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## Introduction






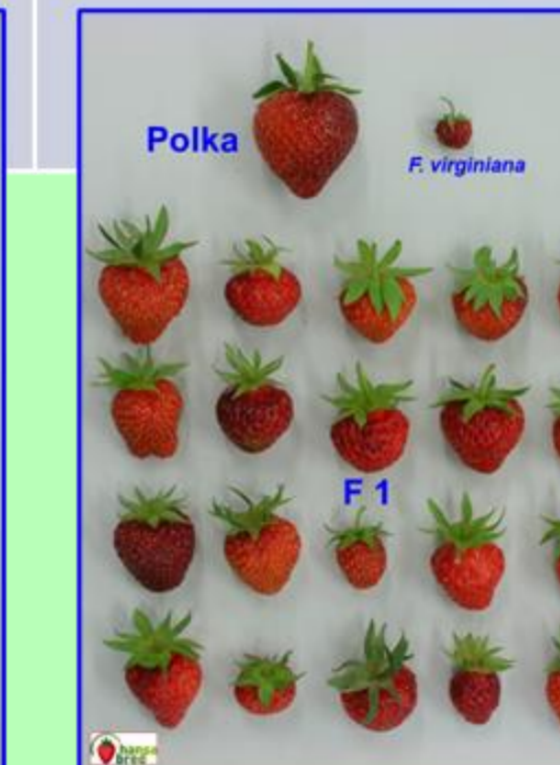
The main objective of "BreedingValue" (title: "Pre-breeding strategies for obtaining new resilient and added value berries") is to provide the knowledge and tools to utilize strawberry, raspberry and blueberry GenRes and pre-breeding material for the creation of new breeding possibilities. The achievements are directed to create European cultivars with resilience to different and changing climatic conditions, as well as adaptability to different cultivation systems.

## Material Selection and Methods

The selection of proper model plants is always crucial for successful experimental designs. The European project "BreedingValue" is a comprehensive action combining methods of phenotyping, metabolomic, sensory and molecular studies. Activities are supported by a proper data management and organized in several work packages. The general objective of WP1 is to identify, select, assess, and evaluate in field trials berry genetic resources from collections and breeding programs.

### Definition of Material

GenRes collections and even breeding lines and progenies originated from intra- and inter-specific crosses, as well as species accessions are used and identified and valorized for breeding programs. The selection of proper material is the base for the tasks of the other work packages of "BreedingValue". Six plant categories were created based on breeding history and breeding stage (Fig. 1). Using cultivar collections from gene banks as well as breeding material from European breeders in summary 15 partners from the project contributed their material. Additionally, external private breeding companies could be acquired to make material available for different studies. Potential genotypes were announced by the partners by means of questionnaires, webinars and workshops. Also, populations are available for each berry species. In a second step, genotypes were selected for different tasks. How many genotypes will be used in the different work packages are shown in table 1.

Plant category 1 Old cv. (before 1960)	Plant category 2 Modern cv. (1960-2004)	Plant category 3 Newest (released) cv. (2005 till now)	Plant category 4 Pre-breeding (advanced selections or selections in new breeding directions)	Plant category 5 Species	Plant category 6 Populations
					

### Maintenance

- Several partners of the project maintain important collections of germplasm in the three species (blueberry, raspberry, and strawberry).
- ECPGR concept is used and made available, living plant collections of partners are included.
- Germplasm is maintained On-farm/ Ex situ / In vitro conservation.

Fig. 1: Definition of plant categories based on breeding history and breeding stage (example strawberry)

### Field trials

Field trials in different cultivation systems allow phenotyping, genotyping, fruit evaluation and consumer sensory tests. Experiments are established at the following cultivation sites: JHI – Scotland (raspberry, blueberry), Luke – Finland (strawberry, blueberry), UPM - Italy (strawberry), NIBIO – Norway (strawberry), NIAB (strawberry), S'O – Italy (strawberry, raspberry, blueberry), Hansabred– Germany (strawberry), UCUK/YL – Turkey (strawberry, raspberry, blueberry), JKI– Germany (strawberry, raspberry), IFAPA– Spain (strawberry), CIV – Italy (strawberry), INVENIO - France (strawberry).

### The selected genotypes are used for:

- Evaluation in different climates.
- Evaluation for disease resistance.
- Waterstress resistance
- Life Cycle Assessment (LCA) of fruit production
- Marker-Assisted Selection (MAS),
- Genomic Selection,
- Allelic Diversity Study (in strawberry only)
- Application of new phenotyping tools
- Metabolomic Studies

Tab. 1: Number of genotypes per work package for strawberry, raspberry, and blueberry.

	Sum	WP1	WP2	WP3	WP4	Allelic diversity
<i>Fragaria</i>	1735 and 27 populations	819	1081	215	107	376
<i>Rubus</i>	409 and 4 populations	74	54	59	16	-
<i>Vaccinium</i>	79+2 populations	45	78	57	19	-

## Conclusion and Perspectives

The Horizon2020 project "BreedingValue" requires proper plant material to apply modern tools in molecular, metabolomic and phenotypic methods to strawberry, blueberry and raspberry. The material was selected by all project partners, assigned to different plant categories and serves as the basis for different work packages. Plantations in different cultivation systems deliver material and data for genetical, metabolomic analysis and all kinds of phenotypical evaluations. A Life Cycle Assessment (LCA) of fruit production is performed in a separate task.

Additionally, an allelic diversity study in strawberry is performed with specifically selected material to shed light on the breeding history and to evaluate the resilience of the European breeding material for the future.