M.I. Vavilov	UKR0 93	Poltava city	ds.vavilova@ukr.net	alfalfa, smooth brome, vetch	549	482	AC – 444; STS – 38	
23	Institute of Bioenergy Crops and Sugar Beet	UKR0 14	Kyiv city	sugarbeet@ukr.net	beets, miscanthus, poplar, switchgrass, willow	493	493	AC – 426; FC – 67	
24	Prydnistrovska Experimental Station of	UKR0 33	Chernivtsi city	prydnistrovska@ukr.net	pear, walnut, apple, plum	371	371	FC – 371	

	Horticulture								
25	Volyn State Agricultural Experimental Station	UKR086	Volyn` region, Rokyni town	voldsgds@gmail.com	triticale	164	125	STS – 125	
26	NSC ‘Institute of Experimental and Clinical Veterinary Medicine’, laboratory of silk production and technical entomology	UKR143	Kharkiv city	g.babaeva52@gmail.com	mulberry	115	115	FC – 115	
27	Donetsk State Agricultural Experimental Station	UKR145	Donetsk region, Pokrovsk city	vuskyb@ukr.net	barley	71	78	AC – 78	
28	Podilska Experimental Station of Horticulture	UKR077	Vinnytsia region, Medvezhe Vushko village	sad-institut@ukr.net	fruit crops	420	420	FC – 420	
29	Melitopol Experimental Station for Irrigated	UKR032	Zaporizhzhya region, Melitopol city	sad-institut@ukr.net	fruit crops (apple, pear, cherry, apricot, cherry, peach)	838		occupied	occupied

	Horticulture								
30	Bakhmut Experimental Station of Plant Nursery	UKR030	Donetsk region, Opytne village	sad-institut@ukr.net	fruit, berry, forest crops	639		occupied	occupied
31	Institute of Essential Oil and Medicinal Plants	UKR018	AR of Crimea		essential oil and medicinal plants	1,584		annexed	annexed
32	Institute of Viticulture and Winemaking "Magarach"	UKR050	AR of Crimea		Grape	4,451		annexed	annexed
33	Crimean Pomological Station	UKR046	AR of Crimea		fruit and berry crops	2,862		annexed	annexed
34	Nikitsky Botanical Garden	UKR036	AR of Crimea		Ornamental and forest plants	10,223		annexed	annexed
PARTNER INSTITUTIONS OF THE NATIONAL PLANT GENE BANK OF UKRAINE									
1	Ukrainian Research Institute of Forestry and Agroforestry named after H.M. Vysotsky	UKR040	Kharkiv	uriffm@uriffm.org.ua	forest, ornamental plants	1793	1,793	FC – 1,793	
2	M. M. Gryshko	UKR037	Kyiv	nbg@nbg.kiev.ua	forage crops	1200			

	National Botanic Garden								
3	Podillia State University	UKR1 30	Khmelnysk yi region, Kamianets- Podilskyi city	rector@pdatu.edu.ua	buckwheat	975	981	AC – 981	
<p>* The number of samples as of 01.01.2024, which are in the institution, according to the type of storage: AC - active collection, FC - field collection, STS - short-term storage, MTS - medium-term storage, LTS - long-term storage.</p> <p>* The Institute of Irrigated Agriculture, the Institute of Rice and the Southern Experimental Station of Melon Growing, located in the occupied territories, were merged into the Institute of Climate-Oriented Agriculture and moved to the Odesa Region.</p>									

Annex 7. Map of the location of research institutes of the National Academy of Agrarian Sciences and partner institutions that manage the PGRU collection (numbers on the map correspond to the numbers of institutions in Annexes 5 and 6)



Annex 8. Areas of activity of PGRSU

Principal areas of activity of PGRSU:

1. Storing accessions.
2. Maintaining and managing accession databases.
3. Regenerating accessions during STS, MTS and LTS.
4. Expanding accession collections, including the involvement of valuable accessions of genetic diversity.
5. Using accessions, including exchange of information, accessions.
6. Studying and revealing the potential of valuable traits of accessions.
7. Participation in international cooperation programmes related to PGR.
8. Information and communication support

1. Storing accessions

GeneBank of Ukraine includes 154,300 accessions of generatively and vegetatively propagated plants. The most important in the GeneBank of Ukraine are collections of wheat, triticale, barley, corn, peas, millet, buckwheat, flax, potatoes, fodder crops, fruit crops of the temperate zone, etc., among which there are many accessions of Ukrainian origin.

Seeds of agricultural crops are stored at:

- long-term storage (LTS) in a freezer at a temperature of -18–20 °C in hermetically sealed foil bags;
- medium-term storage (MTS) in a refrigerating chamber at a temperature of + 2 – +4 °C in hermetically sealed foil bags;
- short-term storage (STS) in hermetically sealed glass containers, in paper and fabric bags at ambient temperature and relative humidity.

Samples of the gene pool of plants propagated vegetatively are stored in field collections (FC) (plantations, orchards, vineyards, potato plantations, etc.).

The total amount of crop seeds stored in the PGRS system is as follows:

- over 40 thousand samples in short-term storage, of which 12 000 are in the UESPP, 10 600 in the Plant Breeding and Genetics Institute, 6.3 thousand in the NCPGRU of the PPI, and 6 000 in the V.M. Remeslo Myronivka Institute of Wheat
- in the medium term – 36 000 samples, of which 19 200 are in UESPP and 15 100 t in NCPGRU of the PPI;
- 54,800 in the long term, of which 51,000 were duplicated in the IACR.

The NCPGRU of the PPI, which performs the functions of the National Seed GeneBank of Ukraine, stores 76,200 plant accessions, namely:

- 6,300 accessions in short-term storage (STS),
- 15,100 accessions in medium-term storage (MTS),
- 54,800 in long-term storage (LTS).

The Ustymivka Experimental Station of Plant Production (UESPP) stores about 31,400 accessions in MTS, of which 23,300 are duplicate material of the national GeneBank (accessions

in MTS and LTS). 61% of accessions (19,200 out of 31,400) are stored under controlled conditions in a refrigerator.

After the start of the full-scale aggression by Russia on 24 February 2022, to save the national GeneBank with the support of FAO, 51,000 accessions in LTS were moved to the safer western region of Ukraine, 2,000 accessions on MTS were duplicated in the UESPP, in the Poltava region.

Other institutions of the PGRSU have only active collections and collections in STS. In total, about 23,000 accessions are stored in active collections.

In addition to seed collections, the PGRSU includes collections of crops kept alive in field conditions, namely fruit, berry, nut, grape, potato, vegetable, and plants that have forestry, decorative, and medicinal value. About 18,000 accessions are stored in field collections of various research institutes and research stations.

Samples of the gene pool of plants propagated vegetatively are stored in field collections (FC) (plantations, orchards, potato plantations, etc.).

The GeneBank of Ukraine stores 56,900 accessions of Ukrainian origin. About 13,000 specimens of Ukrainian origin are stored in national and international GeneBanks in 30 world countries. 2,780 accessions are stored in the Svalbard Global Seed Vault. This indicates that accessions of Ukrainian origin are largely unique and insufficiently duplicated.

2. Maintaining and managing accession database

Provision of prompt access of users to the genetic diversity of the National GeneBank and information about it for effective use and storage is based on informational support. For this purpose, in 1992, the Plant Gene Fund Information System (IS), which is constantly being improved, was developed and implemented in the NCPGRU. Universal descriptors based on FAO/IPGRI descriptors are used in the IS.

The Plant “Gene Pool” IS solves the following tasks:

- inventory of plant gene pool accessions;
- formation of the Central Passport Database;
- accounting and monitoring of the status of gene pool accessions in all institutions of the PGRSU;
- accumulation, processing and use of information about gene pool accessions;
- registration of collections and accessions of the gene pool in the NCPGRU;
- exchange of information on the plant gene pool between PGRSU institutions within Ukraine and with foreign GeneBanks, breeding and other institutions, its distribution, including through electronic publications;
- participation in the formation and maintain of the European catalogue of plant genetic resources EURISCO and the European central databases of crops GENESYS.

Plant Gene Fund IS consists of a complex of databases, reference subsystem and software. Passport databases are maintained in ACCESS format, storage databases — in FoxPro format and are also duplicated in ACCESS format. Installations of the passport database of institutions of the PGRU System are regularly transferred to the Central Database, where they are included after correction. All accessions included in the collection, regardless of the type of storage, have

a unique number of the National Catalogue as an identifier, it must be indicated when providing the material to users.

3. Regeneration of accessions

Seeds in LTS can be stored for tens of years, seeds in MTS can be stored for up to 20 years without critical loss of germination, and seeds in STS must be renewed to obtain a new crop every 4–8 years, depending on the crop.

The seed regeneration process is planned and managed by the NCPGRU of the PPI in consultation and in cooperation with 21 research institutes where seeds are produced (Appendix 5).

Each facility collects, threshes and cleans the seeds on site. It is then sent to the NCPGRU for drying, moisture and viability testing, packaging and storage. Drying takes place at a temperature not higher than 25 °C and relative humidity not higher than 20%. The viability test is performed on a control accession for each batch of seeds (one or two for 50 similar accessions). The seeds are packed in a foil bag. The bag with seeds in LTS is opened in an exceptional case when the necessary vital conditions are lost in the control accession of the batch. The bag with seeds in MTS is opened when the accession seed is not available in active collections (AC), there is a need, according to the data of the control accession, to restore germination, for propagation or distribution. After the sampling of seeds, the bag is sealed again. On average, the NCPGRU of the PPI and institutes regenerate and put into storage 1.2–2.0 thousand seed accessions in MTS or LTS annually.

4. Increase in collections of accessions

Increase in collections of accessions takes place due to putting into storage of new varieties or selection material created in Ukraine, through the exchange of seeds with other countries, holding expedition meetings.

In peacetime, on average, the GeneBank of Ukraine increases by 2.5–3.8 thousand accessions annually.

5. Use of accessions

In 5 years (2018–2022), PGRSU and NCPGRU of the PPI received about 265 requests for germplasm. On average, about 5,000 accessions are transferred per year. The vast majority (about 95%) were transferred to recipients in Ukraine, of which 78% were used for breeding and research. These were mainly users of the public sector in Ukraine, although the material also reached the private sector. The top 4 countries that received germplasm during the last 5 years are Estonia, Slovakia, Moldova and China.

Material for breeding, scientific research and involvement in educational programs is provided on the basis of the Agreement on the transfer of plant gene pool accessions.

In order to obtain information about the results of the use of the material provided by the NCPGRU of the PPI and other institutions of the PGRSU, forms of Acts and Certificates were developed, which indicate how the material was used and what results were obtained. Over the

past 5 years, institutions of the PGRSU have received 250 certificates and acts on the introduction and use of collection material from users.

6. Research.

The scientific activity of the NCPGRU is carried out in accordance with the research programme of the National Academy of Agrarian Sciences of Ukraine 17 'Formation and use of the plant genetic resources bank', which consists of 2 subprogrammes: 01 'Genetic resources of agricultural crops', which focuses on the study of genetic diversity of field crops and grapes, and 02 'Expansion and conservation of genetic diversity of fruit, berry, nut and ornamental crops (Pomology)'.

7. International cooperation

Ukraine is not a party to the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) and does not actively participate in the work of the CGRFA. It is not a member of the ECPGR, although it has provided data to EURISCO and then to GENESYS.

In 2009, Ukraine signed an agreement on participation in the European Genebank Integrated System AEGIS. The process of concluding agreements with the Institutions of the SPGR, identification of the most unique accessions to include in AEGIS was started. But these processes were stopped due to the termination of Ukraine's participation in the ECPGR as a full member.

The reasons for Ukraine's non-participation in the CGRFAR, ECPGR and other international organizations and programs are the lack of funds to pay membership fees, the lack of funds to pay the salaries to representatives from Ukraine, and gaps in legislation.

The NCPGRU participated in the development of a number of global strategies for the conservation of agricultural crops. Wheat improvement research programs are actively cooperating with CIMMYT and ICARDA.

In 2022, 2 employees took an international advanced training course at the Academy of Management and Administration in Opole (Poland) on 'Plant Genetic Resources as an Element of Environmental System Management in Agribusiness. Intellectual Property in the Field of Agricultural Science. Personnel management and Pedagogy in the Field of Agricultural Science'.

Representatives of the NCPGRU of the PPI, UESPP and the Institute of Agriculture of Carpathian Region took part in the Working Meeting, which was organized in Bonn in July 2023, by CropTrust with the financial support of FAO to provide international assistance in the development of the PGRSU. At the meeting, the Ukrainian party provided general information on collections of plant genetic resources in Ukraine and the situation with plant genetic resources after 24 February 2022.

After the working meeting, the Crop Trust prepared and submitted proposals for the development of the Strategy for the Development of the Plant Genetic Resources System of Ukraine for 2024–2028.

8. Information and communication support.

Every year, scientists and specialists of the PGRSU institutions inform the authorities, wide circles of specialists and the public about the importance of the PGR, directions and results of

work, problems and activities to solve them, etc. For this purpose, representatives of authorities and mass media are invited to the PGRSU institutions every year, based on these visits broadcasts take place on television, radio, and in social networks on the Internet. Collections and accessions of the gene pool are displayed at exhibitions. Excursions are conducted in collection fields and plantations, in laboratories.

At the same time, the main workload, which increased during the war years, as well as the reduction of funding, significantly reduced the capabilities of PGRSU scientists in information and communication support.

Annex 9. Resources of the PGRSU

Effective functioning of the PGRSU is ensured by:

1. HR.
2. Assets.
3. Funding.

1. HR

Five institutions have dedicated plant genetic resources laboratories with more than 50 employees. The other institutions have 33 laboratories that combine the maintenance of plant genetic resources collections with pre-breeding and crop breeding. They employ more than 100 people.

In order to train specialists in plant genetic resources, the NCPGRU of the PPI developed and approved a curriculum for higher educational institutions based on the course “Plant genetic resources”, which is taught in universities of Ukraine. At a higher level, training is conducted through postgraduate studies in this area.

During the functioning period of the PGRSU (30 years), using the collections of the National Plant Genebank and methodological developments, 88 graduate students and doctoral students were trained in the specialities “Plant Breeding”, “Plant Production”, “Genetics” and others. Appeals of the NCPGRU together with the NAAS to the Ministry of Education and Culture and other competent institutions about the advisability of introducing the speciality “Plant genetic resources”, taking into account the specifics of this scientific field, remained unanswered.

In 2023-2024, 11 people are completing postgraduate studies in the institutions of PGRSU in related scientific fields.

Annual advanced training courses “Formation, maintenance, effective use of collections of plant genetic resources” are held at the NCPGRU of the PPI for scientific and pedagogical workers.

In 2003, an internship of scientists of the PGRSU was carried out during a joint meeting with FAO and VTRSGK with the assistance of international donor organizations. In 2023, internship of specialists of PPI, UESPP, IACR in management of PGR information systems in Sweden, NordGen was conducted.

There is a need for more active scientific exchange with genetic banks of other countries, in particular the internship of employees in scientific institutions and educational institutions.

2. Assets

Facilities and resources of the PGRSU consists of:

Experimental base for field study and maintenance of gene pool accessions in a living state of the Plant Production Institute named after V. Ya. Yuriev of the NAAS:

- land area of 40.3 ha (land area is in good condition, but partially mined);
- fleet of agricultural machinery (tractors — 4 pcs., agricultural machines — 8 pcs., vehicles — 2 pcs., agricultural tools — 19 pcs.), machinery and equipment are mostly in working condition, but there is damage from shelling from by the RF, therefore there is need for repair and renewal;

- a complex of premises for storage, threshing and primary analysis of the harvest of gene pool accessions with a total area of 770 m² (the premises were damaged by rocket fire and require major and current repairs.).

In 2022, NordGen Genebank provided the Plant Production Institute named after V. Ya. Yuriev with two laboratory threshers purchased in Germany from Haldrup, as well as two diesel generators for a total amount of EUR 51,050.44, having paid for their delivery.

Experimental base for field study and maintenance of gene pool accessions in a living state of the Ustymivka Experimental Station for Plant Production:

- land area of 60.2 ha (land area is in good condition);
- tractor park — 6 pcs., agricultural machines — 12 pcs., vehicles — 4 pcs., agricultural tools — 23 pcs. (machinery and equipment is in working condition, but need renewal and replenishment);
- a complex of premises for storage, threshing, disassembly and primary analysis of the harvest of gene pool accessions with a total area of 990 m² (the premises require major and current repairs).

Introduction-quarantine nursery of the Plant Production Institute named after V. Ya. Yuriev of the NAAS:

- land area of 1.1 ha;
- three buildings with an area of 45 m²;
- thresher, equipment for quarantine objects laboratory control, cultivation and collection of gene pool accessions.

The soil requires fertility improvement by applying organic fertilizers, the premises require major repairs, machinery and equipment are in working condition, but need modernization and replenishment.

Introductory-quarantine nursery of the Ustymivka Experimental Station of Plant Production of the Plant Production Institute named after V. Ya. Yuriev of the NAAS:

- land area of 2.2 ha;
- three buildings with an area of 180 m²;
- equipment for quarantine objects laboratory control, cultivation and storage of gene pool accessions.

The land area is in satisfactory condition, the premises need major repairs, machinery and equipment are in working condition but need renewal.

National Depository of gene pool seeds at the Plant Production Institute named after V. Ya. Yuriev:

- 4 rooms with an area of 91 m²; 15 pieces of equipment, including dehumidifier MD 600 by MUNTERS (Sweden); refrigerating chamber by HUURRE (Finland); 2 freezers. The premises are in satisfactory condition, in need of repair; the equipment is in working condition, but needs to be modernized.
- storage room with unregulated temperature conditions — 2 rooms with an area of 80 m² — in need of repair.
- laboratory for seed viability assessment with equipment — thermostats, scales, hygrometer — that need to be modernized:

It is necessary to purchase one freezing chamber, two thermostats, a scale, a moisture meter, 20,000 foil bags for storing accession seeds.

Storage of duplicate collection accession seeds at the Ustymivka Experimental Station of Plant Production:

- a unit for storing seeds at an unregulated temperature regime with a total area of 90 m²;
- refrigerating chamber by HUURRE (Finland) equipped with stationary racks for 25,000 accessions and dehumidifier MD 600 by MUNTERS (Sweden);
- storage for the collection of potatoes and two-year-old vegetable crops with an area of 230 m².

There is an urgent need to purchase an equipped refrigerating chamber for 25–30 thousand accessions, a seed dryer with adjustable drying conditions (15°C/15% humidity) and a modern seed laboratory for monitoring the condition of seeds before planting and during storage. The existing room of the seed storage unit with an unregulated temperature regime needs major repairs, the rest is in satisfactory condition, the equipment for drying and storing seed material is in working condition, but needs modernization. It is necessary to purchase 1 refrigerating chamber, hygrometer, and scales.

Laboratory complex for determining the genetic potential of winter and frost resistance of winter crops:

- two KNT freezing chambers;
- laboratory equipment (requires modernization);
- laboratory, vegetation premises and sites with an area of 490 m² (premises need repair).

Laboratory-field complex of immunological assessment of plant gene pool accessions:

- a field of infection background with an area of 14 ha;
- boxes for the cultivation of pathogens and assessment of the resistance of accessions; laboratory equipment (requires modernization);
- premises with an area of 190 m² (the premises at the experimental base need to be restored after being destroyed by shelling of the RF).

Laboratory of grain quality assessment and biochemical identification of gene pool accessions:

- a set of equipment for bakery assessment, electrophoretic analysis of reserve proteins; liquid chromatograph, infrared spectrometer, NMR analyser, etc. (need repair and modernization and the required reagents);
- premises with an area of 525 m².

Laboratory of biotechnology for maintaining plant genetic diversity:

- three vegetation chambers, boxes for cultivating tissues and plants;
- equipment for cytogenetic studies, identification of accessions by isozyme and DNA markers, etc.;
- premises with an area of 120 m².

The equipment needs modernization, the premises need ongoing repair. It is necessary to provide reagents for analyses and *in vitro* cultivation.

Information base of the National GeneBank:

- 12 modern computers with licensed software connected to a local network with a permanent connection to the Internet using a fibre optic cable and communication devices. Software and means of Internet communications work properly. Office machinery and equipment are in working condition.

Information base:

- 1) library of the Plant Production Institute named after V. Ya. Yuriev of the NAAS:
 - premises with an area of 182 m².
 - book collection amounting to 61,500 volumes.
- 2) library of the Ustymivka Experimental Station:
 - premises with equipment with an area of 20 m²;
 - book collection amounting to 7,000 volumes.
- 3) publishing system:
 - a computer with peripheral equipment;
 - laser printer, scanner, copier.

Machinery and equipment are in working condition, but need modernization and replenishment. It is necessary to purchase licensed software, to provide new domestic and foreign editions.

Experimental base of the Institute of Agriculture of Carpathian region:

More than 300 ha of arable land are used for scientific studies. Studies at the institute are conducted at eight stationary field experiments (area — 13.35 ha) and 67 field experiments. In addition, 6 field experiments on a total area of 2 ha have been established to conduct studies in the field of conservation of plant genetic resources (legumes, beans, perennial grasses).

The institute is equipped with computer and office equipment.

The network of the Institute includes 4 research stations — Bukovyna, Precarpathian, Volyn and Ternopil, which are located in different soil and climate zones.

Experimental base of the Institute of Vegetable and Melon Growing:

For scientific research in the areas of genetic resources of vegetable and melon crops, 15 hectares of arable land in good condition and a greenhouse complex with film greenhouses with emergency heating with an area of up to 1000 m² are used. In addition, field experiments on vegetatively propagated vegetable plants (garlic, shallots, sweet potatoes) are annually carried out for research in the area of plant genetic resources conservation.

The Institute has a complex of premises for processing, threshing and primary analysis of harvested accessions of vegetable and melon gene pools with a total area of 500 m², a cold storage room to ensure guaranteed preservation of the seed stock of medium-term storage collections, and a fleet of agricultural machinery. The institution also has a laboratory for agrochemical research and to assess the product quality biochemical parameters of gene pool accessions; a laboratory for genetics, genetic resources and biotechnology for accelerated reproduction of gene pool accessions; a laboratory complex for assessing varietal and sowing qualities of gene pool accessions; laboratory equipment for immunological assessment of vegetable gene pool accessions.

The Institute is provided with computer and office equipment.

The network of the Institute includes 3 research stations - Dnipropetrovsk, Donetsk (occupied), and “Mayak”, which are located in different soil and climatic zones.

Experimental base of the Institute of Potato Growing.

Laboratory premises of genetic resources with an area of 50 m² (premises need repair); laboratory equipment (needs modernisation); laboratory of biotechnology for maintaining plant genetic diversity: boxes for tissue and plant cultivation; climate-controlled room; laboratory for identification of accessions by DNA markers; premises with an area of 56 m².

Information base: 10 modern computers with permanent connection to the Internet via fibre optic cable and communication devices. The software and Internet communication tools are working properly. Machinery and equipment are in working order, but need to be upgraded and replenished. Licensed software needs to be purchased.

Experimental base of the L.P. Symyrenko Experimental Station of Pomology of the IS NAAS.

The institution has office machinery and equipment in working order, eight modern computers are connected to a local network with a permanent connection to the Internet.

Scientific Library of the L.P. Symyrenko Research Station of Pomology of the NAAS - a collection of 13.5 thousand volumes in a 40 m² room + 10 m² archive room.

The L.P. Symyrenko Experimental Station of Pomology of the NAAS maintains a genetic resources collection of 16 crops with a total of 2474 accessions in a viable condition.

The storage and maintenance of the gene pool accessions of fruit and berry crops in a viable condition has a number of problems associated with the lack of funds to finance the replanting of accessions, maintenance of their vital functions, care of collection plantations, and their protection.

It is necessary to introduce reliable and low-cost methods of long-term storage of the accessions genetic diversity including cryopreservation, *in vitro* maintenance.

Experimental base of the V.Ye. Tairov Institute of Viticulture and Winemaking.

For genetic research, a 23-hectare land plot is used, which includes 4 hectares of collection plantations, clone testing areas, areas of promising introduced and proprietary varieties and forms, a vaccination room (in need of repair), a planting material school (1.5 hectares), and a storage facility for grafting, rootstock and planting material (in need of repair).

The fleet of agricultural machinery is minimal, has been in operation for more than 20 years, and needs to be updated. It is desirable to irrigate some of the plantations, as weather and climate changes lead to the inevitable loss of drought-resistant varieties in the collection.

The institution has a laboratory of grape genetic resources, a sector of ampelography and variety research; a sector of clonal selection and biochemistry of grapes; a chemical and analytical laboratory of winemaking to assess the quality characteristics of fresh grapes and wine.

The NSC ‘V.Ye. Tairov Institute of Viticulture and Winemaking’ has 5 modern computers with licensed software, with a permanent connection to the Internet via fibre-optic cable and communication devices. The software and Internet communication tools are working properly. Office equipment and facilities are in good working order.

The scientific library of the NSC 'Tairov IP&I' occupies an area of 270 m², is located in the structure of the Department of Scientific Research on Intellectual Property and Marketing of Innovations, includes 110 thousand copies, including a fund of rare literature of 1.5 thousand publications

Experimental base of the Plant Breeding and Genetics Institute – National Centre of Seed and Cultivar Investigation:

A land plot of 1.1 hectares is used for scientific research in the field of genetic resources. The samples are stored in the premises of the breeding centre located in Dachne village. The room has an area of 70 square metres and provides storage of samples in uncontrolled temperature conditions. The premises are in satisfactory condition.

The Plant Breeding and Genetic Institute uses one computer for the needs of working with genetic resources, which is in working order. For further effective work, a sheaf thresher is needed. In addition, the soil at the site needs to be improved, which can be achieved by fertilising and using herbicides to control weeds.

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3. *Funding*

Financing of the PGRSU is carried out from the State Budget through the National Academy of Agrarian Sciences of Ukraine (50%), as well as at the expense of commercial activities of the main institute and other institutions of the PGRSU, including the sale of seeds, technical consultations, consulting of farmer groups, etc. (50 %). From 2020 to 2022, annual allocations from the State Budget fluctuated but averaged around EUR 400,000 per year. Total salary costs are about EUR 400,000 per year, which are covered from the state budget. Typically, another EUR 200,000 per year is allocated to commercially funded operations, although the need to support core operations is likely to be closer to EUR 1,000,000. Costs for operational activities, equipment and premises are covered by commercial revenues or projects.

In 2022:

- Assistance was received from Bioversity International to support the staff of the Plant Production Institute named after V. Ya. Yuriev in the amount of EUR 5,000 and from the NordGen Genebank in the amount of EUR 15,000.
- The Novo Nordisc Foundation has allocated EUR 18,896 through the NordGen's administration to support the Duplicate Depository of the Ustymivka Experimental Station of Plant Production.
- The Novo Nordisc Foundation has allocated EUR 20,000 through the NordGen's administration to support the work of the scientific units of the NCPGRU in wartime (financial support for personnel salaries).
- NordGen's administration provided two Haldrup Laboratory threshing machines (LT-35 and LT-15) worth EUR 40,000, as well as EUR 13,180 for the purchase of a diesel generator for the National Repository.

In 2023:

- Bioversity International provided €47550 to the Plant Production Institute named after V.Y. Yuriev, of which €29265 was used to save the seed collection of the National Plant Genebank of Ukraine by transporting it to the safer Western region,

- Novo Nordisk Foundation provided EUR 27,000 to support IT equipment, travel, accommodation and per diem for training of Ukrainian specialists in GRIN Global and barcoding of seed samples, which took place at NordGen (Alnarp, Sweden).

In 2024, as part of the cooperation with FAO Ukraine, an agreement was reached on the provision of an equipped refrigerating chamber and generator to the Ustymivka ESPP to ensure the guaranteed preservation of the seed fund of medium-term storage collections.

Annex 10. Operational plan for the implementation of the Strategy (can be implemented only if funds are available)

Strategic goal	Operational goal	Responsible executors and necessary support/resources	Measures to achieve goals by years	Year				
				2024	2025	2026	2027	2028
1. Increasing the efficiency of management of the plant genetic resources system.	1. Guaranteeing the safety of collections	Executors: NCPGRU of the PPI, IACR, UESPP	To develop evacuation plans for the National Depository (Kharkiv), Lviv and Ustymivka genebanks.	+				
		Executors: IACR with the support of FAO Ukraine	Organized the DDPGRU in Lviv as a safe place for duplicating collections of STS and LTS		+			
		Executors: IACR with the support of FAO Ukraine	To transport the collection of LTS, which is in temporary storage in the Lviv region, to the DDPGRU		+			
		Executors: NCPGRU of the PPI, IACR, UESPP with the support of FAO Ukraine	To install access control and alarm with notification (for key personnel) for the Kharkiv, Lviv, and Ustymivka gene banks		+			
		Executors: CC, NCPGRU of the PPI with the support of CropTrust	To develop a plan for the duplication of Ukrainian genebank accessions for Svalbard (2026–2035) and start its implementation		+	+	+	+
	2. Ensuring long-term availability and use of collections	Executors: UESPP with the support of donors	Installation and filling of a new refrigerating chamber for MTS	+				
		Executors: NCPGRU of the PPI with the support of donors	Installation and equipment of a freezing chamber for LTS		+			
		Executors: PGRSPU institutions with the support of donors	To repair and renovate workspaces, technical facilities, laboratory equipment, gadgets in the institutions of the PGRSPU		+			

	Executors: NCPGRU of the PPI and UESPP with the support of donors	To modernize the drying facilities at the NCPGRU of the PPI and the Ustymivka Experimental Station to the recommended conditions of 15 °C/15% relative humidity, with an anteroom for packing seeds		+			
	Executors: IVMP with the support of donors	Buy isolation boxes			+		
	Executors: IPG with the support of donors	Purchase climate-controlled greenhouses with a total area of 20 m2			+		
	Executors: NCPGRU of the PPI, Institute of Horticulture, L.P. Symyrenko Experimental Station of Pomology with the support of donors	To identify possible duplicate sections and draw a plan for safe duplication of unique field collections		+	+		
	Executors: L.P. Symyrenko Experimental Station of Pomology with the support of donors	To replant the collection of fruit, berry and nut crops				+	+
	Executors: Institute for Potato Groving with the support of donors	Develop a plan to create <i>in vitro</i> gene banks and a central cryo-storage facility for potatoes.				+	+
	Executors: NCPGRU of the PPI with the support of donors	To put into operation the National Depository of the NCPGRU of the PPI with a capacity of 125,000 accessions with cryoconservation of plant parts of vegetatively reproducing species; equipment for the identification of accessions using DNA technologies.					+
3. Ensuring long-term availability of collection data	Implementers: IACR with the support of NordGen and FAO Ukraine Needs: Training	Apply barcoding to all packages of the transported collection		+	+		

	Resources: 1. Converted inventory data 2. Equipment (computer, reader, printer, etc.)						
	Executors: CC, NCPGRU of the PPI with the support of donors	To complete the installation of the Plant Gene Pool Information System in GRIN-Global		+	+	+	
	Executors: NCPGRU of the PPI with the support of donors	To update the passport database in EURISCO			+		
	Executors: NCPGRU of the PPI and UESPP with the support of donors	To implement routine barcoding in the Kharkiv and Ustymivka collections (and later in all other collections of the PGRSU).			+	+	+
4. Optimising the structure and adapting the regulatory framework of the PGRSU in line with international standards	Executors: NCPGRU of the PPI with the support of CropTrust Support: Translation of the AEGIS template into Ukrainian and the instructions for managing the genebank into English	To develop instructions for maintaining a genebank, enter into the AEGIS template and share with external experts	+				
	Executors: NCPGRU of the PPI with the support of CropTrust	To review standard operating procedures (SOPs) for conservation, with a particular focus on increasing intervals of viability testing and improving the packaging workflow.	+	+			
	Executors: NAAS, CC	To develop a business plan for sustainable financing of the PGR System	+	+			
	Executors: NAAS, CC, NCPGRU of the PPI with the support of CropTrust	To visit all scientific research institutes with field collections which are accessible:		+			

Support: CropTrust can provide collections status assessments. Resources: to guarantee all necessary expenses for vehicles and personnel	(1) to check their status against a standard check-list (2) to explore the possibility of <i>in vitro</i> maintenance and creation of gene cryobank for their crops on-site					
Executors: NCPGRU of the PPI with the support of CropTrust	To review the SOP for the regeneration of cross-pollinated crops		+			
Executors: NAAS, CC	To optimise the structure of the PGRSU		+	+		
Executors: CropTrust	To conduct an on-site external expert assessment of the PGRSU (perhaps during a national conference) and repeat it every 5 years.			+		
Executors: NAAS, CC, NCPGRU of the PPI	To hold a national conference on the diversity of agricultural crops in Kharkiv with the participation of all stakeholders.				+	
Executors: NCPGRU of the PPI in cooperation with the Leibniz Institute of Plant Genetics and Crop Plant Research (IPK) and other organizations	To perform a gap analysis for priority species in Ukraine, develop and implement a national plan for germplasm collection to fill the gaps				+	
Executors: NCPGRU of the PPI in cooperation with IPK and other donors	To develop and implement a comprehensive training program for the genebank technical personnel, both in Ukraine and abroad				+	
Executors: NCPGRU of the PPI in cooperation with the Leibniz Institute of Plant Genetics and Crop Plant Research (IPK) and other organizations	To perform genotyping of 3–4 key collections (wheat, barley, apple, potato) according to best practices on a pilot basis in cooperation with relevant partners to identify duplicates, quantitative evaluation of diversity and comparison with other collections					+

		Executors: NAAS, CC, NCPGRU of the PPI, IACR, UESPP	To develop a Strategy 2029-2034 that reflects the national agricultural policy					+
	5. Development and implementation of the legislative framework for the PIC system	Implementers: CC, NCPGRU of the PPI and NAAS with the support of the International Treaty on PGRFA, CropTrust and FAO Ukraine. Support: legal advice	Develop a draft Law of Ukraine "On Plant Genetic Resources"		+			
			To formalize the necessary accompanying documents, agree with the competent authorities and submit the draft Law to the Verkhovna Rada.		+	+		
2. Active integration into the European and global network of conservation of plant genetic resources, taking into account national interests	1. Participation in the FAO Commission on Genetic Resources for Food and Agriculture	Executors: Praesidium of the NAAS, NCPGRU of the PPI	To appoint a key person to the International Technical Working Group on Plant Genetic Resources for Food and Agriculture of the FAO Commission on Genetic Resources.	+				
	2. Ratification of the ITPGRFA	Executors: Praesidium of the NAAS, NCPGRU of the PPI	To ratify and implement on PGRFA the International Treaty on PGR.			+		
	3. Participation in ECPGR	Executors: Praesidium of the NAAS, NCPGRU of the PPI	To reserve EUR 4,500 for 5 years to pay membership fees. After payment, to confirm debt relief for membership fees.		+			
		Executors: Praesidium of the NAAS, NCPGRU of the PPI	Join ECPGR		+			

Annex 11.

PROVISION

On the Coordination Committee for the Development of the System of Plant Genetic Resources of Ukraine

1. The Coordinating Committee for the Development of the Plant Genetic Resources System of Ukraine (hereinafter referred to as the Coordinating Committee) is established by the National Academy of Agrarian Sciences of Ukraine to implement the Strategy for the Development of the Plant Genetic Resources System of Ukraine (hereinafter referred to as the PGRSU) for 2024-2028 (hereinafter referred to as the Strategy).

2. In its activities, the Coordination Committee shall be guided by the Constitution and laws of Ukraine, decrees of the President of Ukraine, resolutions of the Verkhovna Rada of Ukraine, acts of the Cabinet of Ministers of Ukraine, regulations of the National Academy of Agrarian Sciences of Ukraine and this Regulation.

3. The main tasks of the Coordination Committee are:

a) to ensure coordination between the scientific institutions of the PGRSU, as well as other institutions and organisations involved in the implementation of the Strategy;

b) search and involvement of national and international organisations, independent experts that can provide scientific support, as well as financial institutions and funds of donor states that can provide financial support, in the development, implementation and monitoring of the Strategy and priority measures/projects;

c) annual:

- development of priority activities/projects of the Strategy with details of planned results and tasks;

- determination of the needs of the scientific institutions of the PGRSU and other parties involved in the implementation of the Strategy in scientific and logistical support necessary for the implementation of measures/projects;

- preparation of proposals for activities/projects, including financial calculations;

- organisation of submission of proposals for activities/projects to domestic and international organisations, financial institutions and funds of donor states that can support them;

- coordination and monitoring of the activities of the scientific institutions of the PGRSU and other parties involved in the implementation of activities/projects supported by donors;

- organising the preparation of reports on implemented activities/projects;

- organise monitoring of the implementation of the current Strategy;

d) organise the preparation of the Strategy for the next period.

In accordance with the tasks assigned to it, the Coordination Committee prepares and submits to the Presidium of the National Academy of Agrarian Sciences of Ukraine proposals, recommendations and analytical reports on

a) annual development, submission, implementation and monitoring of priority activities/projects;

b) negotiations with domestic and international organisations, independent experts, financial institutions and competent funds of donor states on scientific and financial support of priority measures/projects;

c) identifying ways and means of solving problems that impede the implementation of the Strategy;

d) monitoring the implementation of the current Strategy and preparing the Strategy for the next period.

The Coordination Committee has the right to:

- to receive, in accordance with the established procedure, from the scientific institutions of the CGRU, ministries and other executive authorities, self-government bodies, involved institutions and organisations, information necessary to perform its tasks;
- to involve representatives of scientific institutions of the PGRSU, ministries and other executive authorities, self-government bodies, involved institutions and organisations (in agreement with their heads), as well as independent experts (by agreement) in its work;
- organise conferences, meetings and other events.

The Coordination Committee is chaired by the Vice-President of the National Academy of Agrarian Sciences of Ukraine, curator of the Plant Industry Department.

The Steering Committee is composed of:

- Academician-Secretary of the Department of Plant Production of the National Academy of Agrarian Sciences of Ukraine,
- Deputy Director for Scientific Work with Plant Genetic Resources of the Plant Production Institute named after V. Ya. Yuriev of the National Academy of Agrarian Sciences of Ukraine,
- Deputy Director for Scientific Work of the Ustymivka Experimental Plant Growing Station of the Institute of Plant Production of the National Academy of Agrarian Sciences of Ukraine,
- Deputy Director for Research at the Institute of Agriculture of Carpathian Region of the National Academy of Sciences of Ukraine,
- Deputy Director for Research of the Institute of Horticulture of the National Academy of Sciences of Ukraine,
- Deputy Director for Research of the Institute of Potato Growing of the National Academy of Agrarian Sciences of Ukraine,
- Deputy Director for Research at the National Scientific Centre 'V.Ye. Tairov Institute of Viticulture and Winemaking',
- Deputy Director for Research of the Plant Breeding and Genetics Institute – National Centre of Seed and Cultivar Investigation,
- Deputy Director for Research of the Institute of Bast Crops of the National Academy of Sciences of Ukraine,
- Deputy Director for Research of the Institute of Bioenergy Crops and Sugar Beet of the National Academy of Sciences of Ukraine,
- Deputy Director for Research at the Institute of Vegetable and Melon Growing of the National Academy of Sciences of Ukraine,
- Representative of the Ministry of Environmental Protection and Natural Resources of Ukraine (upon agreement with)
- Representative of the Ministry of Agrarian Policy and Food of Ukraine (upon agreement with)
- Representative of the Ministry of Education and Science of Ukraine (upon agreement with)

The personal composition of the Coordination Committee, the chairman, deputy chairman and secretary are approved by the Presidium of the National Academy of Agrarian Sciences of Ukraine.

7. The organisational form of the Coordination Committee's work is meetings held at least twice a year by the decision of the Chairman. Meetings of the Coordination Committee shall be chaired by the Chairman, and in his absence - by the Deputy Chairman. The Secretary shall prepare materials for consideration at the meetings of the Coordination Committee.

A meeting of the Coordination Committee shall be deemed valid if more than half of its members, including those participating remotely, are present.

8. Proposals, recommendations and decisions of the Coordination Committee shall be deemed approved if more than half of the members of the Coordination Committee present at the meeting vote for them. In the event of an equal distribution of votes, the vote of the chairman of the meeting shall be decisive.

Proposals, recommendations and decisions shall be recorded in the minutes of the meeting, which shall be signed by the chairman of the meeting and the secretary and sent to all members of the Coordination Committee.

9. Organisational support of the Coordination Committee shall be provided by the Presidium of the National Academy of Agrarian Sciences of Ukraine.

LIST OF ABBREVIATIONS AND CONVENTIONS

AC	active collection
AEGIS	European Genebank Integrated System
CC	Coordination Committee for the Development of the Plant Genetic Resources System of Ukraine
Crop Trust	Global Crop Diversity Trust
DDPGRU	Duplicate Depository of Plant Genetic Resources of Ukraine of the Institute of Agriculture of Carpathian Region of the NAAS
ECPGR	European Cooperative Program for Plant Genetic Resources
EIC	European Integrated Collection
EURISCO	European Search Catalogue for Plant Genetic Resources
EVA	European Evaluation Network for Plant Genetic Resources
FAO	Food and Agriculture Organization of the United Nations
FAO	Food and Agriculture Organisation of the United Nations
FC	field collection
GBF	Kunming-Montreal Global Biodiversity Framework
GeneBank	Bank of plant genetic resources
IACR	Institute of Agriculture of Carpathian Region of the NAAS
IAPGRFA	International Agreement on Plant Genetic Resources for Food and Agriculture
IPG	Institute of Potato Growing
IPK	Leibniz Institute of Plant Genetics and Crop Plant Research
IVMG	Institute of Vegetable and Melon Growing of NAAS
LTS	long-term storage
MTS	medium-term storage
NAAS	National Academy of Agrarian Sciences of Ukraine.
NCPGRU	National Centre for Plant Genetic Resources of Ukraine of the Plant Production Institute named after V. Ya. Yuriev of the NAAS
NordGen	Nordic Genetic Resource Centre
NSC	National Scientific Center
PGR	plant genetic resources
PGRFA	plant genetic resources for food and agriculture
PGRSU	Plant Genetic Resources System of Ukraine
PPI	Plant Production Institute named after V. Ya. Yuriev of the NAAS
STS	short-term storage
UESPP	Ustymivka Experimental Station of Plant Production of the Plant Production Institute named after V. Ya. Yuriev of the NAAS

TERMS AND DEFINITIONS

In this document, the following terms are used with the following definitions:

Accession (of plant gene pool) of folk breeding A cultural accession of a plant that was formed under the influence of long-term natural selection and the simplest methods of artificial selection (folk breeding).

Accession (of plant gene pool) The lowest collection unit representing the plant gene pool and includes plants, their parts or organs, seeds, etc. of a certain form or population, capable of reproduction in genetic integrity.

Accessions of trait, special, genetic and other collections can be used as elements of a working collection

Active collection (of plant gene pool accessions) A part of the collection of plant gene pool accessions intended for prompt fulfilment of current user requests.

Base collection (of plant gene pool accessions) A collection that most fully represents the main gene pool of a crop of various geographical origins and includes cultivated, wild plants and related species that can grow in the conditions of a certain country and region

Breeding line (of a plant) A plant gene pool accession, which is a stable offspring of one homozygous self-pollinated plant, isolated as a result of breeding.

Breeding material (of a plant) Populations of varying degrees of genetic heterogeneity, hybrids, families, forms, lines, clones, elite plants, created by purposeful breeding.

Catalogue of plant gene pool accessions A printed or electronic publication containing a list of accessions of plant gene pool collection with their characteristics.

Collection (of plant gene pool accessions) A set of accessions of a plant gene pool, formed according to a certain principle for solving scientific, breeding and other tasks.

Core collection (of plant gene pool accessions) A collection of accessions of different geographical origins that represents the genetic diversity of a crop with the minimum number of accessions selected from the base collection.

Cryoconservation (of plant gene pool accessions) Conservation of seeds, part of plant organs at cryogenic temperatures.

Cultivated plant, crop A plant, improved by methods of folk and scientific breeding, which is grown by a person to meet his or her needs.

Curator of the collection (of plant gene pool accessions) A scientist or specialist who determines the directions and supervises the formation, preservation and effective use of base, trait, special, genetic and other collections of a certain crop or group of crops.

Donor — a non-profit institution, charitable foundation, scientific institution or other organization that provides financial, material, consulting or other free assistance

Duplicate collection (of plant gene pool accessions) A collection created for the purpose of backup conservation of accessions of the corresponding type of collection, which is located in another geographical point.

Duplicate depository (of plant gene pool accessions) A depository in which a duplicate collection of plant gene pool accessions is stored.

Educational collection (of plant gene pool accessions) A collection formed for the use in educational process, and which includes botanical diversity, sets of different cultivars, sources of valuable traits, hybrids and their parent forms, etc.

Ex situ conservation (of plant gene pool accessions) Conservation of plant gene pool accessions outside their natural ecosystems in a genebank.

Field collection (of plant gene pool accessions) A collection of plant gene pool accessions maintained in field conditions: plantation, garden, etc.

Field conservation (of plant gene pool accessions) Conservation of perennial plant gene pool accessions and vegetatively propagated plants in field conditions, gardens, plantations, etc.

Form (of a plant) The lowest taxonomic unit of a plant, which is characterized by any hereditary trait (morphological, physiological, biochemical, etc.) by which it is distinguished from other plants or their groups.

Forming a collection (of plant gene pool accessions) Involving, including accessions and arranging them in a collection by origin, level of traits manifestation, genetic difference according to its type and purpose of creation.

Gene pool (of plants) A set of genes of a population, species or other taxonomic unit, within which they are characterized by a certain frequency, as well as a group of plants as carriers of these genes.

GeneBank (of plants), bank of genetic resources (of plants) Collected, systematized, documented and preserved in a viable state plant gene pool accession.

Genetic collection (of plant gene pool accessions) A collection that includes accessions with identified genes and abigenic complexes, the manifestation and inheritance of which have been studied under certain conditions.

Genetic source (of a plant) An accession of the plant gene pool with identified genes and a known pattern of inheritance of a certain level of manifestation of the trait.

Genetically modified plant GMP A plant gene pool accession represented by a plant created by artificially introducing, changing, disabling, or eliminating portions of DNA.

In vitro collection (of plant gene pool accessions) A collection of cells, tissues or plant vegetative organs of gene pool accessions, which are maintained in a viable state in a nutrient medium, and from which whole plants can be grown with the help of special methods.

Inclusion of an accession (in the collection of plant gene pool accessions) Introduction of a new accession into the collection, which replenishes and expands its genetic diversity.

Introduction (of plant gene pool accessions) Transfer of plant gene pool accessions to an area where they did not grow before.

Introduction-quarantine nursery The complex, which includes land area, premises and equipment and is intended for testing regulated plant gene pool accessions introduced from abroad, for the presence of quarantine objects and for initial study.

Involvement (of plant gene pool accessions to the collection) Collecting and obtaining plant gene pool accessions for evaluation and study in order to replenish the collection.

Local accession (of plant gene pool) An accession of natural or breeding origin originating from a specific area.

Long-term conservation of seeds (plant gene pool accessions) Conservation of plant gene pool accessions in a viable state and genetic invariance at a temperature close to -20°C.

Maintenance of the collection (of plant gene pool accessions) A set of measures aimed at maintaining the accessions of the collection in a viable state and genetic integrity, documenting it, studying it, replenishing it with new accessions and ensuring its use.

Medium-term conservation of seeds (plant gene pool accessions) Conservation of plant gene pool accessions in a viable state and genetic invariance at a temperature close to 0°C.

National catalogue of plant genetic resources of Ukraine The register, which contains the passport data of plant gene pool accessions of Ukraine.

National depository (of plant gene pool accessions) A complex of premises, equipment and facilities intended for long-term preservation in a living state and genetic invariance of collections of plant gene pool accessions of national significance

Passport database (of plant gene pool accessions) A database containing formatted and organized information about accession numbers in collections, taxonomic affiliation, names, origin, status, etc. of accessions of plant gene pool collections.

Plant genetic resources information system A system of electronic databases together with a reference subsystem and software tools that ensures inventory control of plant gene pool accessions, their characterization, systematization, search, processing and issuance of information and its exchange.

Plant genetic resources PGR Any genetic material of plant origin of actual or potential value to mankind, including food production, agriculture, etc.

Regeneration of (plant gene pool) accessions Cultivation of plant gene pool accessions in order to restore viability.

Related [genus] [species] (to a cultivated plant), relative (of a cultivated plant) Genus, species, close to a cultivated plant by genetic origin, traits and properties.

Seed monitoring (of plant gene pool accessions) Periodic determination of seed viability level of plant gene pool accessions during its preservation.

Short-term conservation of seeds (of plant gene pool accessions) Conservation of plant gene pool accessions during the period limited by its loss of viability due to natural ageing in unregulated conditions.

Special collection (of plant gene pool accessions) A collection created of accessions selected according to traits studied by special methods to solve specific breeding, scientific and other tasks.

Trait codifier (of plant gene pool accessions) A scale of trait manifestation levels expressed by a digital code covering the entire range of trait variability in representatives of a species or a crop.

Trait collection (of plant gene pool accessions) A collection in which the accessions are selected according to a certain level of phenotypic manifestation of individual traits or their combinations. This collection is formed by a classifier based on reference accessions.

Trait donor (of a plant) A plant gene pool accession with a certain level of manifestation of a trait, capable of transmitting it during crossing and other ways.

Traits classifier (of crop) A set of codifiers of traits in representatives of a species or a crop.

Transgenic plant A genetically modified plant in which foreign DNA has been incorporated into the genome using genetic engineering methods.

Type of collection (of plant gene pool accessions) Category of a collection, which is determined by its composition and intended purpose.

Value of a (plant gene pool) accession The presence and level of phenotypic manifestation by a plant gene pool accession of a hereditary trait or a group of traits that determine its ability to satisfy the needs and requirements set for its use

Variety (of a plant) An artificially created set of plants at the level of the lowest known botanical taxa with a complex of biological and economic features characteristic of it, which can

be separated from any other group of plants by the degree of manifestation of at least one of these traits and reproduced in an unchanged form.

Wild plant A plant originating from the natural flora, which in ecosystems corresponding to its biological properties is able to grow and self-reproduce without the use of agrotechnical measures.

Working collection (of plant gene pool accessions) A collection created for the implementation of breeding, scientific and other programs, and which includes sources and donors of valuable traits relative to specific conditions and areas of breeding or scientific pro.

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