D 1.2 Preliminary Collection of Each Target Species Identified

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IMPROVING CROPS

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EXECUTIVE SUMMARY

This deliverable describes throughout six chapters procedures used to encompass the four crops genetic diversity and to select material for the preliminary collection.

The widespread adoption of genetically uniform crop varieties and associated agricultural practices may have increased the vulnerability of production systems and reduced their adaptability to the new environmental challenges and led to a loss of crop diversity. ECOBREED has explored different approaches aimed at increasing crop genetic diversity. It will help to identify the genetic material and traits that can be used and selected for in organic breeding programmes to produce elite varieties with increased agronomic performance and enhanced nutritional composition. These approaches have the potential to implement sustainable farming systems, support local and fair supply chains and reconnect farmers and breeders.

The document defines and characterizes the types of collections of plant genetic resources according to the method of their conservation and use. Active collections are used for distribution to users, but it should be emphasized that their provision is guided by international and national guidelines. The preliminary collections will help to rationalize the Ecobreed project work, the development and adoption of protocols for more valuable use, e.g. in organic breeding but also in other research areas. Preliminary collections will help rationalize research activities in the Ecobreed project and develop protocols for more valuable uses, e.g. for organic breeding, but also for other research areas. We will create a preliminary collection based on availability of plant genetic resources, supported by the results from research projects, field trials performed by breeders, organic production experts or VCU tests.

The wide variety of biological materials has long been referred to as plant genetic resources (PGR). Since organic farming demands high genetic diversity, it is necessary to cultivate a wide range of crops and their varieties in order to achieve quality production depending on heterogeneous environmental conditions, crop rotation, and marketing of the products. For this reason, it is important to have varieties that meet the high yield requirements for high-quality production regarding the nutritional and technological characteristics of organic food as well as to meet the organic production requirements.

The three steps involved in building of preliminary collections included identification, determination, and selection for each species. Firstly we have described the different types of varieties and their inclusion to preliminary ECOBREED collections, the methods used for creating them and we highlighted their advantages and their limits. The preliminary collections of wheat, potato, soybean and buckwheat were amended with specific breeding objectives and the assessment of their production potential.

Selected varieties of wheat represent biotic stress tolerance/resistance to significant pests and diseases and qualitative characters used in organic breeding. The selected organic traits were characterized in particular by rust and bunt resistance, resistance to leaf and ear pathogens, resistance to powdery mildew and leaf spots, resistance to brown rust, limited resistance to Fusarium, resistance against Septoria, yellow rust

tolerance and *Tilletia* & *Ustilago* and good tolerance to viruses. Organic farming requires varieties having high nutritional quality. Also, conventional varieties with good performance under organic farming, excellent adaptability or good adaptability to different growing conditions, very good performance and yield in organic trials and quality in the low N environment were selected.

From detailed phenotypic analysis of potato preliminary collection, we have identified a number of traits suitable for organic production systems. Besides the major objectives, specific breeding emphasis is being put on identifying germplasm and developing cultivars that have early maturity, immunity to PVY, resistance to late blight, storage rots and that have improved nutritional quality. The cultivar development is a multi-step process, encompassing identifycation parents with desired characteristics for crossing. Among criteria for the preliminary collection are: earliness, late blight resistance because for breeders' preference for organic production and organic seed production.

Drought tolerance and drought-tolerant biological nitrogen fixation of soybean are important traits that should face global climate changes. Several diseases (stem cancer, Pythium root rot, SMV) were identified as future potential problems, and the source of resistance was included. Another important trait, beneficial for farmers and the processing industry is grain quality. High protein, large/small seed, coloured testa, low Kunitz inhibitor, allergen-free accessions represent a genetic base for developing special type soybean variety.

Desirable traits for buckwheat organic production were discussed with farmers, manufacturers, and producers. Unfortunately, no available data on the quality of the grain and on the processing ability as the main characteristics demanded by processors and producers of buckwheat is known. Nor are there any data available on lodging and the determination of the flowering time required by farmers. This information will be made available after the evaluation for selection of the most suitable genotypes.

Within this deliverable we have described as well the selection of important traits according to the specific crop descriptors which are used by the curators of plant genetic resources. In the appendices the list of wheat, potato, soybean and buckwheat varieties included in the preliminary collections of the ECOBREED project are presented.

Introduction

According to IFOAM, Organic Agriculture (OA) is a production system that sustains the health of soils, ecosystems, and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic Agriculture combines tradition, innovation, and science to benefit the shared environment and promote fair relationships and good quality of life for all involved.

Among other things, it works with the exclusion of artificial agrochemicals (e.g. industrial pesticides and mineral fertilizers) and genetically modified organisms (GMOs). Organic agriculture is seen worldwide as an essential alternative to conventional agricultural production of the future and is an integral part of the EU agricultural policy. (Figure 1).

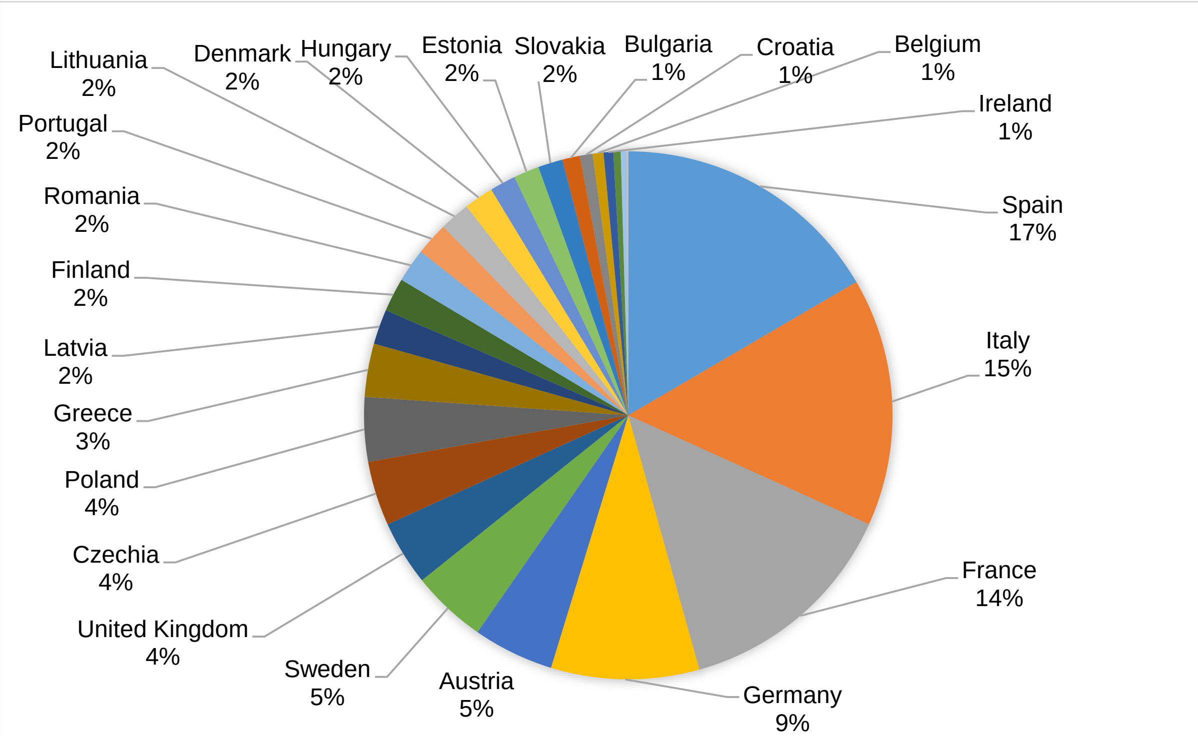

Figure 1. Share of the total organic area in the EU in 2017 (EUROSTAT, 2019)

Legal framework

In the EU, there are several valid regulations and directives on organic production and labelling of organic products. These rules are obligatory for all organic farmers and producers. These are Council Regulation (EC) No 834/2007, Commission Regulation (EC) No 889/2008 and No 1235/2008. According to the rules of the legal framework, for the production of products other than seed and vegetative propagating material only organically produced seed and propagating material shall be used. It means, there shall be enough organically grown and certified seed for European organic production. However, the organic seed market is not as developed as expected and therefore, where it is necessary in order to ensure access to seed and vegetative propagating material, where such is not available on the market in organic form, the derogation may be granted. In several EU countries, derogation is granted only in the case no organic seed is available on the market. Nevertheless, from 1st of January 2021 the new **Council Regulation No 484/2018** will come into force repealing Council Regulation (EC) No 834/2007. One of the most important parts regarding the organic seed production is preamble 105 with mentioning the intent of the EU to phase out the derogations for using the non-organic plant reproductive material in the near future. The new regulation also for the first time defined the organic variety suitable for organic production as well as the organic breeding activities which shall be conducted under organic conditions.

The new Common Agricultural Policy (CAP) (2014-2020) recognizes the role of organic farming in responding to consumer demand for more environmentally friendly farming practices. If you wish to get more information about support to organic production under the rural development policy in EU countries follow the link **https://ec.europa.eu/agriculture/links-to-ministries_en**.

Repealing of the derogations may help to enhance breeding of varieties for organic agriculture. Until now, derogations are used for varieties which were bred for conventional agriculture, where a lot of shortcomings or problems can be solved by mineral fertilizers, industrial pesticides (e.g. insecticides, fungicides etc.) for pest and disease control or by morphoregulators etc. which are banned in organic production. For efficient and sustainable food production in organic farming, the optimized crop rotation, and technology used have to be selected advisedly. Since most of the available varieties have been developed under conventional conditions for conventional farming, the potential of organic farming is not fully exploited. Some traits that are key for organic farming, such as resistance to seed seedborne diseases, weed control or nutrient efficiency (NUE), are not the main parameters for varieties where these deficiencies are dealt with pesticides and mineral fertilizers.

As a result, many varieties used in organic farming are bred for high inputs of mineral fertilizers and pesticides treatment and are not so efficient in organic and low input farming. An important contribution to the competitiveness of the organic farming might have a proper organic plant breeding, which can offer improved varieties that are able to meet the modern challenges of the organic food sector. The organic variety should be better in nutrient uptake from an organic source, better in weed competitiveness and resistant/tolerant to diseases and pests.

Therefore, breeders are starting to focus on breeding varieties in organic conditions for use in organic farming to stabilize the production and quality of organic production. Since organic farming means high genetic diversity, it is necessary to cultivate a wide range of crops and their varieties in order to achieve quality production depending on heterogeneous environmental conditions, crop rotation, and marketing of the products. For this reason, it is important to have varieties that meet the high yield requirements for high quality production regarding the nutritional and technological characteristics of organic food as well as to meet the hygienic requirements of production.

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In principle, the conventional and organic breeding have many procedures in common. Principles and techniques used in organic plant breeding are recommended in the IFOAM standard. However, several issues are overlooked in the conventional breeding. The traits that are more important for organic farming include the following:

- resistance to soil pathogens and seedborne diseases;
- fast juvenile growth;
- good weed suppression;
- resistance to lodging in tall varieties;
- qualitative traits and many others.

A fundamental principle in organic production is the use of seeds produced organically. One of the obligations of the EU member states is to maintain an **online database** in order to facilitate the acquisition of such seeds. Suppliers can enter organically produced seeds and seed potatoes that are available for purchase from this list.

1. Implementing preliminary collections of plant genetic resources in ECOBREED project

Source of plant genetic resources

The materials used for breeding can be diverse. The wide diversity of suitable materials has long been referred to as plant genetic resources (PGR). PGR refer to the genetic material of actual or future value. For future utilization, a lot of genetic resources are stored and preserved in the genebanks around the world. The seed propagated species are stored as seeds while vegetative propagated species are conserved in field banks, orchards, vineyard, *in vitro*, or cryobank collections. Base broadening and pre-breeding narrow the gap between raw germplasm and commercial crop genotypes and thereby promote the use of genebank collections. Base broadening and pre-breeding are often aimed at combining various sources of interesting genetic material into a single population, sometimes followed by light mass selection under suitable conditions. Increased use of genebank collections through base broadening and pre-breeding requires good communication between users and suppliers of the germplasm.

Germplasm collections of major crops continue to grow in number and size around the world. Originally, the collections were set up to preserve the genetic diversity of cultivated species before much was lost forever as farmers planted modern, highly bred cultivars instead of primitive stocks. At present, mainly due to the climate change, better access to and use of genetic resources in collections has become an important issue.

Types of conservation and collections

***In situ* conservation:** This type of conservation refers to the conservation of germplasm in ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings. In the case of domesticated species, it refers to their conservation in the surroundings where they have developed their distinctive properties, for example, on-farm conservation.

***Ex situ* conservation:** This type of conservation is the storage of seeds or plant material under artificial conditions, to effectively guarantee its longevity viability and availability. It covers a range of methods suitable for various types of seeds or plant materials. It ranges from cold storage of seeds or propagules, in vitro (tissue culture or cryopreservation), field, and pollen or DNA conservation. With ex-situ conservation two types of storage are recognized: storage of samples for long-term security – referred to as base collections – and storage of samples for immediate use – referred to as active collections. The storage conditions and distribution arrangements of these stores vary.

Several kinds of plant genetic resources collections have evolved over the years in developed to particular needs: base collections, active collections, breeders' or working collections, and back-up collections or called safe duplications. To some extent, these collections can be understood differently, and some collections serve multiple purposes. In the following section, we describe the collections according to the purpose of use.

Base collections provide for the long-term preservation of genetic variability through storage under optimal conditions. Normally, the material is not distributed from base collections directly to users. Base collection materials are not intended for distribution except to replace materials that have been lost from back-up or active collections. Base collections include the most comprehensive sample of the entire genetic variability of a species group. They are static in that they attempt to preserve the genetic variability that exists in accessions in its original, unchanged state. However, they are also dynamic in that additional accessions, such as newly collected materials, new cultivars produced by plant breeding, and populations of genetically enhanced materials, are added as they become available. Base collections are typically held under conditions of low relative humidity and at subfreezing (-10° to -20°C) or cryogenic (-150° to -195° C) temperatures, usually in liquid nitrogen. Difficulties are encountered with seeds of some species that cannot withstand chilling or drying. Alternative methods of long-term storage, such as cryopreservation of in vitro cultures, are needed.

Active collections provide seeds or other propagules for distribution to plant breeders or other users. Seeds are maintained in conditions that ensure at least 65% viability for 10-20 years and in vitro cultures are maintained in slow-growth conditions. Active and base collections often include the same materials. Materials in active collections are usually managed under shorter-term and more variable storage standards than those in base collections. Growouts or multiplications to replenish seed supplies in active collections are therefore usually necessary at shorter intervals than they are for base collections, thus putting the genetic integrity of accessions more at risk. Samples in vegetative banks are only stored for a few months but perennial living plants in field banks can be maintained for 20 years or more.

Back-up collections or called safety duplications supplement base collections at another location. The purpose of safety duplication is to maintain a copy of each accession in a form that is secure and 100% recoverable in the same condition and form as the active collection in case something were to cause a disruption of the operation of the primary collection site. One duplicate should be relatively easily available and hence housed nationally, while the second duplicate should be in another country to guarantee safe maintenance of the collection in the event of a catastrophic national disaster or unrest. For example, the Gene bank of Slovak Republic and Czech Gene bank, hold duplicate reserve samples under a bilateral agreement at Gene bank Prague and Gene bank of Slovak Republic Piešťany; the U.S. National Seed Storage Laboratory at Fort Collins, Colorado, holds duplicate back-up samples of portions of the maize collection from the Centro Internacional de Mejoramiento de Maíz y Trigo (CIMMYT; International Maize and Wheat Improvement Center) in Mexico and much of the rice collection from the International Rice Research Institute (IRRI) in the Philippines. Many genebanks in the world to make use of the Svalbard Global Seed Vault, as long as they agree with the principles of operation and meet the requirements which can be consulted in the Deposit Agreement.

What is a preliminary collection?

Precise identification of plant genetic resources is an important prerequisite for inclusion in preliminary germplasm collections in order to utilize genetic variability in breeding programs. For this in ECOBREED project, we use traditional methods of evaluation of morphological and agronomic characteristics, but these may be influenced by environmental factors. Molecular markers are independent of environmental influences, but these are not adequately available in information systems.

The preliminary collection can be formed from information available in gene bank databases, results and webpages of research projects, national tests performed by breeders, organic experiments, or as part of VCU tests. The preliminary collection can include a wide range of diversity of landraces, obsolete varieties, breeding lines, breeding material from biodynamic programs, and registered and/or legally protected varieties.

The main differences between the Preliminary collection and Working collection in terms of the ECOBREED project

Preliminary Collection	Working Collection
• selection of genotype from several sources: gene banks, research projects, national tests, organic experiments, VCU tests, etc. targeted for defined research and breeding	• selection of accessions evaluated according to descriptors focused on the main characteristics requested for organic breeding supported by farmers', manufacturers', producers' etc. recommendations
• unlimited number of accessions or according to the targeted task	• a limited set of accessions in the collection
• genetic diversity with a focus on research and breeding	• a minimum number of accessions representing maximum genetic diversity
• a representative accession characterized according to the focus of the project	• a representative accession of the genetic spectrum throughout the collection
• development of protocols for more valuable use, e.g. in organic breeding	• the large entity with taxonomic integrity
• specific taxa and geographical regions with a predominant breeding purpose are represented	• non-specific taxa and geographical regions are mainly represented
• opportunity to analyze a large number of alleged accessions	• authentic origin of records if no other option is available
• improve the possibilities of using genetic resources according to the	• collection with the ability to predict the sources of useful

intention of the project	variation

2. Methods and procedures to build preliminary collections

A pragmatic approach has been used for identification of genotypes into the preliminary collection i.e. reliability of classification, amount of additional information such as evaluation data by significant diseases and qualitative characters, year of registration, the status of accessions according to passport descriptors (i.e. by ECPGR or Bioversity International), country of origin, breeder, selected traits which are most important for organic production, accessions with a high reputation which plays an important role in breeding history, availability of material (important to have relatively large quantities of material available for entries in the preliminary collections and policy-driven by the project aims of ECOBREED). The processing of preliminary collections we have divided into three steps and these included: the identification, determination, and selection of wheat, potato, soybean, and buckwheat collections important for organic production.

The creation of preliminary collection for ECOBREED

Procedure for the selection of genotypes and creation of preliminary collections:

a) Defining the collection to be represented and identification of genotypes (collection) that will represent the widest diversity including all requested traits (if possible and if they are known) recommended by organic farmers, manufacturers, producers etc. e.g. the biotic stress tolerance/resistance to significant diseases and qualitative characters.
b) Choosing the entries and determination of the size of the preliminary collection and decision on the number of entries per group for wheat, potato, soybean, and buckwheat. According to the project proposal ~200 accessions for each species, with ~100 for potato.
c) Managing the core set and selection of the entries/accessions from each species of wheat, potato, soybean and buckwheat that will be included in the preliminary collection. The selected entries should be those that best represent the group and best serve the function and purposes of the project aims.

The criteria to include accessions to preliminary collections

The European Search Catalogue for Plant Genetic Resources (EURISCO) currently provides information on 2,019,414 accessions of crops and their wild relatives. This list contains accessions from 43 countries. The EURISCO includes the 196,496 accessions of the *Triticum* and of these 110,938 accessions of common wheat (*Triticum aestivum*), 14,912 accessions of potato (*Solanum tuberosum*), 14,853 accessions of soybean (*Glycine max*) and 2,999 accessions of buckwheat (*Fagopyrum esculentum*).

Country of origin: One of the important data about the genetic resource is the origin of the country. The origins of crops have led to the recognition that specific geographical regions around the world have been of particular importance to the development of agricultural crops. The four sets crops in ECOBREED project have summarized accessions from 45 countries: Germany; Netherlands; Russian Federation; France; United States of America; Slovenia; United Kingdom; Austria; China; Romania; Serbia; Poland; Japan; Hungary; Canada; Czech Republic; Slovakia; Ukraine; Switzerland; Belarus; Italy; Ireland; Republic of Korea; Croatia; Bhutan; Sweden; Taiwan; Bulgaria; Zimbabwe; Australia; India; Kazakhstan; Lithuania; Denmark; People's Republic of Korea; Albania; Ethiopia; Georgia; Mexico; Tajikistan; Algeria; Morocco; Moldova and Uruguay.

Biological status of accession: Genetic nature of the accession which decides it´s the probable origin. Examples of biological status are improved variety, genetic stock, farmer's variety, obsolete variety, breeding line, old variety, elite lines, and clonal selection. In some regions of Europe, the most popular varieties are regional varieties or so-called landrace. These varieties are of the general type and in particular, their divergent germplasm can provide the genetic base of breeding programs to increase yields and greater adaptability.

Origin of breeder/company: The detailed phenotypic analysis of a preliminary collection of each crop can be identified by a number of traits suitable for organic production. To do this, we used a sample of research and breeding institutions. These institutions are constantly developing new efficient varieties that are adapted to different uses, climate, and growing conditions. The wheat, potato, and soybean market have many sectors and which is reflected in breeding programs.

Traits for selection: An important criterion to build the preliminary collection is to define features according to descriptors for each crop which are listed in the following sections: Revised descriptors list for wheat (*Triticum* spp.) according to IBPGR Secretariat; Descriptors list for potato; Descriptors list for soybean; Descriptors list for common and tatary buckwheat (according to the Buckwheat descriptors list by IPGRI 1994).

For the wheat preliminary collection attention will be focused on traits associated with significant diseases and qualitative characters important to organic breeding, biotic stress tolerance/resistance and qualitative characters used in organic breeding. For the potato preliminary collection, selection may start with resistance to a large number of diseases and pests, early maturity, immunity to PVY, resistance to late blight, storage rots and that have improved nutritional quality. In the later stage, tuber yield is considered. Selection of the soybean accessions for the preliminary collection include varieties with biotic and abiotic stress tolerance, resistance to *Phytophthora* stem and *Pythium* rot resistance, crop and nutritive quality, N fixation efficiency and high protein content. When identifying buckwheat preliminary collection, we will focus on genetic variation in agronomic and nutritional characteristics.

3. A preliminary collection of wheat

Common wheat (*Triticum aestivum* L.) is the most important organic cereal in the European Union (Figure 2 to Figure 4) due to its multiple uses for human nutrition (David et al. 2012). Organic, low-input and conventional wheat trials have revealed significant genotype by environment interaction (Spanakakis 1990, Oberforster et al. 2000, Kempf 2003, Przystalski et al. 2008, Reid et al. 2009). Therefore, specific organic VCU (value for cultivation and use) tests were launched in a few European countries, e.g. Austria, Germany and the Czech Republic (Löschenberger et al. 2008, Pedersen 2012). Organic VCU tests stimulated also conventional breeding companies to establish an organic wheat breeding programme (Kempf 2003, Fontaine et al. 2008, Löschenberger et al. 2008) besides small breeding initiatives started within the organic movement (Müller et al. 2000, Kunz et al. 2006a,b).

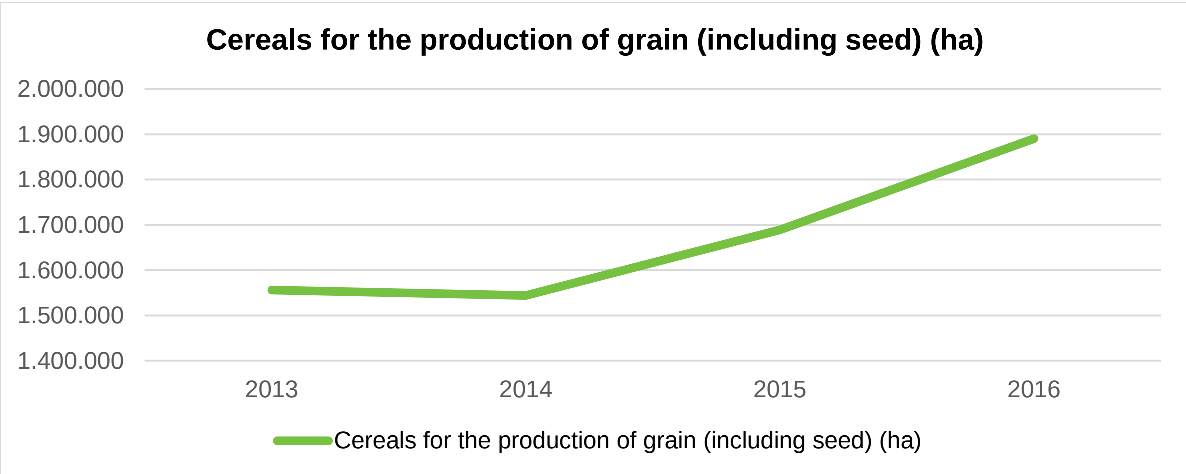

Figure 2 Organic cereals for the production of grain, EU (EUROSTAT, 2019)

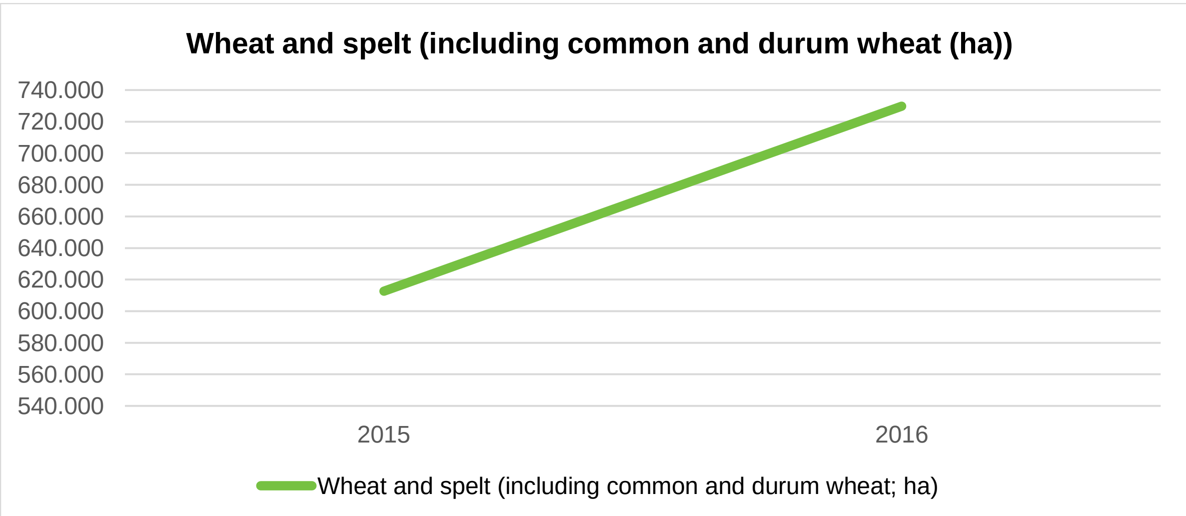

Figure 3 Organic wheat and spelt production in the EU (EUROSTAT, 2019)

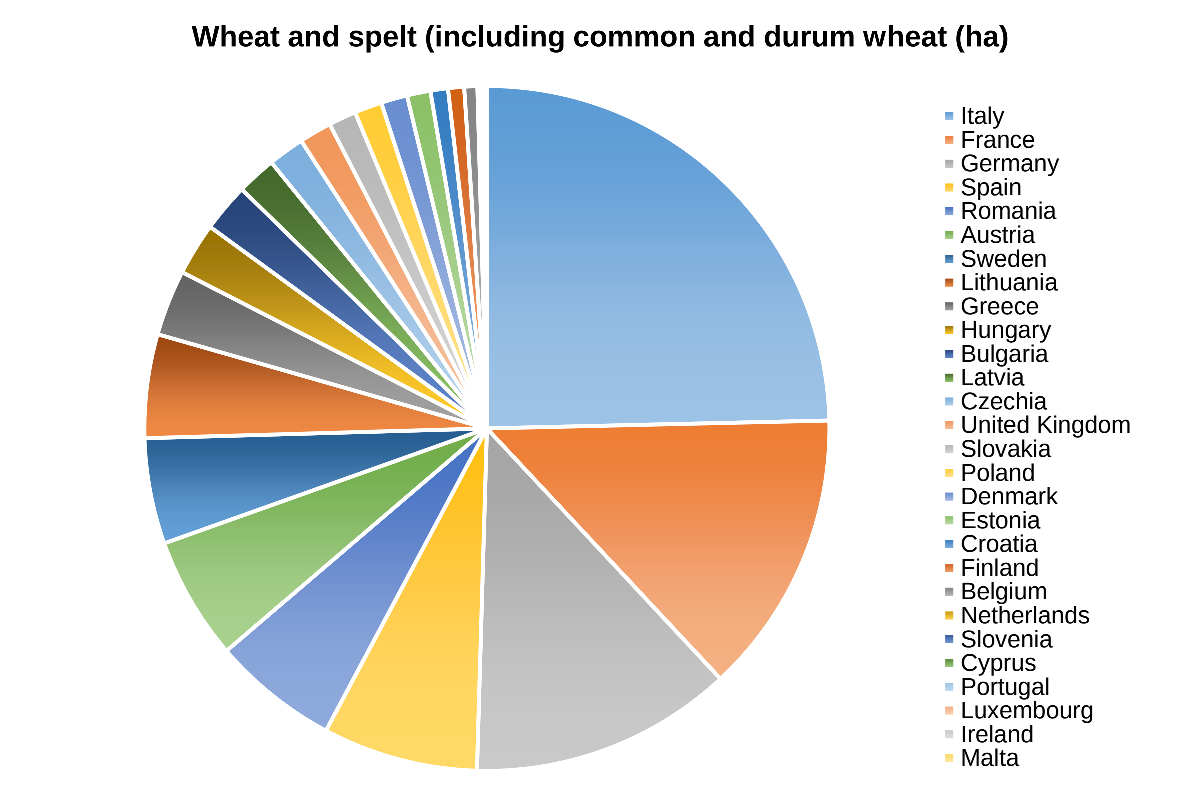

Figure 4 Organic wheat and spelt producers in the EU in 2016 (EUROSTAT, 2019)

The selection of wheat accessions/varieties for the ECOBREED wheat preliminary collection was based on information which was gained in previous European research projects such as COBRA (Core Organic II), SUSVAR (COST 860), national projects and national testing carried out either by breeders or within national organic VCU trials. Each involved partner selected at least 20 genotypes which are included in the ECOBREED wheat working collection. Thereby, the collection includes a broad range of diversity, including both old landraces and recently released cultivars. The selected wheat genotypes originate from 12 different European countries; the majority of the material has its origin in Germany (Table 1).

The majority of the material (83%) represents cultivars which were released in the last two decades and are still included in either the European list or national lists. The rest of the material includes landraces and old varieties as well as modern breeding lines which are at the moment subject to national organic VCU tests and/or internal organic trials. It is worth to mention that the peliminary collection includes also three cross composite populations CCPs (cross composite populations) and that >10% of the genotypes are from bio-dynamic breeding programmes in Germany and Switzerland, i.e. Getreidezüchtungsforschung Darzau (Dr. K.-J. Müller), Dottenfelderhof (Dr. H. Spieß) and Getreidezüchtung Peter Kunz. Moreover, the working collection includes several cultivars which were developed within so-called BFOA (breeding for organic agriculture) programs (Wolfe et al. 2008, Löschenberger et al. 2008), e.g. at Saatzucht Donau, Austria, Secobra, Germany or INRA Le Rheu, France, and passed organic VCU trials in the respective countries.

Table 1. Geographic origin of the winter wheat genotypes selected for the ECOBREED working collection

Country of origin	Number of genotypes
Austria	21
Croatia	3
Czech Republic	19
France	17
Germany	40
Hungary	22
Romania	20
Serbia	10
Slovakia	23
Slovenia	4
Switzerland	18
United Kingdom	3

3.1. Revised descriptors list for wheat (*Triticum* spp.) according to IBPGR Secretariat

Revised descriptor list for wheat is developed according to IBPGR Secretariat, Rome 1985, CEC Secretariat, Brussels 1985)

- **Accession number**

This number serves as a uniqueidentifier for accessions and is assigned by the curator when an accession is entered into his collection. Once assigned this number should never be reassigned to another accession in the collection. Even if an accession is lost, its assigned number is still not available for re-use. Letters should occur before the number to. Identify the gene bank of the national system (e.g. MG indicates an accession comes from the gene bank at Bari, Italy; PI indicates an accession within the USA system).

- **Scientific name**

Taxonomic information should be provided at least for the genus and species level. Information on subspecies and botanical variety (convariety) should be included if available.

- **Sowing & harvest date**

Sowing and harvest date should be provided in a DD.MM.YYYY format.

- **Plant height**

Height of plant at maturity, measured in cm from ground to top of spike, excluding awns

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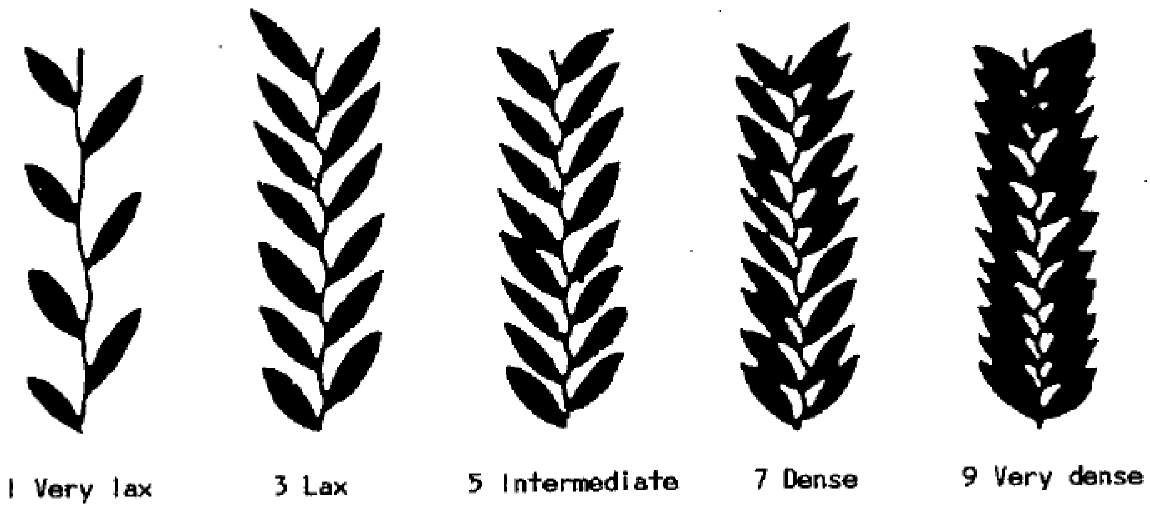
- **Days to flower**

Counted as days from sowing to 50% of plants in flower. However, when planting in dry soils in dryland areas it is counted from the first day of rainfall or irrigation which is sufficient for germination

- **Spike density**

A visual measure of the density of a spike measured on a 1-9 scale. (NB. Spike density is not the same as spike shape.)



Picture 5 Scoring scheme for spike density

- **Glume colour**

Observed on the outer glume and scored on a 1 to 3 scale: 1=white; 2=red to brown; 3=purple to black

- **Number of spikelets per spike**

The average number from five typical growing accessions of spikelets per spike from five typical spikes selected from a growing accession.

- **Seed colour**

Scored on a 1 to 3 scale: 1=white; 2=red; 3=purple; if a visual scoring is difficult, then the sodium hydroxide test can be used. Place grains in a petri-dish and add 25 ml of a 5% solution of NaOH for 60-90 minutes. Original red grains will be dark brownish orange, and white grains will be straw yellow.

- **Pre-harvest sprouting tendency**
- Tendency of grains to sprout in the ear as a result of high moisture near harvest; scored on a 1 to 9 scale: 1=no sprouting; 3=low sprouting; 5=intermediate sprouting; 7=high sprouting; 9=spike completely sprouted.
- **Percentage protein content**

Measured as percentage of dry weight (seed moisture equal to or less than 12%) by standard methods (Kjeldahl, Dumas, NIRS). Indicate the conversion factor used.

- **Stress susceptibility**

These reactions are coded on a 1-9 scale where 3=low susceptibility, 5=medium susceptibility and 7=high susceptibility.

- **Low temperature**

Winter damage is measured as the loss of plants after winter. Cold susceptibility (frost damage) indicates the damage caused by cold to aerial parts of plants which is not associated with the death of plants during winter

- **High temperature**
- **Drought**

- **Pest and disease susceptibility**

In each case it is important to state the origin of the infestation or infection, i.e., natural, field inoculation, laboratory test (specify). Indicate: if information on physiological specialization is available.
Record such information in the NOTES descriptor. Other organisms may be added using a similar coding system.
The scoring is carried out on a 1-9 scale, where: 1=no symptoms; 3=low susceptibility; 5=medium susceptibility; 7=high susceptibility; 9=disease symptoms on >90% of the plant

- **Pests**
  8.1.1 *Nematode* spp.
  8.1.2 Hessian fly *Mayetiola destructor*
- **Fungi**
  8.2.1 Stripe rust *Puccinia striformis*
  8.2.2. Stem rust *Puccinia graminis*
  8.2.3 Leaf rust *Puccinia recondita*
  8.2.4 Powdery mildew *Erysiphe graminis*
  8.2.5 Glume blotch *Septoria nodorum*
  8.2.6 Eye spot *Pseudocercosporella herpotrichoides*
  8.2.7 *Fusarium* spp.
  8.2.8 Take all *Ophiobo1us graminis*

3.2. Descriptors list genus *TRITICUM L.* (according to NPPC-VURV)

Standardized descriptors and characterization information for wheat preliminary collection:

MORPHOLOGICAL / VARIETIES / CHARACTERS / EXAMPLE

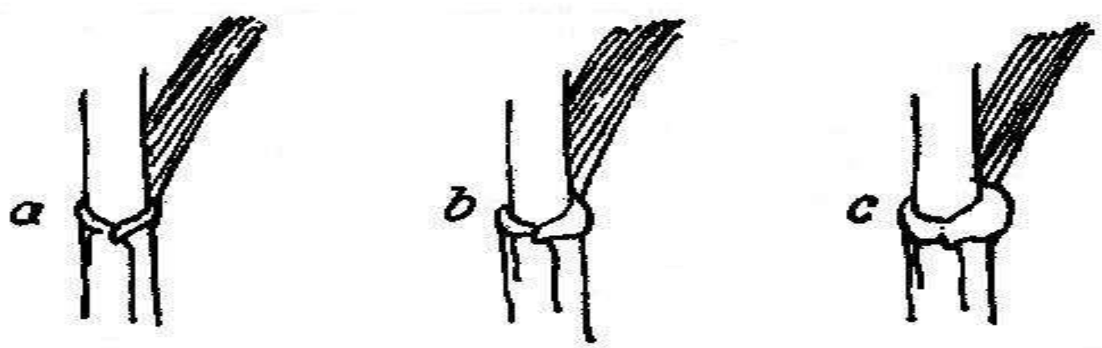
Plant - height (Stem - spike excluding awns and scurs) (at ripeness)		
<35 cm	1 - dwarf	(Courtot, Briscard)
35-50	2 -	
51-65	3 - short	(Konsul, Remus)
66-80	4 -	
81-95	5 - medium	(Sideral, Ventura)
96-110	6 -	

111-125	7 - tall	(Boxer, Adonis)
126-140	8 -	
>140	9 - very tall	(Aladin, Vitus)

Flag leaf – length (at anthesis)	
<10.0 cm	1 - very short
10.0-12.5	2 -
12.6-15.0	3 - short
15.1-17.5	4 -
17.6-20.0	5 - medium
20.1-22.5	6 -
22.6-25.0	7 - long
25.1-27.5	8 -
>27.5	9 - very long

Flag leaf – width (at anthesis)	
<1.0 cm	1 - very narrow
1.0-1.2	2 -
1.3-1.5	3 - narrow
1.6-1.7	4 -
1.8-2.0	5 - medium
2.1-2.2	6 -
2.3-2.5	7 - broad
2.6-2.8	8 -
>2.8	9 - very broad

Leaf - length of auricles (at anthesis)
3 - short
5 - medium
7 - long

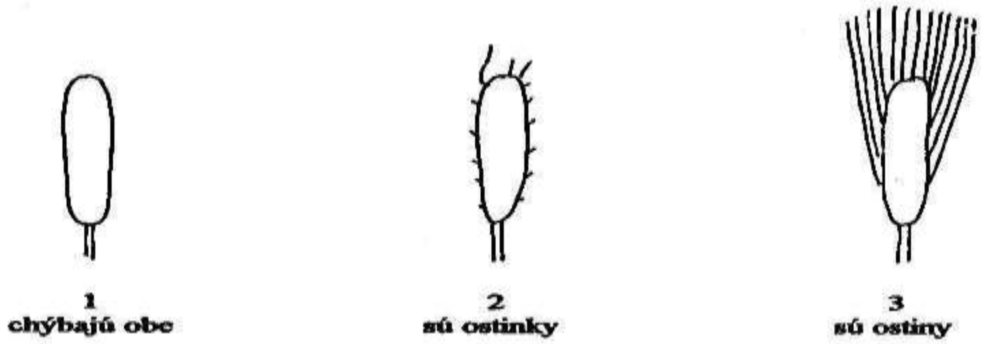


Spike colour (at heading)	
1	Yellow - green
2	light green

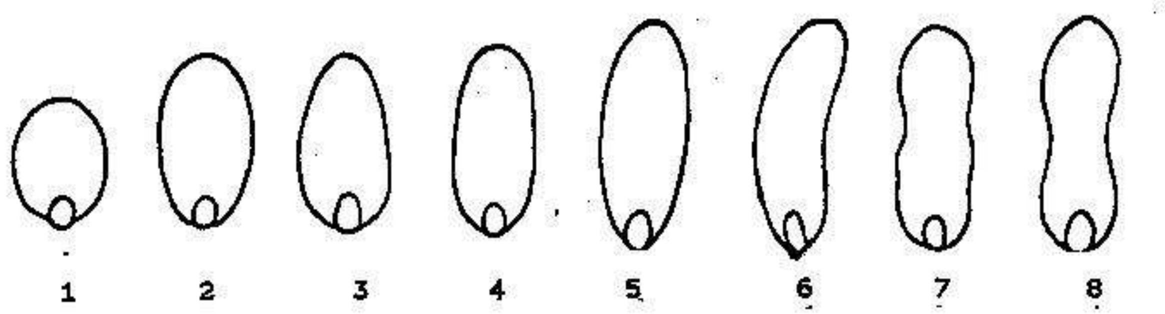
3	green
4	dark green
5	gray-green (light gray blue-weak waxy bloom)
6	blue green (silver grey blue, dense waxy bloom)
7	light violet (sparse anthocyan)
8	Violet (medium with strong anthocyan)
9	others

Spike – length (excluding awns and scurs) (at ripeness)		
<3.0 cm	1 - very short	
3.0-4.5	2 -	
4.6-6.0	3 - short	(Carat)
6.1-7.5	4 -	
7.6-9.0	5 - medium	(Ritmo, Arkas)
9.1-10.5	6 -	
10.6-12.0	7 - long	(Forby, Prinqual)
12.1-13.5	8 -	
>13.5	9 - very long	(Amifort)

Spike - awns or scurs (at ripeness)	
1 - both absent	(Futur, Axona)
2 - scurs present	(Festival, Furio)
3 - awns present	(Soissons, Ventura)



Caryopsis - shape (at ripeness)
1 - spherical
2 - rounded
3 - egg-shaped
4 - elongated
5 - very elongated
6 - falcate
7 - humpbacked
8 - flat (compressed on each side)
9 - other



Caryopsis – colour (at ripeness)
1 - light-yellow
2 - yellow
3 - amber-yellow
4 - light-brown
5 - brown
6 - amber-brown
7 - green
8 - violet
9 – other

BIOLOGICAL CHARACTERS

Vegetation - character	
1 - winter	(Slejpner)
2 - alternative - (ripens when spring sowed, but tuft typically decembent)	(Fidel
3 - spring	(Nandu)

Vegetation period - cultivar (to standard)	
<-8	1 - extremely early
-8-6	2 - very early
-5-4	3 - early
-3-2	4 - semi-early
-1+1	5 - intermediate
+2-3	6 - middle-late
+4-5	7 - late
+6-8	8 - very late
>+8	9 - extremely late

Winter – hardiness (% of survival in field conditions)	
<20 %	1 - very low
20-30	2 -
31-40	3 - low
41-50	4 -

51-60	5 - intermediate
61-70	6 -
71-80	7 - high
81-90	8 -
>90	9 - very high

Lodging - resistance (repeatedly after storm)
1 - very low
2 -
3 - low
4 -
5 - intermediate
6 -
7 - high
8 -
9 - very high

Diseases and pests

Scale of resistance
1 - very low
2 -
3 - low
4 -
5 - medium
6 -
7 -high
8 -
9 - very high

- Powdery mildew (*Erysiphe graminis* D.C.) - plant - resistance (emergence - ripeness) - leaf
- Powdery mildew (*Erysiphe graminis* D.C.) - spike – resistance (emergence - ripeness) - spike
- Stripe rust - resistance (*Puccinia striiformis* WEST) - from the beginning of stem elongation
- Brown rust – resistance triticina /ERIKS./ (*Puccinia persistens* PLOW-var -leaf - (after stem elongation)
- Stem rust – resistance (*Puccinia graminis* PERS. subsp. graminis) - Leaf - (from the beginning of stem elongation)
- Septoria disease - resistance (*Septoria nodorum* BERK.) - leaf - spike (emergence - harvest)
- Septoria leaf lzotch of wheat - resistance (*Septoria tritici* ROB.), leaf - (from tillering stage)
- Cercosporella foot rot - resistance (*Pseudocercosporella herpotrichoides* /FRON/ DEIGTON) (end of tillering - beginning of stem elongation)

D 1.2 Preliminary Collection of Each Target Species Identified

- Fusarium head blight (*Fusarium sp.*) – resistance (during whole vegetation)
- Loose smut of wheat (*Ustilago tritici* /PERS./ JENS.) – resistance (after heading)
- Head smut (*Tilletia caries* /DE CAND/ TUL.) – resistance (after heading)
- Hessian fly (Mayetiola BECK. destructor S.)

ECONOMIC CHARACTERS

Stand - number of spikes (befor harvest)	
<150 m^2	1 - very small
150-250	2 -
251-350	3 - small
351-450	4 -
451-550	5 - medium
551-650	6 -
651-750	7 - high
751-850	8 -
>850	9 - very high

Stand - grain yield preliminary (not repeated evaluation to the standard cv.)	
<65 %	1 - very low
65-75	2 -
76-85	3 - low
86-95	4 -
96-105	5 - medium
106-115	6 -
116-125	7 - high
126-135	8 -
>135	9 - very high

Stand - grain yield preliminary (not repeated evaluation to the average)	
<65 %	1 - very low
65-75	2 -
76-85	3 - low
86-95	4 -
96-105	5 - medium
106-115	6 -
116-125	7 -high
126-135	8 -
>135	9 - very high

1000 grain mass	
<27 g	1 - very low
27-30	2 -
31-34	3 - low
35-38	4 -

39-42	5 - medium
43-46	6 -
47-50	7 - high
51-54	8 -
>55	9 - very high

Spike - grain mass	
<0.6 g	1 - very low
0.6-0.8	2 -
0.9-1.1	3 - low
1.2-1.4	4 -
1.5-1.7	5 - medium
1.8-2.0	6 -
2.1-2.3	7 - high
2.4-2.6	8 -
>2.6	9 - very high

Spike - number of grains	
<11	1 - very small
11-15	2 -
16-20	3 - small
21-25	4 -
26-30	5 - medium
31-35	6 -
36-42	7 - high
43-55	8 -
>55	9 - very high

Spike - number of spikelets	
<12	1 - very small
12-13	2 -
14-15	3 - small
16-17	4 -
18-19	5 - medium
20-21	6 -
22-23	7 - high
24-25	8 -
>25	9 - very high

Spikelet - number of grains	
<1.1	1 - very small
1.1-1.5	2 -
1.6-2.0	3 - small
2.1-2.5	4 -
2.5-3.0	5 - medium
3.1-3.5	6 -
3.6-4.0	7 - high
4.1-4.5	8 -
>4.5	9 - very high

Grain - crude protein content	
<9.0 %	1 - very low
9.0-10.2	2 -
10.3-11.4	3 - low
11.5-12.6	4 -
12.7-13.8	5 - medium
13.9-15.0	6 -
15.1-16.2	7 - high
16.3-180	8 -
>18.0	9 - very high

Flour - wet gluten content	
<15.0 %	1 - very low
15.0-20.0	2 -
20.1-25.0	3 -low
25.1-30.0	4 -
30.1-35.0	5 - medium
35.1-40.0	6 -
40.0-45.1	7 - high
45.1-50.0	8 -
>50.0	9 - very high

Gluten swelling (Berliner method)	
0	1 - very low
1-3	2 -
4-6	3 - low
7-8	4 -
9-11	5 - medium
12-13	6 -
14-16	7 - high

17-19	8 -
>19	9 - very high

Flour - baking quality (Prugar method)	
<20.0	1 - very low
20.0-30.0	2 -
30.1-40.0	3 - low
40.1-50.0	4 -
50.1-60.0	5 - medium
60.1-70.0	6 -
70.1-80.0	7 - high
80.1-90.0	8 -
>90.0	9 - very high

Flour - sedimentation test	
<15 ml	1 - very poor
15-30	3 - poor
31-45	5 - medium
46-60	7 - good
>60	9 - very good

Flour - valorimetric number (farinograph)	
<20.0	1 - very low
20.0-30.0	2 -
30.1-40.0	3 - low
40.1-50.0	4 -
50.1-60.0	5 - medium
60.1-70.0	6 -
70.1-80.0	7 - high
80.1-90.0	8 -
>90.0	9 - very high

Main utilization
1 - baker's product
2 - special pasta (e.g. macaroni)
3 - feed product
4 - for baker and food purposes

4. A preliminary collection of potato

Since 1995, the yield of potato has been erratic from year to year, though showing an overall slight increase. Potatoes were cultivated in 2016 over a harvested area of 19.25 million hectares with a global production of 376.82 million tonnes (Figure 5 and Figure 6).

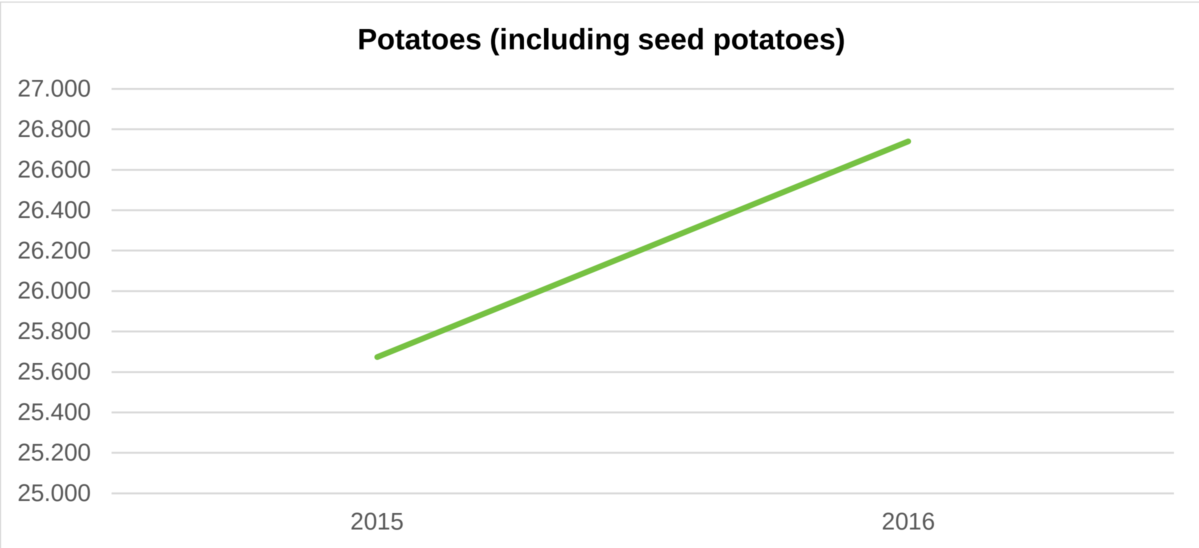


Figure 5. Organic potatoes production in the EU (EUROSTAT, 2019)

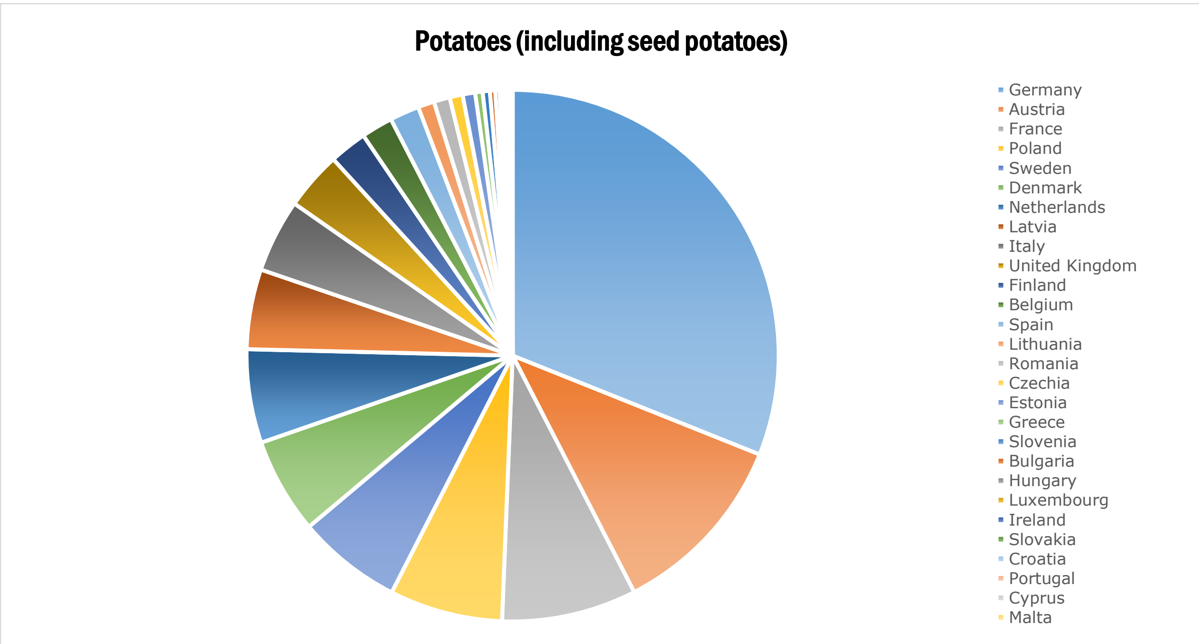


Figure 6. Organic potatoes producers in the EU in 2016 (EUROSTAT, 2019)

The gene pool can be divided into four types of germplasm:

1. Modern cultivars (and old varieties) of common potato (*Solanum tuberosum* subsp. *tuberosum*), the most cultivated potato subspecies in the world;
2. Native cultivars, including local potato cultivars occurring in the centre of diversity;
3. Wild relatives, consisting of wild tuber-bearing species and a few non tuber-producing species, occurring in the centre of diversity;
4. Other germplasm or research material; all types of genetic stocks e.g., interspecific hybrids, breeding clones, genetically enhanced stocks, etc.

Globally, about 98,000 accessions can be found *ex situ*, 80 percent of which are maintained in 30 key collections. Accessions are conserved as botanical seeds or vegetatively as tubers and *in vitro* plantlets. Latin American collections contain many native cultivars and wild relatives and the collections in Europe and North America contain modern cultivars and breeding materials, as well as wild relatives. National collection databases are incomplete and not accessible. Efforts to document and characterize *in situ* collections of wild and cultivated species and their inherent intraspecific diversity are needed as a baseline for future research on genetic erosion, species loss, genetic drift and integrity.

Identification of potato accessions

Accessions of potato were identified by all four partners in the project (KIS, IHAR, UP, UNEW - based on their data on potato varieties), databases such as The European Cultivated Potato Database, World Catalogue of Potato Varieties, ADHB Potato Variety Database, ARVALIS database on potato varieties, SASA database on organic seed lots in Scotland produced in 2017, Data on organic seed produced in 2017 in Austria, data on organic potato varieties tested in FiBL, Switzerland (data for the last 10 years), data on organic potato varieties from Bioland, Germany, Descriptive List for Potato Bundessortenamt BSA for Potato for 2017, Breeders variety cathalogues (Netherlands: Agrico, HZPC, Meijer, Den Hartigh, Stet Holland, Agroplant; Germany: Europlant, Norika, Solana; France: Germicopa, Grocep, Bretagne Plants, Comite Nord, Austria: NOES, UK: Sarpo Potatoes Ltd, James Hutton Institute), personal contacts with other partners involved in the project.

Altogether 197 varieties from 10 European countries and the USA and Canada were selected grown in diverse environments across Europe i.e. from N to S and W to E, late blight resistant and presently popular in organic farming and early commercial conventional varieties. List of variety accessions is attached. Potato is a specific crop with low multiplication rate, therefore only commercial varieties can be used in the first couple of years of the project. Therefore, mainly those with known seed source or maintainer were selected. In general, it corresponds to the number and development of breeding programmes in EU. In most of EU breeding programmes resistances to diseases were high on the priority list.

Table 2. Geographic origin of the potato genotypes selected for the ECOBREED working collection

Country of origin	Number of genotypes
Austria	4
Canada	2
Denmark	1
France	18
Germany	38
Hungary	5
Ireland	12
Netherlands	56
Poland	13
Slovenia	5
United Kingdom	40
USA	1

Due to specific needs of organic production varieties were selected according to resistance/susceptibility to late blight (LB), at LB susceptible varieties time of maturity (very early and early varieties), suitability for organic production (practical and cathalogue data), utilization traits (mainly quality table, some processing and starch, some *S. phureja* varieties), resistance (important for possibility for further multiplication of seed) and according to the country of origin. Most of the criteria determine also value for further breeding purposes (LB and PVY resistances, earliness).

On the list, there are 13 varieties with a very high resistance to late blight and 36 with high resistance, there is also 45 varieties with extreme or high resistance against PVY. According to the available data, there are 15 very early and 28 early varieties, 55 second early varieties, 81 late ones (mainly LB resistant) and 8 very late varieties (LB resistant).
Varieties from countries such as Ukraine and Russia and overseas were not considered as appropriate due to the quarantine reasons and no possibilities of seed delivery on time.
From these accessions, the working collection for further assessment will be selected.

4.1. Descriptors list for potato

3.1.1. Data on experiment management collected before planting and during growth

3.1.1.1 Classical soil analysis

- mineral nitrogen in soil

- soil phosphorous content
- soil potassium content
- pH
- organic matter in soil

3.1.1.2 Manuring and fertilization
- type, quantity and date of application of manure
- type date and quantity of other organic fertilizer

3.1.1.3 Weed control
- measures applied on weed control

3.1.1.4 Insect control
- colorado potato beetle control
- other pest control

3.1.1.5 Disease control (early and late blight...)
- use of copper
- use of any other organically allowed mean of control

3.1.1.6 All dates of technology measures recorded (planting, cultivations, harvesting)

3.1.2. Variety descriptions

3.1.2.1 Catalogue or DUS description of all varieties in the experiment will be prepared

3.1.3. Field observations of the plants (visual assessment)
Growth and development observation (using BBCH scale where applicable)

- Emergence date (50 % plants emerged)
- Date of rows closed
- Plant vigor (1 -5 scale, 5 more vigorous)
- Flowering dates
    - start of flowering (10 % inflorescens blossomed)
    - full flowering (50 % inflorescences blossomed)
    - end of flowering (10 % inflorescences still blossomed)
- Flowers colours
- Flowering abundance (1 - 5 scale, 5 most abundant)
- Maturity estimation
    - senescence estimation weekly (dates from yellowing to dried plants)

3.1.4. Pests and diseases observations

3.1.4.1 Late blight observations (using Henfling scale 1- 9)

% of leaf surface infected	Score	Descriptions of symptoms
0	1	No symptoms of late blight
0.1-1	1	Very small number of plants with lesions on large plots. No more than 2 lesions per 10 m row (+- 30 plants).
1.1-3	2	Up to 10 small lesions per plant.
3.1-10	3	Up to 30 small lesions per plant, no more than 1 of 20 leaves with symptoms.
10.1-24	4	Most of the plants is infected, every third leaf show symptoms. Only some leaves with multiple inifections.
25-49	5	Almost every leaf with lesions. Multiple infections are more often. Field or plot looks green, but all plants are infected.
50-74	6	All plants are infected and half of leaf mass is destroyed due to late blight. Plot looks mixed green/brown, presence of late blight is obvious.
75-90	7	All plants are infected, thre quarters of leaf area is destroyed. Lower leaves are dead and fallen off, the only green leaves (if they are) are at the top of the plants. The shape of the plants become curled. Plot looks nor green nor brown.
91-97	8	Some leaves and most of stems is still green. Plot is brown with some green patches.
97.1-99.9	9	Only some green leaves remained, all with lesins of late blight. Multiple infections of stems. Plot looks brown.
100	9	All leaves and stems are dead.

Henfling JW. 1982. Field screening procedures to evaluate resistance to late blight. CIP Technology Evaluation Series No. 1982: 5.

3.1.4.2 Early blight observations (Henfling (1982) scale 1 - 9, but colour adapted)
3.1.4.3 Rhisoctonia (% of plants with symptoms)
3.1.4.4 Black leg (all species together - % of plants with symptoms)
3.1.4.5 Virus diseases (% of plants with symptoms)

- mild mosaics
- severe mosaics
- leafroll symptoms
- other symptoms

3.1.4.6 Colorado potato beetle damage (% of defoliation)
3.1.4.7 Other pests on foliage recorded

3.1.5. Evaluation after harvest

- Tuber yield and its characteristics
  Tuber yield
  Marketable yield
  Number of tubers per plant

Average tuber weight
Dry matter content (sample of 5 kg of tubers over 45 mm)

6 Quality traits of tubers

6.1 Tuber shape (round, round oval, oval, long oval, long, kidney shape)
6.2 Uniformity of tuber shape (scale 1-9)
6.3 Depth of eyes (scale 1 - 9)
6.4 Skin finish
6.5 Skin colour
6.6 Flesh Colour
6.7 Tuber defects (% of tubers from 30 tubers)

- secondary growth
- tuber cracks
- hollow heart
- internal heat necroses

6. 8 Scoring of disease and pest symptoms

- rotten tubers
- rhisoctonia symptoms
- silver scurf
- other

7 Utilization

7.1 Table quality (boiling on the steam using EAPR scale)

- Surface colour of flesh (1 white, 2 creamy, 3 light yellow, 6 dark yellow)
- Uniformity of colour of cut surface (1 uniform, 4 uninform)
- Disintegration (1 none, 4 heavy)
- Consistency (1 firm, 4 soft)
- Mealyness (1 not mealy, 4 mealy)
- Moisture (1 moist, 4 dry)
- Structure (1 fine, 4 coarse)
- Taste (1 excellent, 2 very good, 3 good, 4 acceptable, 5 worse, 6 unsuitable)
- Other tastes (1 none, 4 heavy strange tastes)
- Stickiness (1 none, 4 sticky)
- General impression (1 excellent, 10 unsuitable)
- Cooking type (A, B, C, D)

7.2 After cooking darkening (5 tubers after 10 minutes, 1 hour and 24 hours, scale 1-9, 1 no darkening - 9 black tubers)

7.3 Optional -french fry estimations (only varieties that are suitable for french fry)

- Appearance (1 good, 4 bad)
- Fry colour (000 to 4, 4 unsuitable)
- Uniformity of colour (1 uniform, 4 ununiform)
- Taste (1 excellent, 4 unsuitable)
- Texture (1 too hard, 2 optimal, 3 tot soft, 4 soak)

- Oil content (1 low, 4 high)
- Crunchiness (1 good, 4 none)
- General impression (1 excellent, 10 unsuitable)

7.4 Storability (1 - 9 scale)

5. A preliminary collection of soybean

Organic soyfoods have experienced fast growth of all consumer food segments during the past 10 years. Its coverage in the EU is contributed mainly from France, Austria, Romania and Italy (Figure 7).

It is first attempt to create preliminary collection intended to use for breeding soybean for organic and low input production. Due to specificity and different demands in organic and low input production, different criteria took into account for developing of such peliminary collection. Multiple selection criteria were considered agronomic performances, environmental benefits and farmer socio-economic wellbeing.

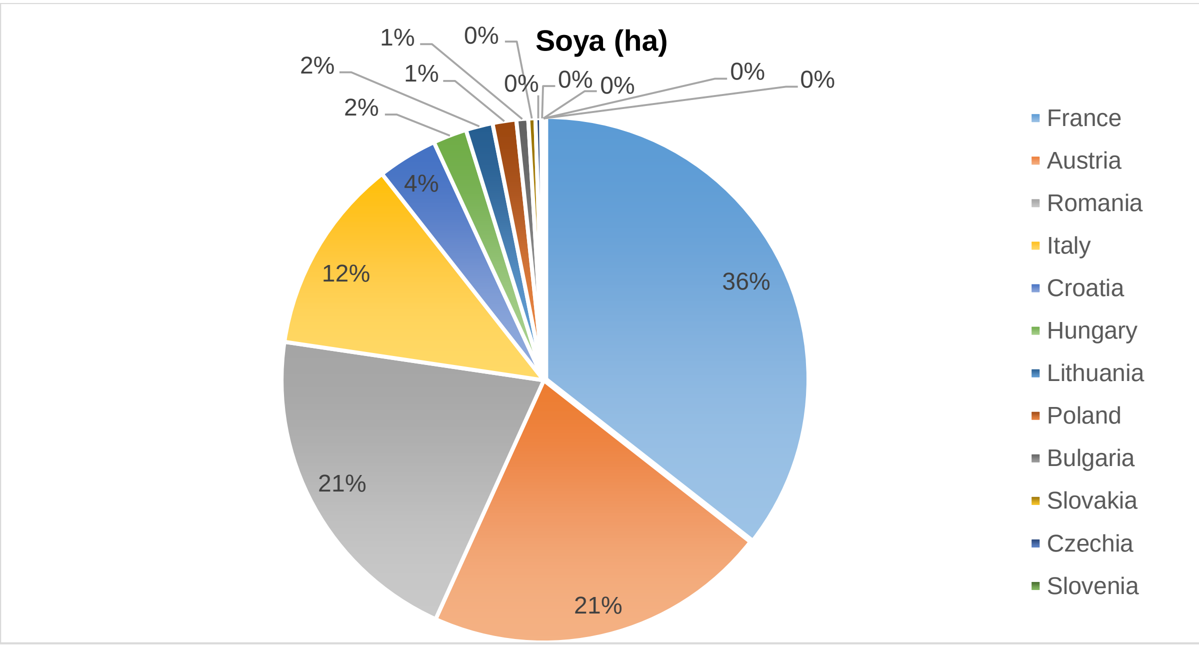


Figure 7. Organic soya coverage in the EU in 2016 (EUROSTAT, 2019)

Soybean breeding and selection is a continual process designed to increase yield levels and improve resistance to biotic and abiotic stresses. Conventional soybean yield has increased over time in response to improved genetics and agronomic practices. Specht et al. (1999) summarized a number of previous genetic gain studies, and based on these studies, reported that the average annual increase in soybean yield due to genetic improvements ranged from 10 to 30 kg ha^{-1} yr^{-1} and today the yield potential of many modern conventional cultivars is greater than 6,700 kg ha^{-1} (Cooper, 2003). Various studies have shown that genetic improvement for yield potential of soybean has been achieved through increased lodging resistance, increased stability across a wide range of environments, increased tolerance to water stress, adaptation of improved cultivars and production methods, increase in atmospheric CO_2 concentration, greater nitrogen fixation, supplying more assimilates during seed filling period, better tolerance to stress of high plant populations, and increased resistance to major pathogens (Pathan and Sleper 2008), or even adjusted planting date (Rowntree et al., 2013).

Identification of soybean accessions suitable for organic and low-input production and breeding were sought through core collection. Accession list contains 200 numbers originated all around the world. The accessions were selected according to the value for further breeding purposes using several criteria: diverse germplasm, popular organic variety, conventional variety and landraces, special traits germplasm and biotic and abiotic resistance and tolerance. Popular organic varieties, old varieties, general type varieties and divergent germplasm in this putative collection should provide genetic base in breeding programs for yield increasing and wider adaptability.

Drought tolerance and drought tolerant biological nitrogen fixation are important trait that should face with global climate changes. Also, disease resistance is essential for successful organic production, due to limitation in crop protection. Several diseases (Stem cancer, *Pythium* root rot, SMV) were identified as future potential problems and source of resistance were included in this putative collection. Another important trait, beneficially for farmers and processing industry is grain quality. High protein, large/small seed, coloured test, low Kunitz inhibitor, allergen free accessions represent a genetic base for developing special type variety that can satisfied divers demand of processing industry while farmers can face economic benefits growing that type of variety. Based on this list, some of the accessions will be tested in the field. Detailed information of accession origin, maintainer and criteria are listed in the Table 3 in the annex.

5.1. Descriptors list for soybean

Descriptor: **FLOWERDATE**

Date that 50% of the plants have begun to flower;

expressed as month (1 or 2 digits) and day (2 digits).

Descriptor is a numeric field. Blank value means no data.

Ex: 806

Descriptor: **FLWRCOLOR**

Flower colour.

Code	Definition
Dp	Dark purple
Lp	Light purple
M	Magenta
Nw	Near white
P	Purple
Pth	Dilute purple (purple throat)

W	White

Descriptor: **HEIGHT**

Plant height from ground to stem tip in centimetres measured at maturity.

Descriptor: **HILUMCOLOR**

Hilum color.

Combination or intermediate color

Code	Definition
Bf	Buff
Bl	Black
Blbr	Black hilum with brown outer ring
Br	Brown
D	Dark shade (prefix)
G	Gray
Gn	Green
Ib	Imperfect black
Ig	Imperfect gray
L	Light shade (prefix)
Rbf	Reddish buff
Rbl	Reddish black
Rbr	Reddish brown
Tn	Tan
Y	Yellow

Descriptor: **LODGING**

Tendency of plant to lodge, measured at maturity.

Descriptor: **MATDATE**

Date that 95% of the pods have reached final color; expressed as month (1 or 2 digits) and day (2 digits).

Blank value means no data. Ex: 1009

Descriptor: **MATGROUP**

Maturity evaluation. 000 = earliest, X = latest.

Code	Definition
0	MATURITY GROUP 0
00	MATURITY GROUP 00
000	MATURITY GROUP 000

D 1.2 Preliminary Collection of Each Target Species Identified

I	MATURITY GROUP I
II	MATURITY GROUP II
III	MATURITY GROUP III
IV	MATURITY GROUP IV
IX	MATURITY GROUP IX
V	MATURITY GROUP V
VI	MATURITY GROUP VI
VII	MATURITY GROUP VII
VIII	MATURITY GROUP VIII
X	MATURITY GROUP X

Descriptor: **MOTTLING**
Estimated percent of seed with dark pigmentation, hilum or saddle excluded.

Descriptor: **OIL**
Oil percent of dry weight of seed. Descriptor is a numeric field. Blank value means no data. Ex: 16.4, 19.2

Descriptor: **PROTEIN**
Protein percent of dry weight of seed. This descriptor is a numeric field. Blank value means no data. Ex: 26.8, 49.9

Descriptor: **PUBCOLOR**
Pubescence colour at middle part of main stem.

Code	Definition
G	Gray
Lt	Light tawny
Ng	Near gray
T	Tawny

Descriptor: **SCOATCOLOR**
Seed coat colour.
Combination or intermediate colour

Code	Definition
Bf	Buff
Bl	Black
Br	Brown
BrBl	Brownish black
D	Denotes dark shade (prefix)

G	Gray
Ggn	Grayish green
Gn	Green
Gnbl	Greenish black
Gnbr	Greenish brown
Ib	Imperfect black
L	Denotes light shade (prefix)
Rbf	Reddish buff
Rbl	Reddish black
Rbr	Reddish brown
Tn	Tan
Y	Yellow

Descriptor: **SEEDWEIGHT**

Weight of 100 seeds in grams (g). Blank value means no data.

Descriptor**: SMV**

Reaction to soybean mosaic virus caused by Soja virus

Blank value means no data.

Code	Definition
1	Moderately resistant
2	(1 = MODERATELY RESISTANT, 5 = HIGHLY SUSCEPTIBLE)
3	(1 = MODERATELY RESISTANT, 5 = HIGHLY SUSCEPTIBLE)
4	(1 = MODERATELY RESISTANT, 5 = HIGHLY SUSCEPTIBLE)
5	Highly susceptible

Descriptor: **STEMCANKER**

Reaction to stem canker caused by *Diaporthe caulivora*.

Code	Definition
R	Resistant
S	Susceptible

Descriptor: **STEMTERM**

Evaluation of stem growth habit, coded for determinate to indeterminate.

Code	Definition
D	Determinate (stem abruptly terminating)
N	Indeterminate (stem tapering gradually toward tip)
S	Semi-determinate (intermediate between determinate and indeterminate)

D 1.2 Preliminary Collection of Each Target Species Identified

Descriptor: **YIELD**

Yield in megagrams per hectare (Mg/ha) at 13% seed moisture. Descriptor is a numeric field. Blank value means no data. Ex: 2.21, 3.05

6. A preliminary collection of buckwheat

Common buckwheat (*Fagopyrum esculentum* Moench.), is a plant originated in China and mainly cultivated for its grain-like fruits and as a cover and melliferous crop. Related and a more bitter species, *Fagopyrum tataricum* (L.) Gaertn., a domesticated food plant common in Asia mainly in the higher attitudes of the Himalaya, but not as common in Europe or North America, is also referred to as buckwheat. Common buckwheat was grown as a traditional staple food in several regions of Europe, however, its cultivation declined sharply in the 20th century with the adoption of nitrogen fertilizer that increased the productivity of other staple crops. At present, buckwheat is still grown in many countries such as China, Russia, Ukraine, Brazil, Japan, the USA etc. but also in France, Slovenia, the Czech Republic, Poland, Slovakia etc. Annual world production (2017) is about 3.83 million t from 3.94 million ha (FAOSTAT, 2019). Unfortunately, there are no statistical data regarding the buckwheat organic production and organic production of its seeds.

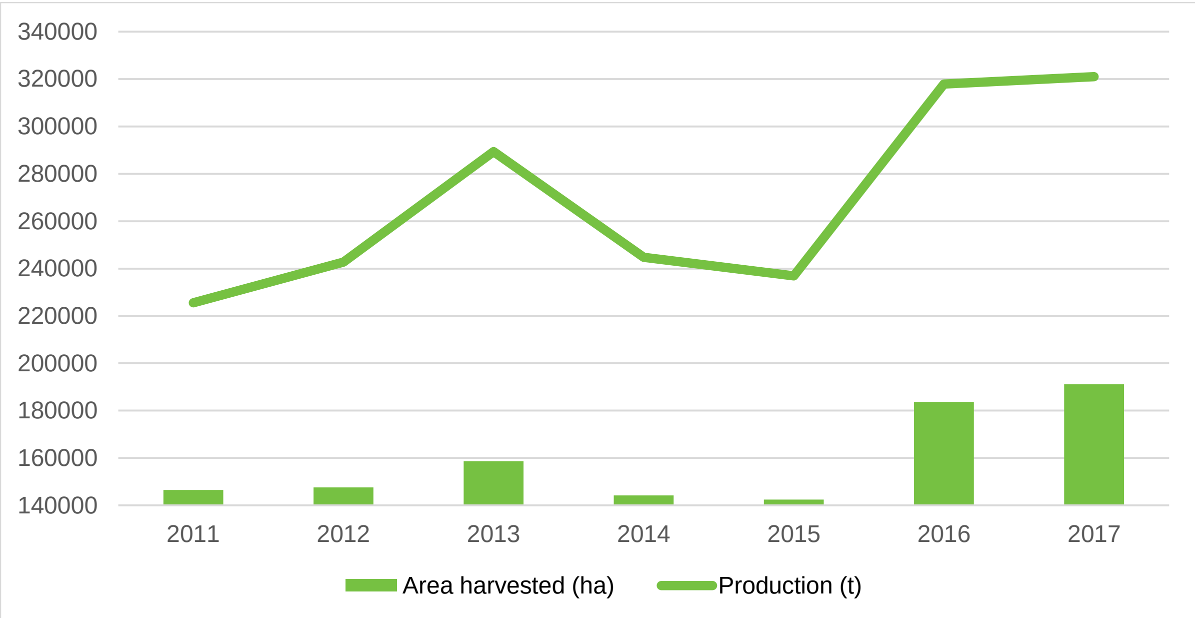


Figure 8. Trend of buckwheat production in the EU (FAOSTAT, 2019)

Buckwheat belongs to the healthy food grains where the consumer's demand has been increasing. It is naturally gluten-free with a high content of rutin which positively influences blood circulation and vessels etc. Buckwheat has a big potential in organic agriculture due to the lower demands on the soil conditions and its capability to improve the accessibility of phosphorus for the next crop. The phosphorus deficiency might be a big problem in crop production not only in the organic environment in the future.

Although buckwheat has been a traditional crop for lot of countries within the EU (Poland, Slovakia, Slovenia, the Czech Republic, France etc.) it has received relatively little attention from the breeding companies. In the past, there were several breeding activities in the Czech Republic, Poland, and Slovakia etc. However, nowadays, the knowledge of the current situation is limited. The most problematic characters of the crop are lodging, seed shattering, and low yields. Improved cropping techniques and a proper breeding programme might partly solve these handicaps.

The main area of breeding has been in China, Korea, Japan, Poland, Russia, and Ukraine. The breeding programmes are still running in Russia, China, and Korea. In these countries, there are numerous landraces and many have already been collected for selection and testing. A lot of buckwheat accessions are stored in gene banks worldwide. In all collections of buckwheat worldwide, there are stored thousands of accessions. For better handling with the buckwheat accessions, the preliminary collection has been created for further breeding by partners SZG, KIS and RGA and evaluation of selected traits (CRI, UViGO). According to international agreements, countries may regulate access to their genetic resources. It may cause limited access to the genebanks accessions. In the case of buckwheat, the biggest buckwheat collections are in China and in Russia. However, China regulates access to their genetic resources and Russian access is limited as well. For that reason, the accessions only from the free access sites were used as a source of buckwheat genotypes.

The buckwheat preliminary collection was defined according to the available genotypes from freely accessible gene banks and from seed companies in Europe. A total of 2,999 accessions of common buckwheat (2,014 accessions are stored in Ukrainian and 985 in other European gene banks) and 202 accessions of Tartary buckwheat genotypes were found in EURISCO. Duplicates and genotypes with the same characteristics were identified. For this reason, the discussion on the most important features was conducted with the breeders, farmers and producers and further with the curators of the buckwheat collections in the selected gene banks. Finally, 264 genotypes were identified for buckwheat preliminary collection. From the preliminary collection, the buckwheat working collection was created using eco-geographical principles. 200 genotypes from different environments across Europe mainly focused on the countries with a tradition of buckwheat cultivation, but genotypes from the main breeding countries such as Russia, Ukraine, China, India and Japan were also included (Figure 9). The genotypes were also selected according to the size of the achenes, the difference in flower colour and the determinant flowering. A set of selected genotypes includes commercial varieties, obsolete varieties, landraces and populations of buckwheat.

Figure 9. Countries of buckwheat genotypes origin selected for the putative collection

All genotypes selected for the working collection will be evaluated in WP5 according to the selected list of descriptors (IPGRI, 1994).

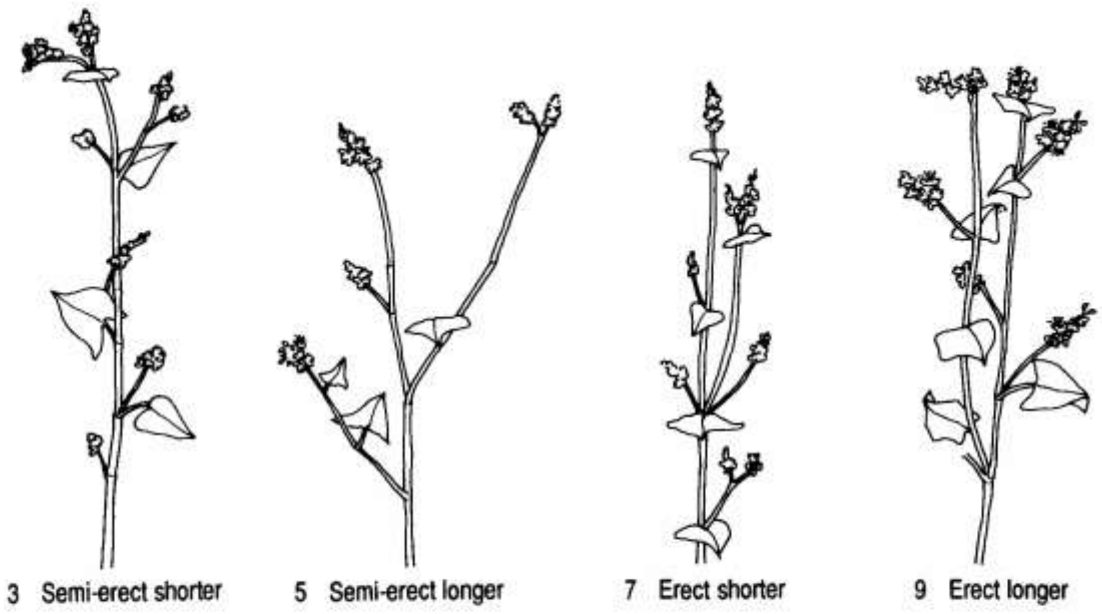
6.1. Descriptors list for common and tatary buckwheat (according to the Buckwheat descriptors list by IPGRI 1994)

Growth and branch shoot habit

Angle of branch shoot and the highest tip branch longer or shorter than main shoot. At flowering stage

3	Semi-erect shorter
5	Semi-erect longer
7	Erect shorter
9	Erect longer

D 1.2 Preliminary Collection of Each Target Species Identified



1. Plant height (cm)

Mean height measured from the ground level to the highest tip of shoots of at least 10 randomly chosen plants at physiological maturity

2. Plant branching

Average number of primary branches taken from randomly chosen plants at physiological maturity

1	Very weak (no branch)
3	Weak (2 branches)
5	Intermediate (4 branches)
7	Strong (6 branches)
9	Very strong (≥8 branches)

3. Stem colour

Recorded when 100% of plants have flowers, from middle part of main the main stem of 10 randomly chosen plants

3	Green	134B, 140B, 140C, 141D, 143D) (RGB codes – 91,177,100; 120,179,81; 150,203,126; 68,109,55; 168,187,129)
5	Pink	(38A, 38B, 39B) (RGB codes – 243,145,137; 240,170,161; 218,115,107)
7	Red	(40D, 41C, 41D) (RGB codes – 243,117,96; 242,120,110; 239,142,133)

4. Leaf colour

Recorded when 100% of plants have flowers, from leaves of the middle part of the main stem

3	Green	(134B, 140B, 140C, 141D, 143D) (RGB codes – 91,177,100; 120,179,81; 150,203,126; 68,109,55; 168,187,129)
5	Pink	(38A, 38B, 39B) (RGB codes – 243,145,137; 240,170,161; 218,115,107)
7	Red	(40D, 41C, 41D) (RGB codes – 243,117,96; 242,120,110; 239,142,133)

5. Leaf number

Mean number of leaves on main stem of 10 randomly chosen plants counted when 75% of seeds turned brown

6. Petiole colour

Recorded on petioles from middle part of the main stem, at flowering stage

3	Green	(134B, 140B, 140C, 141D, 143D) (RGB codes – 91,177,100; 120,179,81; 150,203,126; 68,109,55; 168,187,129)
5	Pink	(38A, 38B, 39B) (RGB codes – 243,145,137; 240,170,161; 218,115,107)
7	Red	(40D, 41C, 41D) (RGB codes – 243,117,96; 242,120,110; 239,142,133)

7. Leaf blade length (cm)

Average length of 5 randomly chosen representative leaves from the middle part of the main stem at the widest part of leaf measured when 75% of seeds turned brown

8. Leaf blade width (cm)

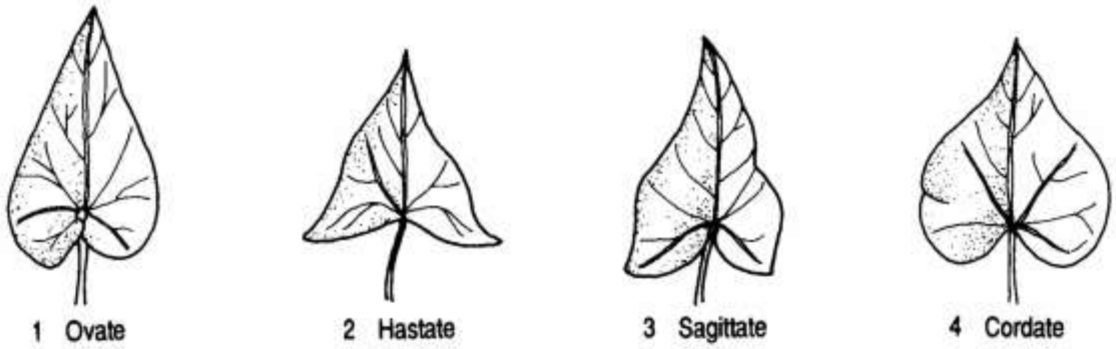
Average width of 5 randomly chosen representative leaves measured when 75% of seeds turned brown

9. Leaf blade shape

Scored on leaves from the middle part of the main stem, when 75% of seeds turned brown

1	Ovate
2	Hastate
3	Sagittate(Intermediate)
4	Cordate
5	Other(specify in the notes)

D 1.2 Preliminary Collection of Each Target Species Identified



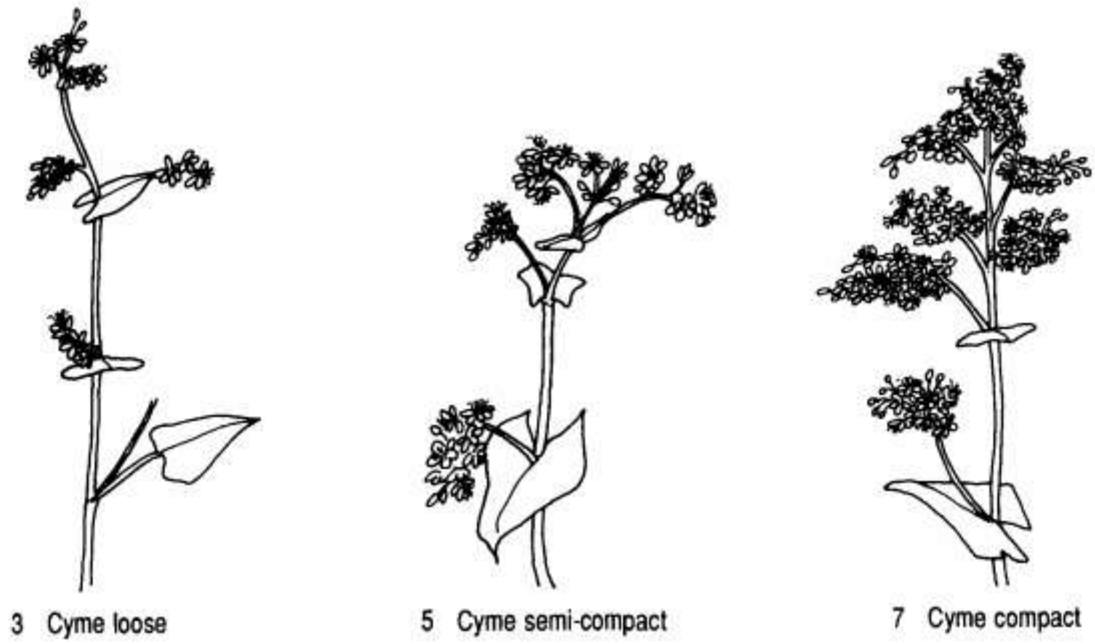
10. Days to flowering

Number of days from sowing to 50% of plants having fully open flowers

11. Compactness of inflorescence

Average of 10 randomly chosen plants

3	Cyme loose
5	Cyme semi-compact
7	Cyme compact



12. Colour of inflorescence stalk

Recorded when 75% of seeds turned brown

3	Green	(134B, 140B, 140C, 141D, 143D) (RGB codes – 91,177,100; 120,179,81; 150,203,126; 68,109,55; 168,187,129)
5	Pink	(38A, 38B, 39B) (RGB codes – 243,145,137; 240,170,161; 218,115,107)
7	Red	(40D, 41C, 41D) (RGB codes – 243,117,96; 242,120,110; 239,142,133)

13. Number of flowers clusters per cyme

Average number of flowers clusters of two representative cymes from five representative plants. Recorded when 75% of seeds turned brown

14. Flower colour

Recorded at the active flowering stage

1	White	
3	Greenish-yellow	(149B, 149C, 150B, 150C) (RGB codes – 198,212,102; 204,221,125; 219,212,85; 223,221,112)
5		
7	Pink	(38A, 38B, 39B) (RGB codes – 243,145,137; 240,170,161; 218,115,107)
9	Red	(40D, 41C, 41D, 42B, 42C) (RGB codes – 243,117,96; 242,120,110; 239,142,133; 193,75,63; 210,86,72)

15. Days to maturity

Actual number of days between sowing and physiological maturity (75% of seeds turned brown)

1	Very early (<60 days)
2	Early (60-75 days)
3	Intermediate (76-90 days)
4	Late (91-105 days)
5	Very late (> 106 days)

16. Number of seeds per cyme

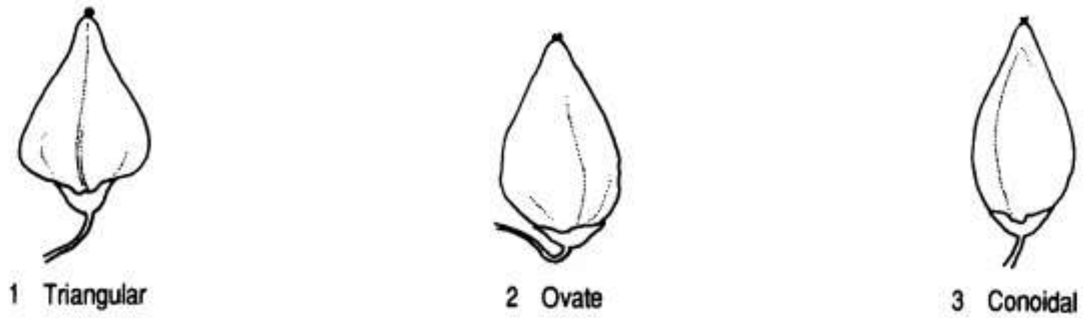
Average number of seeds per two representative cymes each from five different plants. Recorded when 75%.

17. Seed colour

3	Grey	(199C, 199D) (RGB codes – 164,138,107; 176,151,123)
5	Brown	(200D) (RGB codes – 114,80,65)
7	Black	(202B) (RGB codes – 112,116,118)
9	Mottled	

18. Seed shape

1	Triangular
2	Ovate (Intermediate)
3	Conoidal
4	Other (specify in the notes)



19. Seed surface

1	Smooth
2	Irregular or wrinkled
3	Other (specify in the notes)

20. Seed coat colour

Degree of green of seed coat, husked achenes

1	Greenish-yellow	(144C, 144D, 145B, 148D) (RGB codes – 172,173,78; 194,203,127;184,190,110; 170,172,136)
2	Light green	(128D, 129D, 130D) (RGB codes – 198,221,202; 178,216,191; 201,221,197)
3	Green	(134D, 140C, 141D, 143D) (RGB codes – 167,210,165; 150,203,126; 158,184,108; 168,187,129)

21. 1000-seed weight (g)

22. Crude protein content

23. Rutin content (achenes)

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ANNEX

Table 1: List of *winter wheat genotypes* included in the ECOBREED preliminary collection

Variety name	Year of release	Status	Origin (Country, Breeder)	Traits for selection	Source
121-11z 2b 2	.	BL	DE, Secobra		
261-05z 1-2	.	BL	DE, Secobra	bunt resistance, mainly for crossings	
290-08 1 1a	.	BL	DE, Secobra	high yielding, low protein	
313-10z 2a 4 1	.	BL	DE, Secobra		
315-10 6a 23 14	.	BL	DE, Secobra		
A15	1933	old variety	RO, ICAR	main cultivar in the 1940s	
ACHAT	.	Deleted from List	AT, Probstdorfer Saatzucht	longterm check in German organic trials; good quality E despite 1B/1R translocation	http://www.probstdorfer.at/
ADELINA	2012	List: RO	RO, ARS Simnic	Relatively good results in organic yield trials	
AKTEUR	2004	List: DE, CZ, EE, LT, LU, NO, PL	DE, DSV	high baking quality E, good adaptability, recommended bio-variety Germany	https://www.dsv-saaten.de/getreide/winterweizen/sorten/akteur.html
ALESSIO	2016	List: AT	AT, Saatzucht Donau	baking quality 7	http://www.saatzucht-donau.at/
ALEX	1994	List: RO, HU	RO, ARS Lovrin	Relatively good results in organic yield trials	
ANAPURNA	2013	List: HU, RO, BG, IT	FR, Limagrain	good yellow rust tolerance	
ANNIE	2014	List: CZ	CZ, Selgen		https://selgen.cz/
ANTONIUS	2003	List: AT, FR, SI, HR,	AT, Saatzucht Donau	high quality; broad adaptation; BioNet longterm variety	http://www.saatzucht-donau.at/
ARGUMENT	2018	List: DE	DE, Streng- Engelen	long plant hight	
ARISTARO	2016	List: DE	DE, Dottenfelderhof	organic variety; excellent quality; bunt resistance; excellent weed competitiveness	https://www.dottenfelderhof.de/
ARMINIUS	2016	List: AT	AT, Saatzucht Donau	organic VCU; baking quality 7	http://www.saatzucht-

Variety name	Year of release	Status	Origin (Country, Breeder)	Traits for selection	Source
					donau.at/
ARNOLD	2009	List: AT	AT, Saatzucht Donau	high protein content; unstable yield performance	http://www.saatzucht-donau.at/
ASORY	2018	List: DE	DE, Secobra	High baking volume at low protein content, drought resistance?	
ASTARDO	2003	List: AT	AT, Saatzucht Donau	baking quality 7; BioNet longterm variety	http://www.saatzucht-donau.at/
ASZITA	2005	List: DE	CH, Peter Kunz	organic variety; good quality	https://www.gzpk.ch/
ATARO	2004	List: CH	CH, Peter Kunz	organic variety; lodging tolerant; limited quality	https://www.gzpk.ch/
AURELIUS	2016	List: AT, HU, SK	AT, Saatzucht Donau	tall - excellent weed suppression, good tolerance to *S. nodorum, S. tritici* and *Fusarium* spp., high yields	http://www.saatzucht-donau.at/
AXIOMA	2014	List: DE, LU	DE, Secobra	Conventional variety with good yield, used in organic farming in France	https://www.secobra.de/
BÁNKÚTI-1201	1931	old variety	HU	old Hungarian variety, it is still grown in organic, very high protein content (15.8%), but: low yield, lodging	
BARETTA	2016	List: CH	CH, Agroscope/DSP	good disease resistance; limited resistance to *Fusarium*	https://www.agroscope.admin.ch/agroscope/de/home.html
BARRANCO	2016	List: DE, LU	DE, Secobra	Conventional variety with good results under organic conditions	https://www.secobra.de/
BC LIRA	2009	List: HR	HR, BC Institute Zagreb	medium tall - good yellow rust tolerance	
BERNSTEIN	2013	List: AT, DE, CZ, LU	DE, Syngenta	excellent weed suppression, good tolerance to *Septoria nodorum, Fusarium* spp., tolerance to *S. tritici*, resiliant to lodging, good baking quality	https://www.syngenta.de/
BERTOLD	2010	List: SK	SK, Hordeum Sládkovičovo	medium early cv., good resistance to fungal diseases, E quality	https://griss.vurv.sk/

Variety name	Year of release	Status	Origin (Country, Breeder)	Traits for selection	Source
BITOP	2006	List: AT, HU, IR	AT, Saatzucht Donau	organic VCU test; baking quality 7	http://www.saatzucht-donau.at/
BONA VITA	2011	List: SK	SK, Istropol Solary	Glu Score 8, high baking quality E, resistance to leaf rust	https://griss.vurv.sk/
BRANDEX	2016	List: DE	DE, Dottenfelderhof	organic CCP; yellow rust and bunt resistance	https://www.dottenfelderhof.de/
BUSSARD	1998	List: DE, LT, LU, LV	DE, KWS Lochow	long term organic check variety in Germany, baking quality E	https://www.kws.com/
BUTARO	2009	List: DE, LU	DE, Dottenfelderhof	organic variety; bunt resistance	https://www.dottenfelderhof.de/
BUTTERFLY	2017	List: CZ	CZ, Selgen		https://selgen.cz/
CAPO	1989	List: AT, HU	AT, Probstdorfer Saatzucht	good tolerance to leaf diseases-high protein content	http://www.probstdorfer.at/
CCB INGENIO	2005	List: ES	FR, CC Benoist (Syngenta)	tall - excellent weed suppression, good tolerance to *Septoria nodorum, Fusarium* spp., high yields	
CH CLARO	2007	List: CH	CH, Agroscope/DSP	high baking quality	https://www.agroscope.admin.ch/agroscope/de/home.html
COLONIA	2011	List: HU, BE, DE, LU	DE, Limagrain	best results in organic tests in Washington State (US)	
CURIER	.	BL - 3rd year VCU	DE, Dottenfelderhof	organic bred; high yield with excellent resistance to yellow rust and *Tilletia*	https://www.dottenfelderhof.de/
DACIA	1971	List: RO	RO, NARDI Fundulea	Tall, vigorous	http://www.incda-fundulea.ro/index_en.html
DAGMAR	2012	List: CZ, HU, BG, LT, RO, SK	FR, Limagrain		http://lc.lgseeds.cz/
DONNATO	2008	List: AT	AT, Saatzucht Piatti	organic variety, best weed competitiveness in Austrian organic VCU trial	
DROPIA	1993	List: RO	RO, NARDI Fundulea	High quality	http://www.incda-

Variety name	Year of release	Status	Origin (Country, Breeder)	Traits for selection	Source
					fundulea.ro/index_en.html
EDELMANN	2017	List: AT	AT, LFS Edelhof	organic VCU; baking quality 7	
EHOGOLD	2014	List: AT	AT, LFS Edelhof	baking quality 8; excellent test weight	
ELAN	2012	List: CZ	FR, RAGT Semences	medium tall - excellent weed suppression	
ELIXER	2012	List: DE, LU, NL	DE, W. von Borries- Eckendorf	Recommended by Bavarian state institute for organic farming. Bad resistance to bunt.	
ERLA KOLBEN	1961	List: AT	AT, Kärntner Saatbau	old variety, highest baking quality (group 9)	
ESTEVAN	2005	List: AT, LU	AT, LFS Edelhof	good quality, stable yields under organic	
EVROPA 90	1990	List: RS	RS, IFVC	medium tall - good yellow rust tolerance	http://www.ifvcns.rs/
F 49	.	LR	SK, ŠS Sladkovičovo (Hordeum s.r.o.)	old Slovakian landrace, very tall, resistance to *Fusarium*	https://griss.vurv.sk/
FARINELLI	2006	List: FR, HR, IT	FR, KWS Momont SAS	medium tall - good rust tolerance	
FDL MIRANDA	2011	List: RO	RO, NARDI Fundulea	Relatively good results in organic yield trials; low protein content	http://www.incda-fundulea.ro/index_en.html
FDLGPC1	.	BL	RO, NARDI Fundulea	High protein content (*Gpc1 carrier)*	http://www.incda-fundulea.ro/index_en.html
FDLGPC2	.	BL	RO, NARDI Fundulea	High protein content (*Gpc1 carrier)*	http://www.incda-fundulea.ro/index_en.html
FLAMENKO	2010	List: FR	FR, Agri-Obtentions/INRA	good quality, resistance against *Septoria*; recommended bio-variety in France	
FLORIAN	2010	List: DE, LU	DE, Nordsaat	excellent quality (class E); recommended bio-variety Bavaria	
FOLKLOR	2010	List: FR	FR, Agri-Obtentions/INRA	organic programme	
FUNDULEA 4	1987	List: RO	RO, NARDI Fundulea	Better ground cover	http://www.incda-fundulea.ro/index_en.h

Variety name	Year of release	Status	Origin (Country, Breeder)	Traits for selection	Source
					tml
GENIUS	2010	List: DE, CZ, HU	DE, Nordsaat	conventional variety; high baking quality; good bunt resistance	
GENOVEVA	2006	List: SK	SK, Hordeum Sládkovičovo	late cv., higher plant height, long and wide leaves, good resistance to fungal diseases, A-B quality	https://griss.vurv.sk/
GHAYTA	2012	List: FR	FR, Agri-Obtentions/INRA	resistance against mosaic virus; recommended bio-variety in France	
GLOSA	2005	List: RO, HU	RO, NARDI Fundulea	Most widely grown by organic farmers	http://www.incda-fundulea.ro/index_en.html
GOROLKA	1990s	List: SI	SI, Anton Tajnšek	tall - good weed supression, good yields and quality in low N environment	
GOVELINO	2015	List: DE, LU	DE, GZF Darzau	organic variety; resistance against *Ustilago*; high NUE and high gluten content	
GRAZIARO	2016	List: DE	DE, Dottenfelderhof	Highest bunt resistance in German listed varieties	https://www.dottenfelderhof.de/
HENDRIX	2011	List: FR	FR, Agri-Obtentions/INRA	high test weight, organic variety from INRA Le Rheu	
IBARRA	2017	List: SK	CZ, Selgen		https://selgen.cz/
ILLICO	2010	List: FR, HR, IT	FR, Syngenta	good tolerance to *Fusarium* spp., good tillering, high yields	
ILLUSION	?	?	CZ, Selgen		https://selgen.cz/
ILONA	1989	CV	SK, Selekt Bučany		https://griss.vurv.sk/
IS AGILIS	2017	List: SK	SK, Istropol Solary	extra early cv., medium resistance to powdery mildew and leaf spots, high resistance against wheat rust, good tolerance to viruses, quality E (8-9)	https://griss.vurv.sk/; http://istropol.sk/
IS CONDITOR	2012	List: SK	SK, Istropol Solary	medium late cv., high tillering and regeneration potential, low quality (feed)	https://griss.vurv.sk/; http://istropol.sk/

Variety name	Year of release	Status	Origin (Country, Breeder)	Traits for selection	Source
IS ESCORIA	2011	CV	SK, Istropol Solary		https://griss.vurv.sk/; http://istropol.sk/
IS GORDIUS	2012	List: SK	SK, Istropol Solary	medium late cv., good resistance to diseases, E/A quality	https://griss.vurv.sk/; http://istropol.sk/
IS LAUDIS	2015	List: SK	SK, Istropol Solary	high food quality, high winter-hardiness, good disease resistance, origin: Barroko x Capo	https://griss.vurv.sk/; http://istropol.sk/
IS MANDALA	2014	List: SK	SK, Istropol Solary	medium late cv., good disease resistance, high tillering, E quality (7-8)	https://griss.vurv.sk/; http://istropol.sk/
IS SOLARIS	2016	List: SK	SK, Istropol Solary	late cv., E quality (8), good disease resistance	https://griss.vurv.sk/; http://istropol.sk/
IULIA	1974	List: RO	RO, NARDI Fundulea	Relatively tall	http://www.incda-fundulea.ro/index_en.html
IZALCO CS	2015	List: IT, FR, HR	FR, Caussade Semences	semi tall with good tillering - good weed suppression, good tolerance to *S. nodorum*, *Fusarium* spp., good tolerance to yellow rust, high yields	
IZVOR	2008	List: RO	RO, NARDI Fundulea	Relatively good results in organic yield trials; drought resistant	http://www.incda-fundulea.ro/index_en.html
JUGOSLAVIJA	1980	List: RS	RS, IFVC	medium tall - good yellow rust tolerance	http://www.ifvcns.rs/
JULARO	2011	List: DE	DE, Dottenfelderhof	organic variety; good quality; resistant to *Ustilago*, medium resistant to *Tilletia*	https://www.dottenfelderhof.de/
JUNO	2017	List:SK	SK, Selekt Bučany	early cv., high food quality	https://griss.vurv.sk/
KM1	.	BL	CZ, Agrotest		https://www.vukrom.cz/cz/agrotest-fyto-s-r-o.html
KM108	.	BL	CZ, Agrotest		https://www.vukrom.cz/cz/agrotest-fyto-s-r-o.html

Variety name	Year of release	Status	Origin (Country, Breeder)	Traits for selection	Source
KWS CRISPIN	2014	List: UK	UK, KWS UK	high yield in UK organic trials	http://www.kws-uk.com/
KWS MILANECO	2013	List: DE, LU	DE, KWS Lochow	high quality (class E); recommended in Bavaria	https://www.kws.com/
KWS SISKIN	2014	List: UK	UK, KWS UK	highest yield in UK in organic trials	http://www.kws-uk.com/
KWS ZYATT	2015	List: UK, DK	UK, KWS UK	highest protein content in UK organic trials, high yield	http://www.kws-uk.com/
LENNOX	2011	List: UK, FR, AT, DE, FI, LU	DE, Strube	baking quality 7; good adaptation; high yields in BioNet trials	https://www.strube.net/
LIOCHARLS	2016	List: DE	DE, Dottenfelderhof	organic CCP; good baking quality; good resistances	https://www.dottenfelderhof.de/
LISETA	2018	List: SK	CZ, Selgen		https://selgen.cz/
LITERA	2010	List: RO	RO, NARDI Fundulea	relatively good results in organic yield trials	http://www.incda-fundulea.ro/index_en.html
LORENZO	2011	List: CH	CH, Agroscope/DSP	high baking quality	https://www.agroscope.admin.ch/agroscope/de/home.html
LUDWIG	1997	List: AT, DE, CZ, HU, HR, PL, SI	AT, Probstdorfer Saatzucht	tall - excellent weed suppression	http://www.probstdorfer.at/
LUKULLUS	2008	List: AT, RO, SK	AT, Saatzucht Donau	tall - excellent weed suppression, good tolerance to *Septoria nodorum, Fusarium* spp.	http://www.saatzucht-donau.at/
MIDAS	2008	List: AT, HR, HU, SK, RS, UA, TR	AT, Saatzucht Donau	high adaptability, quality group 7	http://www.saatzucht-donau.at/
MOLINERA	2013	List: CH	CH, Agroscope/DSP	excellent quality, good weed competitiveness	https://www.agroscope.admin.ch/agroscope/de/home.html
MOSCHUS	2016	List: DE	DE, Hermann Strube	Conventional variety, New check in German org. trials	https://www.strube.net/
MULAN	2005	List: AT, BE, CZ, DE, EE, HU, LT, LU, PL, SE	DE, Nordsaat	high yielding, high adaptability to various European growing regions	https://www.saaten-union.de/

Variety name	Year of release	Status	Origin (Country, Breeder)	Traits for selection	Source
MV BÉRES	2003	List: HU	HU, MTA ATK	high grain protein content: 14,5% (mean of 46 data from the last 10 years, Kjeldahl method)	http://martongenetics.com/kalaszos-katalogus-2018/
MV BOJTÁR	2014	List: HU	HU, MTA ATK	good yield results in organic trials, GPC:12,2%	http://martongenetics.com/kalaszos-katalogus-2018/
MV EMESE	2000	List: HU	HU, MTA ATK	good *Fusarium* resistance	http://martongenetics.com/kalaszos-katalogus-2018/
MV KARÉJ	2011	List: HU	HU, MTA ATK	good baking quality, high protein content (13%), good adaptability to different growing conditions	http://martongenetics.com/kalaszos-katalogus-2018/
MV KARIZMA	2009	List: HU	HU, MTA ATK	high protein variety (GPC:13,7%), facultative type	http://martongenetics.com/kalaszos-katalogus-2018/
MV KEPE	2014	List: HU	HU, MTA ATK	good yield results in organic trials, GPC: 12,4%, leaf rust and yellow rust tolerance	http://martongenetics.com/kalaszos-katalogus-2018/
MV KOLO	2006	List: HU, HR, RO	HU, MTA ATK	high protein variety (GPC:13,7%)	http://martongenetics.com/kalaszos-katalogus-2018/
MV KOLOMPOS	2009	List: HU, HR	HU, MTA ATK	high gluten content, good baking quality in extensive production, good results in organic yield trials, GPC: 13,3%	http://martongenetics.com/kalaszos-katalogus-2018/
MV LUCILLA	2007	List: HU	HU, MTA ATK	excellent adaptability, very good performance and yield in organic trials, GPC: 12,5%	http://martongenetics.com/kalaszos-katalogus-2018/
MV MAGDALÉNA	1996	List: HU	HU, MTA ATK	high protein content (13,7%), old variety, today it is recommended for extensive conditions	http://martongenetics.com/kalaszos-katalogus-2018/
MV MENROT	2014	List: HU	HU, MTA ATK	very good tolerance to leaf, yellow and stem	http://martongenetics.

Variety name	Year of release	Status	Origin (Country, Breeder)	Traits for selection	Source
				rust, high yielding variety, GPC: 12,5 %	com/kalaszos-katalogus-2018/
MV MENUETT	2009	List: HU	HU, MTA ATK	high GPC: 13,8%, good adaptability	http://martongenetics.com/kalaszos-katalogus-2018/
MV NEMERE	2013	List: HU	HU, MTA ATK	high yielding, early variety with good quality, GPC: 12,6%	http://martongenetics.com/kalaszos-katalogus-2018/
MV PÁNTLIKA	2012	List: HU	HU, MTA ATK	very good tolerance to wheat diseases (fusarium, yellow rust), good quality, GPC: 12,6%	http://martongenetics.com/kalaszos-katalogus-2018/
MV SUBA	2002	List: HU, HR	HU, MTA ATK	high GPC: 13,9%, premium quality	http://martongenetics.com/kalaszos-katalogus-2018/
MV TALLER	2010	List: HU	HU, MTA ATK	grain size, good milling quality	http://martongenetics.com/kalaszos-katalogus-2018/
MV TOBORZÓ	2003	List: HU	HU, MTA ATK	very early variety, excellent baking quality, high grain protein content (13,8%)	http://martongenetics.com/kalaszos-katalogus-2018/
MV UNCIA	2017	List: HU	HU, MTA ATK	new variety with good protein content (13%), good performance in organic trials	http://martongenetics.com/kalaszos-katalogus-2018/
MV VERBUNKOS	2001	List: HU	HU, MTA ATK	high grain protein content: 14,1 % (mean of 25 data from the last 10 years, Kjeldahl method)	http://martongenetics.com/kalaszos-katalogus-2018/
MV05-15	.	BL	HU, MTA ATK	variety candidate, high yield in organic trials, GPC: 12,3%	http://martongenetics.com/kalaszos-katalogus-2018/
MV-ELITE-CCP	.	BL	HU, MTA ATK	composite cross population produced by MTA ATK	http://martongenetics.com/kalaszos-

Variety name	Year of release	Status	Origin (Country, Breeder)	Traits for selection	Source
					katalogus-2018/
NATURASTAR	2002	Deleted from List	DE, Saatzucht Schweiger	Longlisting organic variety (2002- 2017)	http://saatzucht-schweiger.de/sorten/
NELSON	2011	List: DE, LU	DE, Saatzucht Schweiger	high quality, tall, good results in UK organic trials	http://saatzucht-schweiger.de/sorten/
NIC0017	.	BL	CZ, Limagrain		http://lgseeds.cz/
NIKOL	2008	List: CZ, RO, BG	FR, Limagrain Verneuil	medium tall - good yellow rust tolerance	
NOVY ZIVOT	.	LR	SK	old Slovakian landrace, resistance to *Fusarium*	https://griss.vurv.sk/
NS 40S	2006	List: RS	RS, IFVC	good tillering and yellow rust tolerance	http://www.ifvcns.rs/
NS EFROSINA	2015	List: RS	RS, IFVC	medium tall - good yellow rust tolerance	http://www.ifvcns.rs/
NS FRAJLA	2016	List: RS	RS, IFVC	good tillering - excellent weed suppression	http://www.ifvcns.rs/
NS ILINA	2010	List: RS	RS, IFVC	medium tall - excellent weed suppression	http://www.ifvcns.rs/
NS MILA	2014	List: RS	RS, IFVC	medium tall - good yellow rust tolerance	http://www.ifvcns.rs/
NS OBALA	2015	List: RS	RS, IFVC	good tillering - excellent weed suppression	http://www.ifvcns.rs/
PAJURA	2014	List: RO	RO, NARDI Fundulea	Relatively good results in organic yield trials	http://www.incda-fundulea.ro/index_en.html
PENELOPE	2016	List: CZ	CZ, Selgen		https://selgen.cz/
PEPPINO	2008	List: AT	AT, Saatzucht Donau	organic VCU test; baking quality 7	http://www.saatzucht-donau.at/
PHILARO	2016	List: DE	DE, Dottenfeldelderhof	organic variety with top quality; resistant to yellow rust and bunt	https://www.dottenfelderhof.de/
PIRENEO	2004	List: AT	AT, Saatzucht Donau	organic VCU test; baking quality 7	http://www.saatzucht-donau.at/
PIRUETA	?	?	CZ, Saaten Union		https://www.saaten-union.cz/
PITAR	2015	List: RO	RO, NARDI Fundulea	Higher grain protein content and bread making quality	http://www.incda-fundulea.ro/index_en.html

D 1.2 Preliminary Collection of Each Target Species Identified

Variety name	Year of release	Status	Origin (Country, Breeder)	Traits for selection	Source
PIZZA	2012	List: CH	CH, Peter Kunz	organic variety, top quality	https://www.gzpk.ch/
POESIE	2015	List: CH	CH, Peter Kunz	organic variety, soft gluten quality	https://www.gzpk.ch/
PREMIO	2011	List: FR	FR, RAGT Semences	good yellow rust tolerance	
PRIM	2018	List: CH	CH, Peter Kunz	new organic variety	https://www.gzpk.ch/
PROFUND	.	BL	RO, NARDI Fundulea	High protein content; Consistent positive deviation from regression yield-protein	http://www.incda-fundulea.ro/index_en.html
PS DOBROMILA	2018	List: SK	SK, NPPC Vígľaš-Pstruša	high food quality, very good disease resistance	https://griss.vurv.sk/
PS JELDKA	2015	CV	SK, NPPC Vígľaš-Pstruša		https://griss.vurv.sk/
PS KVALITAS	2017	List: SK	SK, NPPC Vígľaš-Pstruša	Glu Score 10, high baking quality E, good resistance to powdery mildew and brown rust	https://griss.vurv.sk/
PS PUQA	2015	List: SK	SK, NPPC Vígľaš-Pstruša	A-E quality, good resistance to leaf and ear pathogens	https://griss.vurv.sk/
PURINO	2018	List: DE	DE, Secobra	Organic Variety, good resistance, good yield, good quality	https://www.secobra.de/
RADOSINSKA KAROLA	1938	old variety	SK, ŠS Radošina	RY: 1938-1960, obsolete cv., less rust resistant	https://griss.vurv.sk/
RADOSINSKA NORMA	1937	old variety	SK, ŠS Radošina	RY: 1937-1945, obsolete cv., less resistant to diseases, very tall	https://griss.vurv.sk/
RENAN	1989	List: FR, AT, BE, BG, DE, HR, RO, SI	FR, INRA Le Rheu, Rennes	high adaptability, high quality, popular under organic farmers, good resistance against diseases	
RESKA	1990s	List: SI	SI, Anton Tajnšek	tall - good weed supression, good yields and quality in low N environment	
RGT LAUROTT	2017	List: SK	CZ, RAGT		https://ragt-osivo.cz/cs-CZ/ragt-czech-sro
RODERIK	2018	List: DE	DE, K.-J. Müller, Darzau	Organic variety (awns) very long, good groundcover and early vigour	

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Variety name	Year of release	Status	Origin (Country, Breeder)	Traits for selection	Source
ROYAL	2015	List: CH	CH, Peter Kunz	organic variety, good NUE	https://www.gzpk.ch/
RUNAL	1995	List: CH, FR	CH, Agroscope/DSP	high quality; very high wet gluten content	https://www.agroscope.admin.ch/agroscope/de/home.html
SANDOMIR	2010	List: DE	DE, Karl- Josef Müller	organic variety, excellent baking quality (class E)	
SAVINJA	1990s	List: SI	SI, Anton Tajnšek	tall - good weed supression, good yields and quality in low N environment	
SCARO	2006	List: CH	CH, Peter Kunz	organic variety, top quality	https://www.gzpk.ch/
SEMNAL	2017	List: RO	RO, NARDI Fundulea	Apparent tolerance to low N	http://www.incda-fundulea.ro/index_en.html
SG-S1004-18	.	BL	CZ, Selgen		https://selgen.cz/
SG-S269-09	.	BL	CZ, Selgen		https://selgen.cz/
SIALA	2005	List: CH	CH, Agroscope/DSP	recommended bio-variety in Switzerland; limited weed competitiveness	https://www.agroscope.admin.ch/agroscope/de/home.html
SIMNIC 60	2017	List: RO	RO, ARS Simnic	Relatively good results in organic yield trials	
SKAGEN	2006	List: DE, EE, FI, LT, LU, LV, PL, NO, SK	DE, Borries-Eckendorf	high baking quality E, good adaptability, recommended bio-variety Germany	https://www.wvb-eckendorf.de/
SKERZZO	2011	List: FR	FR, Agri-Obtentions/INRA	excellent baking quality; high protein content; organic variety from INRA Le Rhe	
SLOVENSKA 200	1946	old variety	SK, Hordeum s.r.o.	1946-1967, medium rust resistance	https://griss.vurv.sk/
SOFRU	2002	List: FR, HR, IT	FR, Caussade Semences	good tillering - excellent weed suppression	
SOLEHIO	2006	List: FR, HR, IT	FR, KWS Momont SAS	medium tall - good yellow rust tolerance	
SPONTAN	2014	List: DE, AT, LU	DE, Secobra	High resistance (bunt), bad in wet gluten	https://www.secobra.de/
STANISLAVA	2005	List: SK	SK, Selekt Bučany	medium early cv., A-E quality, drought tolerance, winter-hardiness	https://griss.vurv.sk/

D 1.2 Preliminary Collection of Each Target Species Identified

Variety name	Year of release	Status	Origin (Country, Breeder)	Traits for selection	Source
STAPARKA	1986	List: RS	RS, IFVC	good yellow rust tolerance	http://www.ifvcns.rs/
STEFANUS	2005	List: AT	AT, Saatzucht Donau	organic VCU test; baking quality 7	http://www.saatzucht-donau.at/
STUPICKÁ BASTARD	.	PGR	CZ, VURV		https://grinczech.vurv.cz/gringlobal/search.aspx
SULTAN	2008	List: CZ, SK	CZ, Selgen		https://selgen.cz/
SUNNYBOY	2017	List: AT, SK	CZ, RAGT		https://ragt-osivo.cz/cs-CZ/ragt-czech-sro
SURETTA	2008	List: CH	CH, Agroscope/DSP	good milling quality	https://www.agroscope.admin.ch/agroscope/de/home.html
TATA MATA	2017	List: HR	HR, Poljoprivredni Institut Osijek	good tolerance to *Septoria nodorum*, *Fusarium* spp., good tolerance to yellow rust, high yields	https://www.poljinos.hr/
TENGRI	2007	List: CH	CH, Peter Kunz	organic variety, top quality	https://www.gzpk.ch/
THOMARO	2018	List: DE	DE, Dottenfelderhof	organic variety, top quality, resistance to yellow and leaf rust, *Tilletia* and *Ustilago*	https://www.dottenfelderhof.de/
TILLIKO	2016	List: AT, DE	DE, GZF Darzau	organic variety; baking quality 7; *Tilletia* resistance (BtZ)	
TITLIS	2002	List: CH, FR	CH, Agroscope/DSP	excellent baking quality; good organic results in CH	https://www.agroscope.admin.ch/agroscope/de/home.html
TOBIAS	2011	List: AT	AT, Saatzucht Donau	organic VCU; late maturity, high protein content, baking quality 8	http://www.saatzucht-donau.at/
TREBELIR	2016	List: DE	DE, GZF Darzau	organic variety; resistance against leaf diseases, *Tilletia* & *Ustilago*	
TURANDOT	2012	List: CZ	CZ, Selgen		https://selgen.cz/
UNITAR	.	BL	RO, NARDI Fundulea	Relatively good results in organic yield trials; low protein content	http://www.incda-fundulea.ro/index_en.h

Variety name	Year of release	Status	Origin (Country, Breeder)	Traits for selection	Source
					tml
URSITA	.	BL	RO, NARDI Fundulea	Bunt resistant from *Secale.* Relatively good results in organic yield trials	http://www.incda-fundulea.ro/index_en.html
VIKI	2016	List: SK, DE	CZ, Selgen		https://selgen.cz/
VIOLA	2010	List: SK	SK, Hordeum Sládkovičovo	early cv., A-B quality, good-medium resistance to fungal diseases	https://griss.vurv.sk/
VLASTA	1992	List: CZ	CZ, VURV		https://grinczech.vurv.cz/gringlobal/search.aspx
VULKAN	2009	List: HR, SI	HR, Poljoprivredni Institut Osijek	good weed suppression, good tolerance to *Septoria nodorum, S. tritici* and *Fusarium* spp., high yields (medium quality class)	https://www.poljinos.hr/
WENDELIN	2018	List: DE	DE, Secobra	Organic Variety, good resistance, very good yield, good quality	https://www.secobra.de/
WITAL	2018	List: CH	CH, Peter Kunz	new organic variety	https://www.gzpk.ch/
WIWA	2005	List: CH	CH, Peter Kunz	Recommended by Bavarian state institute for organic farming	https://www.gzpk.ch/
XT 9.23	2017	CV - passed VCU testing	SI, Primož Titan	excellent weed suppression, good tolerance to S. *nodorum, Fusarium* spp. and *Septoria tritici*, good quality	
ZVEZDA	1982	List: RS	RS, IFVC	good yellow rust tolerance-high protein content	http://www.ifvcns.rs/

Table 2: List of *potato genotypes* included in the ECOBREED preliminary collection

Variety name	Taxon	Country of Origin	Original breeder / Holding institute	Selected organic traits
ACUSTIC	Solanum tuberosum	Netherlands	C. Meijer B.V.	late blight resistance
ADDRETA	Solanum tuberosum	Germany	Norika GmbH	breeders preference for organic production
ADELINA	Solanum tuberosum	United Kingdom		Bioland Germany - for organic production
AFRA	Solanum tuberosum	Germany	EUROPLANT Pflanzenzucht GmbH	breeders preference for organic production
AGATA	Solanum tuberosum	Netherlands	Agrico	organic variety in Austria
AGILA	Solanum tuberosum	Denmark	Danespo	Bioland Germany - for organic production
AGRIA	Solanum tuberosum	Germany	EUROPLANT Pflanzenzucht GmbH	organic variety in Austria
ALLIANS	Solanum tuberosum	Germany	EUROPLANT Pflanzenzucht GmbH	late blight resistance, breeders preference for organic production
ALMERA	Solanum tuberosum	Netherlands	Agrico	ADHB organic list
ALOUETTE	Solanum tuberosum	Netherlands	Agrico	late blight resistance, ADHB organic list
AMBO	Solanum tuberosum	Ireland	IPM Potato Group Limited	SASA - organic seed in production
AMBRA	Solanum tuberosum	Netherlands	HZPC Holland BV	earliness
AMETYST	Solanum tuberosum	Poland	Pomorsko Mazowiecka Hodowla Ziemniaka w Strzekęcinie	proposed by IHAR
ANABELLE	Solanum tuberosum	Netherlands	HZPC Holland BV	organic variety in Austria
ANDEAN SUNSIDE	Solanum tuberosum	Netherlands	Agrico	late blight resistance
ANUSCHKA	Solanum tuberosum	Germany	EUROPLANT Pflanzenzucht GmbH	organic variety in Austria
APOLLO	Solanum tuberosum	France	F. Levieil - Cooperative de lennon	organic variety in France
ARGOS	Solanum tuberosum	United Kingdom	Caithness Potatoes Ltd	UNEW - suitable for organics
ARIELLE	Solanum tuberosum	Netherlands	Agrico	earliness
ARRAN VICTORY	Solanum tuberosum	United Kingdom	GB Seed Industry	SASA - organic seed in production
ARROW	Solanum tuberosum	Netherlands	Agrico	earliness
ATHLETE	Solanum tuberosum	Netherlands	Agrico	late blight resistance, breeders preference for organic

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Variety name	Taxon	Country of Origin	Original breeder / Holding institute	Selected organic traits
				production, SASA - organic seed in production
AUGUSTA	Solanum tuberosum	Germany	EUROPLANT Pflanzenzucht GmbH	breeders preference for organic production
AVALANCHE	Solanum tuberosum	Ireland	Jonquil Development Ltd	ADHB organic list
AXONA	Solanum tuberosum	United Kingdom	Sarpo Potatoes Ltd	ADHB organic list
AZILIS	Solanum tuberosum	France	Bretagne Plants	late blight resistance
BALATON ROSZA	Solanum tuberosum	Hungary	University of Pannonia, Potato Research Centre	proposed by UPAN
BAMBINO	Solanum tuberosum	United Kingdom	Cygnet PB Ltd	SASA - organic seed in production
BASA	Solanum tuberosum	Hungary	University of Pannonia, Potato Research Centre	proposed by UPAN
BELANA	Solanum tuberosum	Germany	EUROPLANT Pflanzenzucht GmbH	breeders preference for organic production
BELMONDA	Solanum tuberosum	Germany	Solana GmbH	SASA - organic seed in production
BIONICA	Solanum tuberosum	Netherlands	C. Meijer B.V.	late blight resistance - breeder cathalogue data
BIONTA	Solanum tuberosum	Austria	NÖ Saatbaugenossenschaft R.G.M.B.H.	organic variety in Austria
BIRGIT	Solanum tuberosum	Germany	Norika GmbH	breeders preference for organic production
BONNATA	Solanum tuberosum	Netherlands	Stet Holland	late blight resistance
BOTOND	Solanum tuberosum	Hungary	University of Pannonia, Potato Research Centre	proposed by UPAN
BRITISH QUEEN	Solanum tuberosum	United Kingdom	GB Seed Industry	SASA - organic seed in production
BZURA	Solanum tuberosum	Poland	Hodowla Ziemniaka Zamarte	proposed by IHAR
CAMPINA	Solanum tuberosum	Germany	Solana GmbH	in FIBL organic tests, Switzerland
CAPRICE	Solanum tuberosum	Germany	Norika GmbH	late blight resistance, breeders preference for organic production
CAPUCUNE	Solanum tuberosum	France	Germicopa	breeders preference for organic production
CARA	Solanum tuberosum	Ireland	IPM Potato Group Limited	late blight resistance, SASA - organic seed in production

Variety name	Taxon	Country of Origin	Original breeder / Holding institute	Selected organic traits
CAROLUS	Solanum tuberosum	Netherlands	Agrico	late blight resistance, ADHB organic list
CARRERA	Solanum tuberosum	Netherlands	HZPC Holland BV	earliness
CASABLANCA	Solanum tuberosum	United Kingdom	Cygnet PB Ltd	SASA - organic seed in production
CEPHORA	Solanum tuberosum	France	Grocep	organic variety in France
CHALLENGER	Solanum tuberosum	Netherlands	HZPC Holland BV	organic variety in Switzerland
CHARLOTTE	Solanum tuberosum	France	Germicopa	breeders preference for organic production
COLEEN	Solanum tuberosum	Ireland	IPM Potato Group Limited	ADHB organic list
COLOMBA	Solanum tuberosum	Netherlands	HZPC Holland BV	earliness
COLORADO	Solanum tuberosum	France	Comité Nord Plant	organic variety in France
CONNECT	Solanum tuberosum	Netherlands	Den Hartigh BV	late blight resistance, breeders preference for organic production
COQUINE	Solanum tuberosum	France	Grocep	organic variety in France
CORRIDA	Solanum tuberosum	France	Comité Nord Plant	organic variety in France
COSMOS	Solanum tuberosum	Netherlands	Agrico	ADHB organic list
CRISPIN	Solanum tuberosum	United Kingdom	Jonquil Development Ltd	late blight resistance - The European Cultivated Potato database
DAMARIS OO1	Solanum tuberosum	Germany	Norika GmbH	breeders preference for organic production
DELILA	Solanum tuberosum	France	Germicopa	late blight resistance, breeders preference for organic production
DENAR	Solanum tuberosum	Poland	Hodowla Ziemniaka Zamarte	earliness - proposed by IHAR
DESIREE	Solanum tuberosum	Netherlands	HZPC Holland BV	SASA - organic seed in production
DIDO	Solanum tuberosum	Netherlands	Agroplant Holland B.V.	SASA - organic seed in production
DITTA	Solanum tuberosum	Austria	NÖ Saatbaugenossenschaft R.G.M.B.H.	organic variety in Austria
EDEN	Solanum tuberosum	France	Bretagne Plants	organic variety in France
EDONY	Solanum tuberosum	France	Germicopa	late blight resistance, breeders preference for organic

Variety name	Taxon	Country of Origin	Original breeder / Holding institute	Selected organic traits
				production
ELFFE	Solanum tuberosum	Germany	EUROPLANT Pflanzenzucht GmbH	breeders preference for organic production
EOS	Solanum tuberosum	Netherlands	Den Hartigh BV	UNEW - suitable for organics
ERIKA	Solanum tuberosum	Netherlands	Agrico	organic variety in Switzerland
ESCORT	Solanum tuberosum	Netherlands	Agrico	late blight resistance, Newcastle university - suitable for organics
EUROSTARCH	Solanum tuberosum	Germany	EUROPLANT Pflanzenzucht GmbH	organic variety in Austria
FIDELIA	Solanum tuberosum	Germany	Norika GmbH	breeders preference for organic production
FINESSA	Solanum tuberosum	Germany	Solana GmbH	Bioland Germany - for organic production
FINEZJA	Solanum tuberosum	Poland	Hodowla Ziemniaka Zamarte	proposed by IHAR
FINKA	Solanum tuberosum	Germany	EUROPLANT Pflanzenzucht GmbH	breeders preference for organic production
FORTUS	Solanum tuberosum	Netherlands	HZPC Holland BV	breeders preference for organic production
GALACTICA	Solanum tuberosum	Ireland	IPM Potato Group Limited	UNEW - suitable for organics
GATSBY	Solanum tuberosum	United Kingdom	Cygnet PB Ltd	SASA - organic seed in production
GOLDMARIE NN	Solanum tuberosum	Germany	Norika GmbH	in FIBL organic tests, Switzerland
GRANOLA	Solanum tuberosum	Germany	Solana GmbH	UNEW - suitable for organics
GUNDA	Solanum tuberosum	Germany	EUROPLANT Pflanzenzucht GmbH	breeders preference for organic production
HERMES	Solanum tuberosum	Austria	NÖ Saatbaugenossenschaft R.G.M.B.H.	organic variety in Austria
HOPEHELY	Solanum tuberosum	Hungary	University of Pannonia, Potato Research Centre	proposed by UPAN
HUCKELBERRYGOLD	Solanum tuberosum	Germany	Norika GmbH	breeders preference for organic production
INCA BELLA	Solanum phureja	United Kingdom	The James Hutton Institute	S. phureja - proposed by IHAR
INCA DOWN	Solanum phureja	United Kingdom	The James Hutton Institute	S. phureja - proposed by IHAR
INCA SUN	Solanum phureja	United Kingdom	The James Hutton Institute	S. phureja - proposed by IHAR

D 1.2 Preliminary Collection of Each Target Species Identified

Variety name	Taxon	Country of Origin	Original breeder / Holding institute	Selected organic traits
INNOVATOR	Solanum tuberosum	Netherlands	HZPC Holland BV	organic variety in Switzerland
INWESTOR	Solanum tuberosum	Poland	Pomorsko Mazowiecka Hodowla Ziemniaka w Strzekęcinie	late blight resistance - proposed by IHAR
JASIA	Solanum tuberosum	Poland	Hodowla Ziemniaka Zamarte	proposed by IHAR
JELLY	Solanum tuberosum	Germany	EUROPLANT Pflanzenzucht GmbH	breeders preference for organic production
JESTER	Solanum tuberosum	United Kingdom	Greenvale AP	SASA - organic seed in production
KARLENA	Solanum tuberosum	Germany	Norika GmbH	organic variety in Austria
KELLY	Solanum tuberosum	France	Germicopa	late blight resistance, breeders preference for organic production
KIKKO	Solanum tuberosum	Ireland	IPM Potato Group Limited	ADHB organic list
KINGSMAN	Solanum tuberosum	United Kingdom	Cygnet PB Ltd	SASA - organic seed in production
KIRRIE	Solanum tuberosum	United Kingdom	The James Hutton Institute	UNEW - suitable for organics
KIS 05-204/191-2	Solanum tuberosum	Slovenia	Agricultural Institute of Slovenia	proposed by KIS
KIS KOKRA	Solanum tuberosum	Slovenia	Agricultural Institute of Slovenia	late blight resistance, breeders preference for organic production
KIS SAVINJA	Solanum tuberosum	Slovenia	Agricultural Institute of Slovenia	late blight resistance, breeders preference for organic production
KIS SLAVNIK	Solanum tuberosum	Slovenia	Agricultural Institute of Slovenia	earliness - proposed by KIS
KIS VIPAVA	Solanum tuberosum	Slovenia	Agricultural Institute of Slovenia	earliness - proposed by KIS
KOENIGSBLAU	Solanum tuberosum	Germany	Norika GmbH	breeders preference for organic production
KURAS	Solanum tuberosum	Netherlands	Agrico	organic variety in Austria
LADY BALFOUR	Solanum tuberosum	United Kingdom	Greenvale AP	ADHB organic list
LADY CHRISTL	Solanum tuberosum	Netherlands	C. Meijer B.V.	organic variety in Switzerland
LADY ROSETTA	Solanum tuberosum	Netherlands	C. Meijer B.V.	organic variety in Switzerland
LAURA	Solanum tuberosum	Germany	EUROPLANT Pflanzenzucht GmbH	organic variety in Austria
LEVANTE	Solanum tuberosum	Netherlands	Agrico	late blight resistance, breeder data

D 1.2 Preliminary Collection of Each Target Species Identified

Variety name	Taxon	Country of Origin	Original breeder / Holding institute	Selected organic traits
LINDA	Solanum tuberosum	Germany	EUROPLANT Pflanzenzucht GmbH	SASA - organic seed in production, Bioland
LISETA	Solanum tuberosum	Netherlands	HZPC Holland BV	earliness - proposed by KIS
LORD	Solanum tuberosum	Poland	Hodowla Ziemniaka Zamarte	earliness - proposed by IHAR
LOREEN	Solanum tuberosum	Germany	Norika GmbH	organic variety in Austria
MADELEINE	Solanum tuberosum	Netherlands	Agrico	organic variety in Austria
MAGNOLIA	Solanum tuberosum	Poland	Pomorsko Mazowiecka Hodowla Ziemniaka w Strzekęcinie	earliness - proposed by IHAR
MAÏWEN	Solanum tuberosum	France	Comité Nord Plant	late blight resistance
MALAGA	Solanum tuberosum	Poland	Hodowla Ziemniaka Zamarte	proposed by IHAR
MARABEL	Solanum tuberosum	Germany	EUROPLANT Pflanzenzucht GmbH	UNEW - suitable for organics
MARIS BARD	Solanum tuberosum	United Kingdom	GB Seed Industry	SASA - organic seed in production
MARIS PEER	Solanum tuberosum	United Kingdom	GB Seed Industry	SASA - organic seed in production
MARIS PIPER	Solanum tuberosum	United Kingdom	GB Seed Industry	UNEW - suitable for organics
MARKIES	Solanum tuberosum	Netherlands	Agrico	organic variety in Switzerland
MAYAN GOLD	Solanum phureja	United Kingdom	The James Hutton Institute	late blight resistance
MAZUR	Solanum tuberosum	Poland	Pomorsko Mazowiecka Hodowla Ziemniaka w Strzekęcinie	proposed by IHAR
MERCURY	Solanum tuberosum	Netherlands		late blight resistance - The European Cultivated Potato database
MILVA	Solanum tuberosum	Germany	EUROPLANT Pflanzenzucht GmbH	SASA - organic seed in production
MONALISA	Solanum tuberosum	Netherlands	HZPC Holland BV	UNEW - suitable for organics
MONTANA	Solanum tuberosum			late blight resistance - The European Cultivated Potato database
NATASHA	Solanum tuberosum	Germany	Solana GmbH	earliness - proposed by IHAR
NICOLA	Solanum tuberosum	United Kingdom	GB Seed Industry	SASA - organic seed in production
NOBLESSE	Solanum tuberosum	Netherlands	HZPC Holland BV	breeders preference for organic production

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Variety name	Taxon	Country of Origin	Original breeder / Holding institute	Selected organic traits
NOFY	Solanum tuberosum	Netherlands	Agrico	late blight resistance, breeder data
OBERON	Solanum tuberosum	Poland	Hodowla Ziemniaka Zamarte	proposed by IHAR
ORLA	Solanum tuberosum	Ireland	IPM Potato Group Limited	ADHB organic list
OSPREY	Solanum tuberosum	United Kingdom	Caithness Potatoes Ltd	ADHB organic list
OSTARA	Solanum tuberosum	Netherlands	HZPC Holland BV	organic variety in Austria
OTHELLO	Solanum tuberosum	United Kingdom		UNEW - suitable for organics
OTOLIA	Solanum tuberosum	Germany	EUROPLANT Pflanzenzucht GmbH	breeders preference for organic production
OWACJA	Solanum tuberosum	Poland	Pomorsko Mazowiecka Hodowla Ziemniaka w Strzekęcinie	earliness - proposed by IHAR
PANAMERA	Solanum tuberosum	Netherlands	HZPC Holland BV	breeders preference for organic production
PARAMOUNT	Solanum tuberosum	Ireland	Jonquil Development Lltd	ADHB organic list
PARU	Solanum tuberosum	United Kingdom	The James Hutton Institute	late blight resistance
PASSION	Solanum tuberosum	France	Bretagne Plants	organic variety in France
PICASSO	Solanum tuberosum	Netherlands	Agrico	UNEW - suitable for organics
PINK GIPSY	Solanum tuberosum	United Kingdom	Cygnet PB Ltd	SASA - organic seed in production
PRADA	Solanum tuberosum	Netherlands	HZPC Holland BV	earliness - proposed by KIS
PREMIERE	Solanum tuberosum	Netherlands	Agrico	ADHB organic list
PRIMABELLE	Solanum tuberosum	Netherlands	HZPC Holland BV	earliness
PRINCESS	Solanum tuberosum	Germany	Solana GmbH	late blight resistance
PRODUCENT	Solanum tuberosum	Netherlands	Kweekbedrijf Prummel BV	UNEW - suitable for organics
RECORD	Solanum tuberosum	United Kingdom	GB Seed Industry	SASA - organic seed in production
RESY	Solanum tuberosum	Netherlands	HZPC Holland BV	organic variety in France
RIVIERA	Solanum tuberosum	Netherlands	Agrico	earliness
ROBINTA	Solanum tuberosum	Netherlands	HZPC Holland BV	SASA - organic seed in production

Variety name	Taxon	Country of Origin	Original breeder / Holding institute	Selected organic traits
ROMANO	Solanum tuberosum	Netherlands	Agrico	ADHB organic list
ROOSTER	Solanum tuberosum	Ireland	IPM Potato Group Limited	UNEW - suitable for organics
ROYAL	Solanum tuberosum	Canada	McCain Potatoes	organic variety in Austria
SALOME	Solanum tuberosum	Germany	Norika GmbH	late blight resistance, breeders preference for organic production
SANTE	Solanum tuberosum	Netherlands	Agrico	ADHB organic list
SARPO EXTRA	Solanum tuberosum	Hungary	Sarpo Potatoes Ltd	late blight resistance - The European Cultivated Potato database
SARPO MIRA	Solanum tuberosum	Hungary	Sarpo Potatoes Ltd	late blight resistance, ADHB organic list
SARPO PEAK	Solanum tuberosum	Hungary	Sarpo Potatoes Ltd	late blight resistance - The European Cultivated Potato database
SARPO SHONA	Solanum tuberosum	Hungary	Sarpo Potatoes Ltd	late blight resistance
SARPO UNA	Solanum tuberosum	Hungary	Sarpo Potatoes Ltd	SASA - organic seed in production
SELENA	Solanum tuberosum	France	Bretagne Plants	proposed by IHAR
SETANTA	Solanum tuberosum	Ireland	IPM Potato Group Limited	ADHB organic list
SHELAGH	Solanum tuberosum	United Kingdom		UNEW - suitable for organics
SHEPODY	Solanum tuberosum	Canada	McCain Potatoes	UNEW - suitable for organics
SLANEY	Solanum tuberosum	Ireland	IPM Potato Group Limited	UNEW - suitable for organics
SOLIST	Solanum tuberosum	Germany	Norika GmbH	breeders preference for organic production
SORAYA NN	Solanum tuberosum	Germany	Norika GmbH	in FIBL organic tests, Switzerland
SORRENTO	Solanum tuberosum	United Kingdom	Greenvale AP	late blight resistance
SPARTAAN	Solanum tuberosum	Netherlands	Zelder BV	organic variety in France
STEMSTER	Solanum tuberosum	United Kingdom	Caithness Potatoes Ltd	late blight resistance, UNEW - suitable for organics
STORMONT ENTERPRISE	Solanum tuberosum			UNEW - suitable for organics
TAJFUN	Solanum tuberosum	Poland	Pomorsko Mazowiecka Hodowla	proposed by IHAR

Variety name	Taxon	Country of Origin	Original breeder / Holding institute	Selected organic traits
			Ziemniaka w Strzekęcinie	
TALENT	Solanum tuberosum	Germany	Norika GmbH	UNEW - suitable for organics
TEENA	Solanum tuberosum	United Kingdom		UNEW - suitable for organics
TENTATION	Solanum tuberosum	France	Grocep	late blight resistance
TOLUCA	Solanum tuberosum	Netherlands	Agrico	late blight resistance - breeder cathalogue data
TORRIDON	Solanum tuberosum	United Kingdom	The James Hutton Institute	UNEW - suitable for organics
TRABANT	Solanum tuberosum	Austria	NÖ Saatbaugenossenschaft R.G.M.B.H.	organic variety in Austria
TRIPLO	Solanum tuberosum	Netherlands	HZPC Holland BV	breeders preference for organic production
TWINNER	Solanum tuberosum	Netherlands	Agrico	late blight resistance, breeders preference for organic production
TWISTER	Solanum tuberosum	Netherlands	Agrico	late blight resistance, breeder data
UMATILLA RUSSET	Solanum tuberosum	USA	USDA	UNEW - suitable for organics
VALES EVEREST	Solanum tuberosum	Ireland	Greenvale AP	ADHB organic list
VALES SOVEREIGN	Solanum tuberosum	United Kingdom	Greenvale AP	SASA - organic seed in production
VALOR	Solanum tuberosum	United Kingdom	Caithness Potatoes Ltd	ADHB organic list
VENEZIA	Solanum tuberosum	United Kingdom	Greenvale AP	organic variety in Switzerland
VERITY	Solanum tuberosum	United Kingdom	Caithness Potatoes Ltd	ADHB organic list
VICTORIA	Solanum tuberosum	Netherlands	HZPC Holland BV	organic variety in Switzerland
VITABELLA	Solanum tuberosum	Germany	KWS Potato BV	organic variety in Switzerland
VIVALDI	Solanum tuberosum	Netherlands	HZPC Holland BV	ADHB organic list
VOYAGER	Solanum tuberosum	Netherlands	HZPC Holland BV	organic variety in France
WEGA	Solanum tuberosum	Germany	Norika GmbH	late blight resistance, breeders preference for organic production
WHITE LADY	Solanum tuberosum	Hungary	University of Pannonia, Potato Research Centre	late blight resistance, breeders preference for organic production

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Variety name	Taxon	Country of Origin	Original breeder / Holding institute	Selected organic traits
YONA	Solanum tuberosum	France	Germicopa	late blight resistance, breeders preference for organic production
ZEN	Solanum tuberosum	France	Grocep	late blight resistance

Legend:

ADHB - Agriculture & Horticulture Development Board, UK

IHAR - Plant Breeding and Acclimatization Institute

UNPAN- University of Pannonia

UNEW - University of Newcastle

SASA - Science and Advice for Scottish Agriculture

FIBL - Research Institute of Organic Agriculture

KIS - Agricultural Institute of Slovenia

Table 3: List of *soybean genotypes* included in the ECOBREED preliminary collection

Variety name	COLLDATE	SAMPSTAT	ORIGCTY	INSTCODE	COLLSRC	STORAGE
Galina	2018----	CV	SRB	SRB051	21) FIELD	10); 20);
NS Kaca	2013----	CV	SRB	SRB051	21) FIELD	10); 20);
Valjevka	2015----	CV	SRB	SRB051	21) FIELD	10); 20);
NS Atlas	2016----	CV	SRB	SRB051	21) FIELD	10); 20);
Fortuna	2015----	CV	SRB	SRB051	21) FIELD	10); 20);
NS Maximus	2011----	CV	SRB	SRB051	21) FIELD	10); 20);
Manitoba Brown	1946----	CV	USA	SRB051	21) FIELD	10); 20);
BlackStar		CV	SRB	SRB051	21) FIELD	10); 20);
NS ALFA	2011----	CV	SRB	SRB051	21) FIELD	10); 20);
FRAJLA	2010----	CV	SRB	SRB051	21) FIELD	10); 20);
LEPOTICA	2017----	CV	SRB	SRB051	21) FIELD	10); 20);
MAPLE ARROW	1976----	CV	CAN	SRB051	21) FIELD	10); 20);
KONUSO		CV	JPN	SRB051	21) FIELD	10); 20);
SELECTA 201		CV	RUS	SRB051	21) FIELD	10); 20);
VALENTA		CV	RUS	SRB051	21) FIELD	10); 20);
DANA	2017----	CV	SRB	SRB051	21) FIELD	10); 20);
BISER	2014----	CV	SRB	SRB051	21) FIELD	10); 20);
NS SPARTAKUS	2017----	CV	SRB	SRB051	21) FIELD	10); 20);
BLACK TOKYO		CV	JPN	SRB051	21) FIELD	10); 20);
PADUA		CV	USA	SRB051	21) FIELD	10); 20);
SIOYX		CV	USA	SRB051	21) FIELD	10); 20);
SECCA	1971----	CV	USA	SRB051	21) FIELD	10); 20);
PROTEUS		CV	CAN	SRB051	21) FIELD	10); 20);

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Variety name	COLLDATE	SAMPSTAT	ORIGCTY	INSTCODE	COLLSRC	STORAGE
DANICA		CV	CRO	SRB051	21) FIELD	10); 20);
KORANA	2006----	CV	CRO	SRB051	21) FIELD	10); 20);
KITAMUSUME		CV	JPN	SRB051	21) FIELD	10); 20);
ALISA		CV	SRB	SRB051	21) FIELD	10); 20);
AFRODITA	1994----	CV	SRB	SRB051	21) FIELD	10); 20);
IVA	2005----	CV	CRO	SRB051	21) FIELD	10); 20);
KRAJINA	1993----	CV	SRB	SRB051	21) FIELD	10); 20);
ANICA		CV	CRO	SRB051	21) FIELD	10); 20);
DUBRAVKA		CV	CRO	SRB051	21) FIELD	10); 20);
EIKO		CV	JPN	SRB051	21) FIELD	10); 20);
AIRES		CV	ITA	SRB051	21) FIELD	10); 20);
HERB 91		CV		SRB051	21) FIELD	10); 20);
KATO		CV	JPN	SRB051	21) FIELD	10); 20);
Bydgoska 071	1978----	CV	POL	ARS GRIN	21) FIELD	10); 20);
Zarja	1973----	CV	BUL	ARS GRIN	21) FIELD	10); 20);
Moldavskaja 65		CV	MDA	ARS GRIN	21) FIELD	10); 20);
Jaune de Desme	1950---	CV	FRA	ARS GRIN	21) FIELD	10); 20);
Bei feng No. 3	1977----	CV	CHN	ARS GRIN	21) FIELD	10); 20);
Itocista	1977----	CV	POL	ARS GRIN	21) FIELD	10); 20);
Lada	2005----	CV	RUS	ARS GRIN	21) FIELD	10); 20);
Toyokomachi	1996----	CV	JPN	ARS GRIN	21) FIELD	10); 20);
Toyomusume	1996----	CV	JPN	ARS GRIN	21) FIELD	10); 20);
Trzic Rana	1971----	CV	ROM	ARS GRIN	21) FIELD	10); 20);
Vinca	1963----	CV	HUN	ARS GRIN	21) FIELD	10); 20);

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Variety name	COLLDATE	SAMPSTAT	ORIGCTY	INSTCODE	COLLSRC	STORAGE
Caloria	1972----	CV	GER	ARS GRIN	21) FIELD	10); 20);
Acme	1953----	CV	CAN	SRB051	21) FIELD	10); 20);
Grignon 37	1946----	CV	FRA	ARS GRIN	21) FIELD	10); 20);
Grignon 48	1977---	CV	FRA	ARS GRIN	21) FIELD	10); 20);
OAC Vision	1993---	CV	CAN	ARS GRIN	21) FIELD	10); 20);
Record North	1964----	CV	RUS	ARS GRIN	21) FIELD	10); 20);
Sibniik 315	1993---	CV	RUS	ARS GRIN	21) FIELD	10); 20);
Noir des Freres Dippo	1950----	CV	FRA	ARS GRIN	21) FIELD	10); 20);
Kamianetz	1950---	CV	FRA	ARS GRIN	21) FIELD	10); 20);
Jilin 8978-6	2000----	CV	CHN	ARS GRIN	21) FIELD	10); 20);
Nen Tszjan Da Doau	1980---	CV	CHN	ARS GRIN	21) FIELD	10); 20);
Kamishunbetzu	1971----	CV	JPN	ARS GRIN	21) FIELD	10); 20);
Fiskeby V	1971---	CV	SWE	ARS GRIN	21) FIELD	10); 20);
Bravalla	1982---	CV	SWE	SRB051	21) FIELD	10); 20);
Traff	1982---	CV	SWE	ARS GRIN	21) FIELD	10); 20);
Ugra Soja	1951---	CV	SWE	ARS GRIN	21) FIELD	10); 20);
PANDO	1991----	CV	KOR	SRB051	21) FIELD	10); 20);
MN-0201		CV	USA	SRB051	21) FIELD	10); 20);
GRACIA	2006----	CV	SRB	SRB051	21) FIELD	10); 20);
FAVORIT	2010----	CV	SRB	SRB051	21) FIELD	10); 20);
JELICA	1994----	CV	SRB	SRB051	21) FIELD	10); 20);
Rasuto San	1930----	LR	JPN	ARS GRIN	21) FIELD	10); 20);
Er-hej-jan	1980----	CV	CHN	ARS GRIN	21) FIELD	10); 20);
Curo Sengocu	1980----	CV	JPN	ARS GRIN	21) FIELD	10); 20);

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Variety name	COLLDATE	SAMPSTAT	ORIGCTY	INSTCODE	COLLSRC	STORAGE
Fiskeby 882-27	1980----	CV	SWE	ARS GRIN	21) FIELD	10); 20);
Corsoy 79	1988----	CV	USA	ARS GRIN	21) FIELD	10); 20);
Kunitz	1990----	CV	USA	ARS GRIN	21) FIELD	10); 20);
Cloud	1991----	CV	CHN	ARS GRIN	21) FIELD	10); 20);
Mukden	1956----	CV	CHN	ARS GRIN	21) FIELD	10); 20);
Adelphia	1991----	CV	USA	ARS GRIN	21) FIELD	10); 20);
Altona	1996----	CV	CAN	ARS GRIN	21) FIELD	10); 20);
Century 84	1991----	CV	USA	ARS GRIN	21) FIELD	10); 20);
Williams	1988----	CV	USA	ARS GRIN	21) FIELD	10); 20);
Parker	1992----	CV	USA	ARS GRIN	21) FIELD	10); 20);
BARC-12	1994----	CV	USA	ARS GRIN	21) FIELD	10); 20);
General	1998----	CV	USA	ARS GRIN	21) FIELD	10); 20);
Apollo	1998----	CV	USA	ARS GRIN	21) FIELD	10); 20);
Olympus	1998----	CV	USA	ARS GRIN	21) FIELD	10); 20);
OHIO FG3	2002----	CV	USA	ARS GRIN	21) FIELD	10); 20);
APEX	2002----	CV	USA	ARS GRIN	21) FIELD	10); 20);
STALWART	2002----	CV	USA	ARS GRIN	21) FIELD	10); 20);
Stout-Rps1k	2006----	CV	USA	ARS GRIN	21) FIELD	10); 20);
Shakkin Nashi	1930----	LR	JPN	ARS GRIN	21) FIELD	10); 20);
Chusei Kurodaizu	1930----	LR	JPN	ARS GRIN	21) FIELD	10); 20);
Hadakadaizu	1930----	CV	JPN	ARS GRIN	21) FIELD	10); 20);
Mizukuguri	1930----	LR	JPN	ARS GRIN	21) FIELD	10); 20);
Fukukingen	1930----	LR	CHN	ARS GRIN	21) FIELD	10); 20);
Seihita	1931----	LR	KOR	ARS GRIN	21) FIELD	10); 20);

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Variety name	COLLDATE	SAMPSTAT	ORIGCTY	INSTCODE	COLLSRC	STORAGE
Hajinomi	1955----	CV	JPN	ARS GRIN	21) FIELD	10); 20);
Shatukinnashi	1957----	LR	JPN	ARS GRIN	21) FIELD	10); 20);
Illinois 301	1958----	CV	USA	ARS GRIN	21) FIELD	10); 20);
Ranetsu No. 1	1959----	CV	JPN	ARS GRIN	21) FIELD	10); 20);
Kohoju	1959----	CV	CHN	ARS GRIN	21) FIELD	10); 20);
Dairyu Tsurunoko	1930----	CV	KOR	ARS GRIN	21) FIELD	10); 20);
Kaigens Kingenzu	1930----	LR	CHN	ARS GRIN	21) FIELD	10); 20);
Kawanagare (Iwate)	1977----	CV	JPN	ARS GRIN	21) FIELD	10); 20);
Kuro masshokutou (Kou 205)CHN	1977----	CV	CHN	ARS GRIN	21) FIELD	10); 20);
Pulaska Zolta Wczesna	1977----	CV	POL	ARS GRIN	21) FIELD	10); 20);
Sjao-tsin-do	1980----	CV	CHN	ARS GRIN	21) FIELD	10); 20);
Fengshan lu tsao shen	1986----	LR	TWN	ARS GRIN	21) FIELD	10); 20);
Yao tou	1986----	LR	TWN	ARS GRIN	21) FIELD	10); 20);
Lu tsao shen	1986----	LR	TWN	ARS GRIN	21) FIELD	10); 20);
Sundar No. 1	1986----	LR	TWN	ARS GRIN	21) FIELD	10); 20);
Tousan 101	1987----	LR	JPN	ARS GRIN	21) FIELD	10); 20);
Mao 205	1988----	LR	TWN	ARS GRIN	21) FIELD	10); 20);
Rokugatsu daizu	1987----	LR	JPN	ARS GRIN	21) FIELD	10); 20);
Rampage	1991----	CV	USA	ARS GRIN	21) FIELD	10); 20);
Yu ci huang	1993----	LR	CHN	ARS GRIN	21) FIELD	10); 20);
Avigea	2011----	CV	BUL	NARDI	21) FIELD	10); 20);
Malaga	2010----	CV	AUT	NARDI	21) FIELD	10); 20);
Perla	1994----	CV	ROM	NARDI	21) FIELD	10); 20);
Ada TD	2016----	CV	ROM	NARDI	21) FIELD	10); 20);

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Variety name	COLLDATE	SAMPSTAT	ORIGCTY	INSTCODE	COLLSRC	STORAGE
Bia TD	2015----	CV	ROM	NARDI	21) FIELD	10); 20);
Carla TD	2013----	CV	ROM	NARDI	21) FIELD	10); 20);
Caro TD	2015----	CV	ROM	NARDI	21) FIELD	10); 20);
CH 22-172			SUI	NARDI	21) FIELD	10); 20);
Eugen	2002----	CV	ROM	NARDI	21) FIELD	10); 20);
Felix	2005----	CV	ROM	NARDI	21) FIELD	10); 20);
Flavia	2010----	CV	AUT	NARDI	21) FIELD	10); 20);
Larisa	2014----	CV	ROM	NARDI	21) FIELD	10); 20);
Mălina TD	2012----	CV	ROM	NARDI	21) FIELD	10); 20);
Oana F	2009----	CV	ROM	NARDI	21) FIELD	10); 20);
Onix	2002----	CV	ROM	NARDI	21) FIELD	10); 20);
Ovidiu F	2018----	CV	ROM	NARDI	21) FIELD	10); 20);
Sigalia	2008----	CV	FRA	NARDI	21) FIELD	10); 20);
Tena	2008----	CV	CRO	NARDI	21) FIELD	10); 20);
Vidra	2010----	CV	SER	NARDI	21) FIELD	10); 20);
Camelia F	2016----	CV	ROM	NARDI	21) FIELD	10); 20);
Crina F	2011----	CV	ROM	NARDI	21) FIELD	10); 20);
Daciana	2006----	CV	ROM	NARDI	21) FIELD	10); 20);
Eider	2010----	CV	CAN	NARDI	21) FIELD	10); 20);
Pedro	2006----	CV	ITA	NARDI	21) FIELD	10); 20);
Pepita	2011----	CV	ITA	NARDI	21) FIELD	10); 20);
Astafor	2007----	CV	FRA	NARDI	21) FIELD	10); 20);
Castetis	2010----	CV	ITA	NARDI	21) FIELD	10); 20);
Danubiana	1983----	CV	ROM	NARDI	21) FIELD	10); 20);

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Variety name	COLLDATE	SAMPSTAT	ORIGCTY	INSTCODE	COLLSRC	STORAGE
ES Pallador	2015----	CV	FRA	NARDI	21) FIELD	10); 20);
Fabiana F	2017----	CV	ROM	NARDI	21) FIELD	10); 20);
Ika	2004----	CV	CRO	NARDI	21) FIELD	10); 20);
Isidor	2010----	CV	FRA	NARDI	21) FIELD	10); 20);
Kofu	2015----	CV	CAN	NARDI	21) FIELD	10); 20);
Korus	2011----	CV	CAN	NARDI	21) FIELD	10); 20);
NS Zora	2005----	CV	SER	NARDI	21) FIELD	10); 20);
Optimus		CV	CAN	NARDI	21) FIELD	10); 20);
Steara	2013----	CV	FRA	NARDI	21) FIELD	10); 20);
Triumf	1996----	CV	ROM	NARDI	21) FIELD	10); 20);
Zlata	2009----	CV	SER	NARDI	21) FIELD	10); 20);
Bahia	2008----	CV	ITA	NARDI	21) FIELD	10); 20);
Blancas	2007----	CV	ITA	NARDI	21) FIELD	10); 20);
CelinaPZO	2011----	CV	ITA	NARDI	21) FIELD	10); 20);
Columna	1995----	CV	ROM	NARDI	21) FIELD	10); 20);
DH 4173	2012----	CV	CAN	NARDI	21) FIELD	10); 20);
Dukat	2007----	CV	SER	NARDI	21) FIELD	10); 20);
Hiroko	2007----	CV	FRA	NARDI	21) FIELD	10); 20);
Mitsuko	2008----	CV	FRA	NARDI	21) FIELD	10); 20);
Neoplanta	2004----	CV	SER	NARDI	21) FIELD	10); 20);
Pacific	1992----	CV	ITA	NARDI	21) FIELD	10); 20);
Richi	2009----	CV	BUL	NARDI	21) FIELD	10); 20);
Sponsor	2000----	CV	FRA	NARDI	21) FIELD	10); 20);
Srebina	2004----	CV	BUL	NARDI	21) FIELD	10); 20);

Variety name	COLLDATE	SAMPSTAT	ORIGCTY	INSTCODE	COLLSRC	STORAGE
Vigo	2011----	CV	ROM	NARDI	21) FIELD	10); 20);
GL Melanie	2016----	CV	Austria	AUT013 Saatzucht Gleisdorf GmbH	21) FIELD	10); 20);
GL Hermine	2010----	CV	Austria	AUT013 Saatzucht Gleisdorf GmbH	21) FIELD	10); 20);
Josefine	2006----	CV	Austria	AUT013 Saatzucht Gleisdorf GmbH	21) FIELD	10); 20);
Christine	2007----	CV	Austria	AUT013 Saatzucht Gleisdorf GmbH	21) FIELD	10); 20);
Xonia	2014----	CV	Italy	ERSA	21) FIELD	10); 20);
Mauthnerov Velkozrun			Austria	AUT040 BOKU	21) FIELD	10); 20);
Mandin Kajon			Austria	AUT040 BOKU	21) FIELD	10); 20);
Grignon 14			Austria	AUT040 BOKU	21) FIELD	10); 20);
Gatersleben 45			Austria	AUT040 BOKU	21) FIELD	10); 20);
SOJA 804			Austria	AUT040 BOKU	21) FIELD	10); 20);
SOJA 809			Austria	AUT040 BOKU	21) FIELD	10); 20);
SOJA 832			Austria	AUT040 BOKU	21) FIELD	10); 20);
Zolta Przebedowska			Austria	AUT040 BOKU	21) FIELD	10); 20);
DH4173	2015----	CV	Canada	AUT022 RWA	21) FIELD	10); 20);
Korus	2011----	CV	Canada	AUT022 RWA	21) FIELD	10); 20);
Lenka	2015----	CV	Canada	AUT022 RWA	21) FIELD	10); 20);
Naya	2010----	CV	Canada	AUT022 RWA	21) FIELD	10); 20);
ES Senator	2012----	CV	France	AUT022 RWA	21) FIELD	10); 20);
Silvia PZO	2012----	CV	Canada	AUT022 RWA	21) FIELD	10); 20);
ES Tenor	2015----	CV	France	AUT022 RWA	21) FIELD	10); 20);

Legenda: STORAGE: (10) SEED; COLLECTION; 20) FIELD COLLECTION;

Table 4: List of *buckwheat genotypes* included in the ECOBREED preliminary collection

Accession Name	Taxon	Acquisition Date	Country of Origin	Holding Institute	Accession Number
Vrhtrebnje	*Fagopyrum esculentum*	n.a.	Slovenia	SVN018	SRGB 2198
Radovljica	*Fagopyrum esculentum*	n.a.	Slovenia	SVN018	SRGB 2206
Slovenj Gradec	*Fagopyrum esculentum*	n.a.	Slovenia	SVN018	SRGB 2207
Cerklje	*Fagopyrum esculentum*	n.a.	Slovenia	SVN018	SRGB 2221
Gorenje Nekovo, Kanal	*Fagopyrum esculentum*	n.a.	Slovenia	SVN018	SRGB 2265
Krajna vas, Sežana	*Fagopyrum esculentum*	n.a.	Slovenia	SVN018	SRGB 2266
Temnica na Krasu	*Fagopyrum esculentum*	n.a.	Slovenia	SVN018	SRGB 2270
Vojščica pri Kostanjevici	*Fagopyrum esculentum*	n.a.	Slovenia	SVN018	SRGB 2273
Kleče	*Fagopyrum esculentum*	n.a.	Slovenia	SVN018	SRGB 2285
Brusnice, Novo Mesto	*Fagopyrum esculentum*	n.a.	Slovenia	SVN018	SRGB 2296
Podgorje, Slovenj Gradec	*Fagopyrum esculentum*	n.a.	Slovenia	SVN018	SRGB 2297
Jeprca, Medvode	*Fagopyrum esculentum*	n.a.	Slovenia	SVN018	SRGB 2305
SVNGOR05 14	*Fagopyrum esculentum*	2005	Slovenia	SVN018	SRGB 5470
SVNKOR2006-32	*Fagopyrum esculentum*	2006	Slovenia	SVN018	SRGB 5505
SVNKOR2006-43	*Fagopyrum esculentum*	2006	Slovenia	SVN018	SRGB 5510
SVNKOR2006-61	*Fagopyrum esculentum*	2006	Slovenia	SVN018	SRGB 5521
SVNDOL2007-41	*Fagopyrum esculentum*	2007	Slovenia	SVN018	SRGB 5553
SVNDOL2007-56	*Fagopyrum esculentum*	2007	Slovenia	SVN018	SRGB 5559
SVNGOR 2010-14	*Fagopyrum esculentum*	2010	Slovenia	SVN018	SRGB 5702
20.10	*Fagopyrum esculentum*	2010	Slovenia	SVN018	SRGB 5737
HUNORS 2010-9	*Fagopyrum esculentum*	2010	Slovenia	SVN018	SRGBTBA
Buchweizen CSFR	*Fagopyrum esculentum*	n.a.	Czech Republic	AUT046	ARCHE-BU001

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Accession Name	Taxon	Acquisition Date	Country of Origin	Holding Institute	Accession Number
Herkunft Conrad	*Fagopyrum esculentum*	1981	Austria	AUT046	ARCHE-BU002
PA 127	*Fagopyrum esculentum*	1960	Serbia	NE9	PI 263949
No. 3872	*Fagopyrum esculentum*	1962	Soviet Union, Former	NE9	PI 280832
Trigo Saraceno O'Alforfon	*Fagopyrum esculentum*	1980	Mexico, Baja Norte	NE9	PI 451723
Yuqiao No. 2	*Fagopyrum esculentum*	1995	China, Beijing	NE9	PI 590988
Chaselimadao	*Fagopyrum esculentum*	1995	China, Beijing	NE9	PI 590989
Winsor Royal	*Fagopyrum esculentum*	1997	United States	NE9	PI 600909
MC 056	*Fagopyrum esculentum*	2003	Soviet Union, Former	NE9	PI 633689
MC 057	*Fagopyrum esculentum*	2003	India	NE9	PI 633690
Tokyo/PA 011	*Fagopyrum esculentum*	2007	Canada	NE9	PI 647594
Pulawska/PA 054	*Fagopyrum esculentum*	2007	Poland	NE9	PI 647598
PA 056	*Fagopyrum esculentum*	2007	Switzerland	NE9	PI 647599
Nostrano	*Fagopyrum esculentum*	2007	Italy	NE9	PI 647601
Sarrasin du Pays/PA 030	*Fagopyrum esculentum*	2007	France	NE9	PI 647603
Clfa 41	*Fagopyrum esculentum*	2007	United States	NE9	PI 647614
Pennline 18	*Fagopyrum esculentum*	2007	United States,	NE9	PI 647615
Tokyo/PA 011	*Fagopyrum esculentum*	2007	United States	NE9	PI 647616
Tokyo	*Fagopyrum esculentum*	2007	Canada, Saskatchewan	NE9	PI 647617
MC 258	*Fagopyrum esculentum*	2007	Poland	NE9	PI 647635
MC 052	*Fagopyrum esculentum*	2007	Soviet Union, Former	NE9	PI 647636
CD 7272	*Fagopyrum esculentum*	2007	Czechoslovakia	NE9	PI 647640
Aomori	*Fagopyrum esculentum*	2007	Japan	NE9	PI 647642
Gunma Prefectura	*Fagopyrum esculentum*	2007	Japan	NE9	PI 647643
Kanada	*Fagopyrum esculentum*	2007	Japan	NE9	PI 647644

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Accession Name	Taxon	Acquisition Date	Country of Origin	Holding Institute	Accession Number
MC 040	*Fagopyrum esculentum*	2007	Poland	NE9	PI 647647
MC 041	*Fagopyrum esculentum*	2007	Poland	NE9	PI 647648
Hiroshima	*Fagopyrum esculentum*	2007	Japan	NE9	PI 647656
Sweden-2	*Fagopyrum esculentum*	2007	Sweden	NE9	PI 647665
Gornosorskaya	*Fagopyrum esculentum*	2007	Soviet Union, Former	NE9	PI 647673
Satilovskaya 4	*Fagopyrum esculentum*	2007	Soviet Union, Former	NE9	PI 647674
Odesskaya	*Fagopyrum esculentum*	2007	Soviet Union, Former	NE9	PI 647675
Slavyanka	*Fagopyrum esculentum*	2009	Soviet Union, Former	NE9	PI 647681
CM-17	*Fagopyrum esculentum*	2007	Czechoslovakia	NE9	PI 647699
Solianskaja	*Fagopyrum esculentum*	2009	Russian Federation	NE9	PI 658428
Mancan	*Fagopyrum esculentum*	2009	Canada	NE9	PI 658432
Manor	*Fagopyrum esculentum*	2009	Canada	NE9	PI 658433
Martin's Alaska	*Fagopyrum esculentum*	2009	United States	NE9	PI 658436
Sperli	*Fagopyrum esculentum*	2009	Switzerland	NE9	PI 658437
Enka	*Fagopyrum esculentum*	2009	Denmark	NE9	PI 658440
CIfa 1	*Fagopyrum esculentum*	2009	United States	NE9	PI 658441
Laharpe/PA 029	*Fagopyrum esculentum*	2009	France	NE9	PI 658444
PA 093	*Fagopyrum esculentum*	2009	Italy	NE9	PI 658445
G 32223	*Fagopyrum esculentum*	2009	Italy	NE9	PI 658446
CIfa 2	*Fagopyrum esculentum*	2009	United States	NE9	PI 658447
Zhong Yang Qiao Mai	*Fagopyrum esculentum*	2014	China	NE9	PI 673844
Grechka	*Fagopyrum esculentum*	2017	Tajikistan, Khujand	NE9	PI 681711
AELITA	*Fagopyrum esculentum*	1992	Former Soviet Union	CZE122	01Z5000001
Astoriya	*Fagopyrum esculentum*	1992	Former Soviet Union	CZE122	01Z5000002

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Accession Name	Taxon	Acquisition Date	Country of Origin	Holding Institute	Accession Number
Chernoplodnaya	*Fagopyrum esculentum*	1992	Former Soviet Union	CZE122	01Z5000003
Chishiminskaya	*Fagopyrum esculentum*	1992	Former Soviet Union	CZE122	01Z5000004
Kalininskaya	*Fagopyrum esculentum*	1992	Former Soviet Union	CZE122	01Z5000005
Krasnostreletskaya	*Fagopyrum esculentum*	1992	Former Soviet Union	CZE122	01Z5000006
Lada	*Fagopyrum esculentum*	1992	Former Soviet Union	CZE122	01Z5000007
Maiskaya	*Fagopyrum esculentum*	1992	Former Soviet Union	CZE122	01Z5000008
Prikamskaya	*Fagopyrum esculentum*	1992	Former Soviet Union	CZE122	01Z5000009
Sibiryachka	*Fagopyrum esculentum*	1992	Former Soviet Union	CZE122	01Z5000010
Skorospelaya 81	*Fagopyrum esculentum*	1992	Former Soviet Union	CZE122	01Z5000011
Shatilovskaya 5	*Fagopyrum esculentum*	1992	Former Soviet Union	CZE122	01Z5000012
Alaya 846	*Fagopyrum esculentum*	1996	Ukraine	CZE122	01Z5000013
UKRAJINSKAJA,Viktoriya Podolskaya	*Fagopyrum esculentum*	1992	Former Soviet Union	CZE122	01Z5000014
Vita Galeya	*Fagopyrum esculentum*	1992	Former Soviet Union	CZE122	01Z5000015
LOCAL	*Fagopyrum esculentum*	1992	unknown	CZE122	01Z5000016
MONORI	*Fagopyrum esculentum*	1992	unknown	CZE122	01Z5000017
Lehnicka krajova	*Fagopyrum esculentum*	1996	Slovakia	CZE122	01Z5000018
Orbita	*Fagopyrum esculentum*	1992	unknown	CZE122	01Z5000020
Slavyachka	*Fagopyrum esculentum*	1996	Ukraine	CZE122	01Z5000021
Iwate Zairai (MIDOU)	*Fagopyrum esculentum*	1992	Japan	CZE122	01Z5000046
Tokushima Zairai	*Fagopyrum esculentum*	1992	Japan	CZE122	01Z5000047
Takizawa Zairai	*Fagopyrum esculentum*	1992	Japan	CZE122	01Z5000048
Yaita Zairai	*Fagopyrum esculentum*	1992	Japan	CZE122	01Z5000049
Stoyoama Zairai	*Fagopyrum esculentum*	1992	Japan	CZE122	01Z5000050
Botansoba	*Fagopyrum esculentum*	1992	Japan	CZE122	01Z5000051

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Accession Name	Taxon	Acquisition Date	Country of Origin	Holding Institute	Accession Number
Hara Zairai	*Fagopyrum esculentum*	1992	Japan	CZE122	01Z5000052
Arihira Zairai	*Fagopyrum esculentum*	1992	Japan	CZE122	01Z5000055
BALLADA	*Fagopyrum esculentum*	1993	Former Soviet Union	CZE122	01Z5000058
KRUPINKA	*Fagopyrum esculentum*	1993	Former Soviet Union	CZE122	01Z5000059
Sumcanka	*Fagopyrum esculentum*	1993	Former Soviet Union	CZE122	01Z5000060
SKOROSPELAJA,SKOROSPELAYA	*Fagopyrum esculentum*	1993	Former Soviet Union	CZE122	01Z5000061
Bolshevik 4	*Fagopyrum esculentum*	1993	Former Soviet Union	CZE122	01Z5000062
PYRA	*Fagopyrum esculentum*	1993	Czechoslovakia	CZE122	01Z5000063
La Harpe	*Fagopyrum esculentum*	1994	France	CZE122	01Z5000064
HRUSZOWSKA	*Fagopyrum esculentum*	1994	Poland	CZE122	01Z5000065
Prego	*Fagopyrum esculentum*	1994	Germany	CZE122	01Z5000066
Chernigovskaya 17	*Fagopyrum esculentum*	1996	Ukraine	CZE122	01Z5000067
Viktoriya	*Fagopyrum esculentum*	1996	Ukraine	CZE122	01Z5000068
Vychodoslovenska krajova	*Fagopyrum esculentum*	1996	Slovakia	CZE122	01Z5000069
Spacinska 1	*Fagopyrum esculentum*	1996	Slovakia	CZE122	01Z5000070
Dozhdik	*Fagopyrum esculentum*	1996	Belarus	CZE122	01Z5000071
Sudtirol Nr. 3	*Fagopyrum esculentum*	1996	unknown	CZE122	01Z5000072
Zelenocvetkovaya 90	*Fagopyrum esculentum*	1996	unknown	CZE122	01Z5000076
Anita Beloruskaya	*Fagopyrum esculentum*	1996	Ukraine	CZE122	01Z5000084
Kasanskaya,Kusanskaja	*Fagopyrum esculentum*	1996	Belarus	CZE122	01Z5000092
JEZYK	*Fagopyrum esculentum*	1996	unknown	CZE122	01Z5000093
JUBILEJNAJA,Yubileina	*Fagopyrum esculentum*	1996	unknown	CZE122	01Z5000094
Kora	*Fagopyrum esculentum*	1996	unknown	CZE122	01Z5000095
JEC 179	*Fagopyrum esculentum*	1996	unknown	CZE122	01Z5000098

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Accession Name	Taxon	Acquisition Date	Country of Origin	Holding Institute	Accession Number
GREEN COROLLA 2	*Fagopyrum esculentum*	1996	unknown	CZE122	01Z5000100
Komsta	*Fagopyrum esculentum*	1996	Former Soviet Union	CZE122	01Z5000105
emka	*Fagopyrum esculentum*	1996	Poland	CZE122	01Z5000111
GEMA	*Fagopyrum esculentum*	1996	Poland	CZE122	01Z5000112
Lopfe	*Fagopyrum esculentum*	1996	unknown	CZE122	01Z5000113
Kasanskaya	*Fagopyrum esculentum*	n.a.	Former Soviet Union	CZE122	01Z5000115
Demetra	*Fagopyrum esculentum*	2001	Former Soviet Union	CZE122	01Z5000117
Podojlanka,Podolyanka	*Fagopyrum esculentum*	2000	Former Soviet Union	CZE122	01Z5000118
SIVA	*Fagopyrum esculentum*	2001	Slovenia	CZE122	01Z5000119
Darja	*Fagopyrum esculentum*	2001	Slovenia	CZE122	01Z5000120
Rana 60	*Fagopyrum esculentum*	2001	Slovenia	CZE122	01Z5000121
Darina	*Fagopyrum esculentum*	2001	Slovenia	CZE122	01Z5000122
KARA-DAG	*Fagopyrum esculentum*	2001	unknown	CZE122	01Z5000123
Bongpyng	*Fagopyrum esculentum*	2001	unknown	CZE122	01Z5000124
Suwon #1	*Fagopyrum esculentum*	2001	unknown	CZE122	01Z5000125
Jana	*Fagopyrum esculentum*	2001	unknown	CZE122	01Z5000127
Panda	*Fagopyrum esculentum*	2003	Russian Federation	CZE122	01Z5000128
LUBA	*Fagopyrum esculentum*	2003	Russian Federation	CZE122	01Z5000129
Billy	*Fagopyrum esculentum*	2003	Austria	CZE122	01Z5000130
ceska krajova	*Fagopyrum esculentum*	2003	Czechoslovakia	CZE122	01Z5000131
ROKSOLANA	*Fagopyrum esculentum*	2003	Russian Federation	CZE122	01Z5000133
Rubra	*Fagopyrum esculentum*	2003	Russian Federation	CZE122	01Z5000134
Bamby	*Fagopyrum esculentum*	2003	Austria	CZE122	01Z5000135
Pulawska II	*Fagopyrum esculentum*	2003	Poland	CZE122	01Z5000137

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Accession Name	Taxon	Acquisition Date	Country of Origin	Holding Institute	Accession Number
Tohno Zairai	*Fagopyrum esculentum*	2003	Canada	CZE122	01Z5000138
Silverhull 24	*Fagopyrum esculentum*	2003	Canada	CZE122	01Z5000139
Tempest	*Fagopyrum esculentum*	2003	Canada	CZE122	01Z5000140
Sweden-1	*Fagopyrum esculentum*	2003	Sweden	CZE122	01Z5000141
CD 7272	*Fagopyrum esculentum*	2003	Czechoslovakia	CZE122	01Z5000143
CD 7273	*Fagopyrum esculentum*	2003	unknown	CZE122	01Z5000144
AKADEMICHNA	*Fagopyrum esculentum*	2004	Ukraine	UKR008	UC0101972
Bilorus'ka gomostil'na	*Fagopyrum esculentum*	1993	Belarus	UKR008	UC0100362
Bilorus'ka odnostebel'na	*Fagopyrum esculentum*	n.a.	Belarus	UKR008	UC0100991
BOGATIR	*Fagopyrum esculentum*	1992	Russian Federation	UKR008	UC0100115
Bol'shevik-Albaniya	*Fagopyrum esculentum*	1992	Albania	UKR008	UC0100276
DETERMINANT 2	*Fagopyrum esculentum*	n.a.	Ukraine	UKR130	UC0101642
Gibridna	*Fagopyrum esculentum*	1992	Russian Federation	UKR008	UC0100100
Gorets' vuz'kolistii	*Fagopyrum esculentum*	1993	Russian Federation	UKR008	UC0101109
CHornogorets'	*Fagopyrum esculentum*	1992	Belarus	UKR008	UC0100365
Ilishevskaya	*Fagopyrum esculentum*	2010	Kazachstan	UKR008	UC0102185
KARA-DAG	*Fagopyrum esculentum*	1997	Ukraine	UKR130	UC0101129
KARMEN	*Fagopyrum esculentum*	2005	Belarus	UKR008	UC0101987
KOSMEYA	*Fagopyrum esculentum*	1994	Ukraine	UKR130	UC0101155
Krupnoplodna SHertandins'k	*Fagopyrum esculentum*	1992	Kazachstan	UKR008	UC0101698
Kvyetka determinantna	*Fagopyrum esculentum*	2010	Belarus	UKR008	UC0102165
Malinka	*Fagopyrum esculentum*	2006	Ukraine	UKR008	UC0101979
Mig	*Fagopyrum esculentum*	n.a.	Russian Federation	UKR008	UC0100988
mistsevii 58	*Fagopyrum esculentum*	1995	Lithuania	UKR008	UC0101906

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Accession Name	Taxon	Acquisition Date	Country of Origin	Holding Institute	Accession Number
MostĂŞapaz	*Fagopyrum esculentum*	1994	Poland	UKR008	UC0100948
Olmemil'	*Fagopyrum esculentum*	1994	People's republic of Korea	UKR008	UC0100949
Perlina Podil's'ka	*Fagopyrum esculentum*	2007	Ukraine	UKR008	UC0101992
RADEKHIVS'KA POLIPSHENA	*Fagopyrum esculentum*	n.a.	Ukraine	UKR130	UC0101496
Sadkom	*Fagopyrum esculentum*	1993	Poland	UKR008	UC0100361
Serebrista	*Fagopyrum esculentum*	1994	Ukraine	UKR008	UC0100912
SKOROSTIGLA 86	*Fagopyrum esculentum*	n.a.	Russian Federation	UKR008	UC0101092
Tetraployidna	*Fagopyrum esculentum*	1992	Russian Federation	UKR008	UC0100285
Vlada	*Fagopyrum esculentum*	2011	Belarus	UKR008	UC0102193
Zelenokvitkova 90	*Fagopyrum esculentum*	1992	Ukraine	UKR008	UC0100348
	Fagopyrum esculentum	1992	Sweden	UKR008	UC0100283
	Fagopyrum esculentum	1994	Belarus	UKR008	UC0100723
Belorusskaja	*Fagopyrum esculentum*	1973	Belarus	AUT046	ARCHE-BU004
Steirischer	*Fagopyrum esculentum*	1994	Austria	AUT046	ARCHE-BU005
PA 160	*Fagopyrum tataricum*	n.a.	United States	SVN018	PI 199769
Madawaska	*Fagopyrum tataricum*	n.a.	United States	SVN018	PI 476852
Sarasin a Ployes	*Fagopyrum tataricum*	n.a.	United States	SVN018	PI 503879
Clfa 38	*Fagopyrum tataricum*	n.a.	United States	SVN018	PI 647612
G 32048	*Fagopyrum tataricum*	n.a.	United States	SVN018	PI 658429
G 32050	*Fagopyrum tataricum*	n.a.	United States	SVN018	PI 658431
Martin's Tarbary	*Fagopyrum tataricum*	n.a.	United States	SVN018	PI 658438
Madawaska Native	*Fagopyrum tataricum*	n.a.	United States	SVN018	PI 658439
Slovenj Gradec	*Fagopyrum tataricum*	n.a.	Slovenia	SVN018	SRGB 2223
Osrednje Goričko	*Fagopyrum tataricum*	n.a.	Slovenia	SVN018	SRGB 2224

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Accession Name	Taxon	Acquisition Date	Country of Origin	Holding Institute	Accession Number
Radohova vas	*Fagopyrum tataricum*	n.a.	Slovenia	SVN018	SRGB 2257
Dolina Krme na Gorenjskem	*Fagopyrum tataricum*	n.a.	Slovenia	SVN018	SRGB 2258
Rut nad Tolminom	*Fagopyrum tataricum*	n.a.	Slovenia	SVN018	SRGB 2268
Vrh nad Višnjo Goro	*Fagopyrum tataricum*	n.a.	Slovenia	SVN018	SRGB 2291
Ravne na Koroškem	*Fagopyrum tataricum*	n.a.	Slovenia	SVN018	SRGB 2309
Žirovski vrh	*Fagopyrum tataricum*	n.a.	Slovenia	SVN018	SRGB 2315
Sveti Miklavž nad Litijo	*Fagopyrum tataricum*	n.a.	Slovenia	SVN018	SRGB 2316
Novo Mesto	*Fagopyrum tataricum*	n.a.	Slovenia	SVN018	SRGB 2321
Cerkno	*Fagopyrum tataricum*	n.a.	Slovenia	SVN018	SRGB 2351
Straža	*Fagopyrum tataricum*	n.a.	Slovenia	SVN018	SRGB 2409