DIVERSIFOOD

Embedding crop diversity and networking for local high quality food systems

Grant agreement n°: 633571

H2020 - Research and Innovation Action

Deliverable 1.1

Common definitions and hypotheses for agricultural diversity

Due date: February 2018

Actual submission date: February 2019

Project start date: March 1st, 2015 **Duration:** 48 months

Workpackage concerned: WP1

Concerned workpackage leader: Edwin Nuitjen

Lead Beneficiary: Véronique Chable, INRA

Dissemination level:

- ☒ **PU:** Public (must be available on the website)
- ☐ **CO:** Confidential, only for members of the consortium (including the Commission Services)
- ☐ **CI:** Classified, as referred to in Commission Decision 2001/844/EC

Abstract

A common framework with clear concepts and methodologies have been developed to make the whole project effective during the whole duration of the project. The focus of DIVERSIFOOD was on diversification, which needed to be considered at three levels: plant breeding / genetic diversity in crops, farming system and food chain in which biological, economic and sociological research perspectives are integrated.

At the start of the project, all partners have been involved to define concepts and develop methodologies in an iterative way, and to refine concepts and methodologies on the basis of their experiences and new insights. Nine key-words have been identified to cover the overall project activities from field to market. The broader and integrative one is 'resilience'; this concept is extended to the whole food system, including economic, social, political and cultural dimensions. Thus, resilience of the food system calls for adaptive capacities of the food chain at the agro-ecological and socio-economic level to provide sufficient high quality food and to maintain its cohesion over time. Building resilient food systems means to connect the other eight key-words/concepts:

Co-evolutionary processes (Key-Word 8) within systems (such as the food system) support dynamic integration of several concomitant processes which cover several dimensions (economic, social, environmental, political, cultural and legal). A food system is resilient when it fulfils its function of providing food based on diversity (KW 1), food quality (KW 2) and sustainable development (KW 3), within local and global conditions of food democracy (KW 4) and community management of biodiversity (KW 5). To reach all these goals, DIVERSIFOOD has promoted collaborative, participative and action research (KW 6), and trans-disciplinarily and a paradigmatic shift (KW 7).

During the project, DIVERSIFOOD activities have provided developments based on the hypothesis on which key-words have been defined. Innovation Fact Sheets have been produced to synthetize the project results.

At the end of the project, partners have collectively described different types of plant varieties and populations from the perspective of DIVERSIFOOD. An integrated comprehensive approach has been used, including the following perspectives: genetic structure; technical aspects: breeding, agronomy and processing; sociological; economic; cultural and legal. In conclusion, we propose to differentiate plant varieties based on the type of market for which they have been bred:

1. Conventional agriculture. Modern varieties are bred for geographical wide adaptation, which means that they should be marketed and then cultivated by farmers in different regions. These modern varieties are registered and protected by plant breeders' rights that permit private breeders to recover the costs of breeding through the payment of royalties.
2. Organic agriculture. Under the umbrella of varieties for organic agriculture one can find many different kinds of cultivars: from modern varieties only certified "organic seed" (and not bred organically) to local varieties or open pollinated varieties (in some cases also bred for organic). Hence, these cultivars originate from both conventional and organic breeding. The new organic regulation 848/2018 is opening a new space under this framework for two new categories: organic heterogeneous material and organic variety. Registration and certification processes for these new categories will be defined through delegated acts by the EU Commission in the coming years. This regulation will enter into force in 2021.
3. Local markets. In these markets, locally adapted and collectively managed varieties play an important role. They are usually heterogeneous cultivars that can be landraces, old varieties or new farmers' varieties bred by participatory plant breeding programmes. It is difficult to find a legal space for marketing them in the current framework due to their diversity. The intention is not to protect them by IPRs and there is a growing interest of using open source or commons to manage them.

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Part 1: Common key-words and framework

At the start of the project, all partners have been involved to define concepts and develop methodologies and a common framework.

Objective

A common framework with clear (and innovative) concepts and methodologies have been managed to make the whole project effective during all the duration of the project. The focus of DIVERSIFOOD was on diversification, which needed to be considered at three levels: 1) Breeding / genetic diversity in crops, 2) Farming system and 3) Food chain in which biological and sociological research perspectives have been integrated (Nuijten 2011[1]).

To define concepts and elaborate a common and agreed set of definitions and common hypotheses, in which biological, economic and sociological research perspectives are integrated, associated to diversity in agriculture, sustainability, quality and multi-actor organisation relevant to the work conducted in WP2 to WP5.

Method and process

For each key-word/concept, a definition was elaborated collectively according to experiences of partners, after which all DIVERSIFOOD activities related to these keywords have been summarised.
Several steps were necessary to manage a collective production. During the first period, two steps were identified: (1) milestone 1 (M6) elaborated by INRA and ITAB out of the raw material collected during the Kick Off Meeting (presentation of WP1) and (2) the annual meeting (16-18th February 2016) in Nicosia where another workshop had been co-organised with all task leaders. The list of key-words has been finalised during AM1.
Then, during the second period (M13-M30), the nine keywords and concepts were developed together within WP1 team and with all partners involved in DIVERSIFOOD thanks to e-mails exchanges. The objective was the production of a common semantics basis to facilitate research and communication among partners and with other stakeholders:
1- Diversified food system, 2- Food quality, 3- Sustainable food systems, 4- Food democracy, 5- Community management of agro-biodiversity, 6- Collaborative, participative and action research, 7- Transdisciplinarity and paradigmatic shift, 8- Co-evolutionary processes, 9- Resilience.

Results

Global objective

DIVERSIFOOD is a European H2020 project facing the challenge of promoting a new way of thinking agriculture. Its ambition: “embedding crop diversity and networking for local high quality food systems”. Through multi-actor and transdisciplinary approaches based on relevant cases, DIVERSIFOOD aims to develop:

- Relevant locally developed adapted innovations
- New biodiversity management models
- New approaches to plant breeding and diversity management

[1] Nuijten, E. (2011) Combining research styles of the natural and social sciences in agricultural research. NJAS – Wageningen Journal of Life Sciences 57, 197–205

- More diversity in crops, varieties and populations
- Diverse healthy and tasty food products and market valorisation
- Original research and communication tools to connect activities and people

What do we mean by food diversity? Nine keywords and concepts were developed together with all partners involved in DIVERSIFOOD, to facilitate research and communication among partners and with other stakeholders.

1 - Diversified food system

Definition

The food system is considered from field to fork promoting diversified crop varieties, animal breeds and end products, considering a diversity of consumers, diets and needs according to diverse environmental, socio-economic and cultural contexts in Europe.

Diversified food systems show different models, but all focus on sharing added value among stakeholders within networks and regional organisations. They offer conditions to consumers to choose and enjoy a broad range of locally adapted, tasteful, nutritional and healthy as well as sustainably produced food.

How DIVERSIFOOD deals with diversified food system

- Including all actors of food chain from seed to plate, fostering the development and maintenance of local food systems
- Promoting collaborative processes "from idea to implementation" in innovation around food practices
- Integrating theoretical & practical perspectives
- Promoting iterative learning among all actors involved
- Taking into consideration all other dimensions involved in addition to technical and organisational issues, such as legal environment, economic issues, cultural and social dynamics.

2 – Food quality

Definition

The concept of food quality has its roots in traditional produces from locally adapted crops. Food quality covers a wide range of traits that are defined in the context of sustainable diet and local food culture and that cover:

- ethical and social values
- nutritional, healthy components
- taste characteristics
- the respect of raw material and natural processes

How DIVERSIFOOD deals with…

DIVERSIFOOD is exploiting untapped and forgotten crops which belong to our common cultural patrimony:

- increasing diversity of species, plant types and genotypes, by including untapped genetic resources, produced in agro-ecological systems
- testing gluten quality and properties for cereals, and evaluation of nutritional traits for vegetables
- managing multi-actor and participative organisation of sensorial quality evaluation
- exploring traditional knowledge and creating new cultivated populations.

3 – Sustainable food systems

Definition

Sustainable food systems are preserving diversity in resources for future generations, respecting human values and environmental richness. Sustainability applied to food system is a complex concept since it covers:

- Production, processing, distribution, consumption and waste disposal activities
- Social, legal, economic, ecological, cultural, ethical values

How DIVERSIFOOD deals with…

DIVERSIFOOD considers that the adaptation of crops to their agricultural and cultural environments is a key component of sustainability and is taking into consideration that:

- agrobiodiversity is the first pillar of crop adaptation and *in situ* evolutionary processes is the second
- people of all spheres of a food system (from seed to food) are equally concerned
- socio-economic environments should be adapted to offer a place to diversities from seed to end products

4 – Food democracy

Definition

Food democracy refers to the opportunity of people to decide in food matters (production, processing and consumption) and to actively participate in shaping their food systems. As such, it is a rights-based concept but also entails active engagement.

It covers empowerment and responsibility of all actors involved around food-related practices (breeding, farming, processing, food preparation, distribution and consumption), creating and promoting 'food culture'.

How DIVERSIFOOD deals with food democracy

- achieving empowerment of the different actors in the different phases of the food chain, by fostering social learning and participatory processes and multi-actor decision making in all chain activities
- connecting the project activities with other contexts where producers and consumers rights about food are stressed and defended (e.g. the right to use farm-saved seed, referring to FAO/UN/International rights of farmers seed laws and informal seed systems organisations

5 – Community agro-biodiversity management

Definition

Groups of actors organised in networks that collectively manage seeds of population varieties for adaptation, breeding and conservation, and the associated knowledge to maintain and develop diversity of crops and food.

They share a common goal in seed management and local supply chains development and are engaged in developing new practices to cope with the current challenges of sustainability and food quality.

How DIVERSIFOOD deals with…

- Experimenting with collective dynamic management of agro-biodiversity on-farm, considering both formal and informal seed systems
- Analysing and defining collective organisation of food chains aimed at enhancing and valorising local agro-biodiversity
- Promoting collective organisation of local markets, increasing awareness of public and policy makers, and designing labels to recognise locally bred seed

6 – Collaborative, participative and action research

Definition

A way of doing together experiments / surveys / studies which is decentralised in terms of ownership, responsibilities, and raising issues, and aiming for concrete applications to answer to societal challenges

How DIVERSIFOOD deals with…

Acting together in a collaborative way. It is about sharing:

- Concepts
- Objectives
- Means and processes
- Identification of new questions and critical issues
- Organisation of actors and institutions participating in the process
- Ways of implementation and dissemination

7 – Transdisciplinarity and paradigmatic shift

Definition

Trans-disciplinarity is the integration of different types and sources of knowledge coming from the interaction between different researchers and actors of the food chain (farmers, processors, cooks, craftsmen), and the capacity of this new shared pool of knowledge to produce more than the sum of the parts.

Paradigmatic shift is to consider different sources of knowledge equally and to share them, integrating objectives for environmental and social sustainability from a holistic perspective.

How DIVERSIFOOD deals with…

- Bringing together different types of knowledge and acknowledging and respecting plurality as a richness.
- Considering ethics and practical usefulness as important as scientific truth and the idea of change towards sustainability as needed in every field
- Working from field to plate through a multi-actor approach
- Stressing the importance of proximity, interaction, trust and shared knowledge between consumers and producers

8 – Co-evolutionary processes

Definition

A co-evolutionary process is a dynamic integration of various concomitant processes which can cover several dimensions:

- Agro-ecosystem dimension in which plants co-evolve, thanks to genetic diversity, with their specific environments and according to human practices
- Social dimension in which agriculture and culture co-evolve thanks to a bio-cultural diversity resulting in new solutions to societal challenges, integrating ethical dimensions (e.g. respect for integrity of the plant), and stimulating local development with “low tech, low input, accessible populations”
- Other dimensions (legal, institutional, economic) that have an important impact in shaping the practices within the food system

How DIVERSIFOOD deals with…

- Promoting breeding techniques that respect and enhance the natural ability of the plant to adapt
- Exploring mechanisms of social innovation to introduce values about diversity and living processes within food chains and breeding

- Promoting social learning among all actors involved, as a way to reproduce knowledge hand-in-hand with practice
- Looking at ways to reshape the legal, institutional and economic environments according to both environmental and social sustainability challenges

9 – Resilience

At the level of the agro-ecosystem, SOLIBAM project (FP7- KBBE-245058) had proposed a first definition:
Resilience is the capacity of an ecosystem to respond to a perturbation by resisting damage and recovering quickly. A resilient system will reorganise while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks. Thus, resilience is linked to the adaptive capacity of a system in the face of change.
Within DIVERSIFOOD, resilience concept is extended to the whole food system, including economic, social, political and cultural dimensions. Thus, resilience of the food system calls for adaptive capacities of the food chain at the agro-ecological and socio-economic level to provide sufficient high quality food and to maintain its cohesion over time.

How DIVERSIFOOD deals with resilience

Building resilient food systems means to connect all 8 previous concepts:
Co-evolutionary processes (KW 8) within systems (such as the food system) support dynamic integration of several concomitant processes which cover several dimensions (economic, social, environmental, political, cultural and legal).
A food system is resilient when it fulfils its function of providing food based on diversity (KW 1), food quality (KW 2) and sustainable development (KW 3), within local and global conditions of food democracy (KW 4) and community management of biodiversity (KW 5).
To reach all these goals, DIVERSIFOOD is promoting collaborative, participative and action research (KW 6) and transdisciplinarity and a paradigmatic shift (KW 7).

Dissemination

A four pages document has been designed and printed as communication tool. It has been translated in several languages: English, French, Italian, German, Portuguese, Spanish and Hungarian


9 Resilience
In the literature
How DIVERSIFOOD deals with resilience
21 partners DIVERSIFOOD CONSORTIUM
Embedding crop diversity and networking for local high quality food systems'
Knowledge
Sustainability
Innovation
networks
Role
Produce
Autonomy
Life
Farmers
Ethics
Healthy
Citizens
Rights
Sources
Seeds
9 Key-concepts for food diversity
Introduction
DIVERSIFOOD is a European H2020 project facing the challenge of promoting a new way of thinking agriculture. It's ambition: "embedding crop diversity and networking for local high quality food systems".
Through multi-actor and transdisciplinary approaches based on relevant cases, DIVERSIFOOD aims to develop:
Relevant locally developed adapted innovations
New biodiversity management models
New approaches to plant breeding and diversity management
More diversity in crops, varieties and populations
Diverse healthy and tasty food products and market valorisation
Original research and communication tools to connect activities and people
What do we mean by food diversity? Nine keywords and concepts were developed together with all partners involved in DIVERSIFOOD, to facilitate research and communication among partners and with other stakeholders.
1 Diversified food system
Definition
2 Food quality
Definition
3 Sustainable food systems
Definition
4 Food democracy
Definition
5 Community management of agro-biodiversity
Definition
6 Collaborative, participative and action research
Definition
7 Trans-disciplinarity and paradigmatic shift
Definition
8 Co-evolutionary processes
Definition

Part 2: Set of definitions of cultivated varieties for agricultural diversity

During the project, all partners have contributed, in an iterative way, to refining concepts and methodologies on the basis of their experiences and new insights.

Objective

1- To elaborate a common and agreed set of definitions of the different forms of cultivated varieties, in which biological, economic and sociological research perspectives are integrated.
2- To connect these definitions to DIVERSIFOOD concepts of varieties to sustain diversified food chains, to disseminate our vision of research boosting agricultural diversity to a broad public (Innovation fact sheets) and scientific community (congress, publication and booklets)

Method and process

During the 3rd annual meeting of DIVERSIFOOD in Vienna, March 5th 2018, a workshop has been organised within the WP1 framework. From the beginning of the project, during each annual meeting, WP1 workshops have been organised to involve all the partners in its activities. For the definitions of the different forms of plants cultivated by farmers, it was important to develop a set of criteria to consider each kind of varieties/plant populations from DIVERSIFOOD perspective.
An integrated comprehensive approach has been used, including the following perspectives:
- genetic structure;
- technical: (1) breeding, (2) agronomy and (3) processing;
- sociological;
- economic;
- cultural;
- legal and political.

Results

The following table shows all information provided by partners during the workshop.

type / description	Genetic structure	Breeding techniques	Farming practices	Processing	Sociological	Economic	Cultural	Legal/political
Genetic resources	All genetic structures are possible	Every techniques including biotechnologies	Seeds used/stored but technical term focused on genetic level	Conserving genes, not whole cultivar, thus disconnected of food chains	Disconnected from farmers-breeders concept of plant breeding	Natural resource	Conventional concept, not used for PPB	Policy concept; Part of biodiversity management
Population	Mostly heterogeneous; Genetic diversity dynamic	Breeding concept and overaching technical term for heterogeneous material e.g. in UK, just CCP (Composite Cross Population), or dynamic management of populations bred by farmers	Not refer to this, only for breeding	Not refer to this, only for breeding	Not connected	Not so much used on market	Not connected	Technical term; Temporary European experiment for marketing
Landraces	Population, heterogeneous and evolving; The heterogeneity depending on pollination biology of the species	Bred by the farmers/mass selection; locally adapted	Mostly disappeared after WW2. Some revival XXI century with low input agricultures and marginal regions	Mostly associated to artisanal processes without high standardized processes ;	Connection to locality; Relationship with farmers related to the cultural context	Niche market concept reappropriated ; Robustness provides basic incomes	Continuity of cultivation through time ; Current importance depending of country/region	Belong to tradition ? No Intellectual Property (IP) rights; Only considered as EU conservation varieties, politically neglected today
Heirloom	Population, heterogeneous	Mass selection; Bred by farmers and amateurs	More a UK concept; Depends on the country	Artisanal processes	Connected to heritage concept; American slang ; Pedigree of plants correlated with pedigree of people using it	Marketing concept	Traditional values en Europe, UK "folk varieties"; A long history of use "heritage"	Not really in discussion ; No IP rights
Traditional variety	From homogeneous variety to populations; Can be a landrace; Bred by farmers or breeders with selection crossing respecting natural processes	No biotechnologies; Mass selection, farmer selection or old conventional varieties	Sometimes not used any more. After WW1 no more; Local adaptation and traditional practices; Used widely during certain period by certain people; Low-input and organic agricultures	Artisanal processing; Traditional practices; Processing adapted to each variety population… Good quality artisanal food	Food culture associated to old way of life; Has a history but can grow in different regions often with knowledge associated; Community management	Marketing uses often the concept with imaginary used in marketing; Empowerment and circular economy	Connected to local areas tradition; History heritage (protecting it); Linked to the past traditions, linked to "old" concept	Variety has different uses, and interpretations; No IP rights; Conservation varieties sometimes
Local variety	Can be traditional or new variety; Mainly heterogeneous	Developed and mainstream in one region; Farmer selection/mass selection; Bred by farmers with or without participatory plant breeding (PPB) programmes			Can be old or newly developed embedded in local commons; Knowledge associated	Niche market		
Farmer/peasant variety	All possible; Mostly heterogeneous	Mass selection and new methods for breeding diversity testing (PPB)	All possible	Farm saved seeds; Self consumption or short chains	Opposite of modern variety: owned by farmers; Peasant has different meanings in different countries; Innovation and collective management	Local economy usually species specific; Seed autonomy; Added value	Peasant – for some countries, the word has bad connotation; Seed autonomy	Peasant, alternative agriculture term; No definition
Modern variety	Phenotypic and genetic homogeneity except for Open Pollinated Varieties (OPV)	All techniques	Large scale industrial agriculture; specific seeds of markets; Often associated with high level of inputs; Can also be used for low input and organic agricultures	All produce for global markets; Uniform for processing; Bred for industrial processing	Produced and distributed by commercial seed companies; Disconnection with farmers; Mainstream agriculture	Business for seed companies, more driven by markets than by farmers needs; Traded within general mass market and industrial agro-industry chain	No attention for farmers cultural values; mainstream consumption	Perfectly supported by present legal environment; Registred on official catalogue; Legally protected by Intellectual Property (IP) rights
Cultivar	Generally uniform except OPV; Word used sometimes in botanical books				Is a product			No legal definition; when legally protected, see modern variety

Discussion

In the text, we are referring to IF (Innovation Factsheets) produced during the project and which are describing the main concepts and project results. The IF list is presented at the end of this document.

Genetic resources:

For the DIVERSIFOOD consortium, this concept is now covering a reality which is disconnected to the context of the fields and the food chains: it was conceived in a conventional organisation of plant breeding in order to manage a reservoir of "genes" and it has been then regulated by the ITPGRFA and the protocol of Nagoya (IF#9).

Nevertheless, genetic resources were the foundation of most of DIVERSIFOOD plant breeding activities. In fact, in the project context, accessions recovered their previous status designated in their passport data (such as traditional cultivar or landrace) (IF#4). These accessions changed of status from *ex situ* genetic resource to farmer/peasant varieties when they showed an interest within on farm plant breeding process (IF#5 and IF#6).

Population:
Plant populations are the basic genetic structure to support DIVERSIFOOD objectives to increase crop diversity. It represents the genetic structure of nearly all the farmers' new varieties based on diversity and evolution of this diversity over time and space (IFS#2). Besides farmers' new varieties, it currently concerns also the "heterogeneous material" experimented since 2014 within an EU temporary experiment to evaluate the feasibility of marketing heterogeneous plant populations in which several partners are engaged (Commission decision C (2014), 1681). This varietal structure has also been recently recognised of interest for organic agriculture (https://www.ifoam-eu.org/en/news/2018/06/15/new-eu-organic-regulation-what-will-change and https://www.arche-noah.at/files/briefing_seeds_in_new_the_eu_organic_regulation_january_2018.pdf).

Landraces, heirloom, traditional variety, local variety:
They are mainly heterogeneous, all anchored in locality and associated to artisanal valorisation. The term 'landrace' seems to represent the broader concept of this kind of varieties. Traditional variety and local varieties are respectively putting first the uses/cultural criteria and local attachments. The word 'heirloom' is used in some English spoken countries, it is not widely used in most European countries. These varieties are still being marketed by small scale seed companies.
Casañas et al. (2017)[2] recognised that "the term 'landrace' encompasses a range of different concepts that have varied over time depending on prevailing trends in the use and conservation of genetic resources. Until recently it was considered important to conserve landraces to maintain biodiversity. Nowadays there is an increasingly commercial message promoting that landraces are generally endowed with superior nutritional and sensory properties". But the same authors (from TRADITOM project)[3], even if we agree with them about the evolving character of landraces -in contrast to modern cultivars-, have proposed to extend "the concept of landraces, beyond their currently recognised value, as a reservoir of genes", to study their potential and correct their defects with available technology (including biotechnologies). For the DIVERSIFOOD team, all forms of landraces remain attached to localities, traditional knowledge and plant breeding know-how, which quite fit to organic requirements. Their origin, genetic structures and methods used to obtain them are strongly connected (IF#16).

Farmer's or peasant's variety:
The main difference between farmer's or peasant's variety and the previous group (landraces, heirloom, traditional variety, local variety) takes place in their contemporaneity and novelty. They are bred from all forms of genetic resources by farmers, mainly organic farmers, respecting natural mating system and using "true traditional" plant breeding methods (IF#2 and IF#3). These varieties are mainly managed collectively thanks to Community Seed Banks (IF#1) allowing farmer autonomy and empowerment. DIVERSIFOOD has fostered their development thanks to participatory, multi-actor and transdisciplinary research connecting farmers and researchers (IF#14, 18, 20), but also, as far as possible, the other actors of the

[2] Casañas F, Simó J, Casals J and Prohens J (2017) Toward an Evolved Concept of Landrace. Front. Plant Sci. 8:145
[3] H2020 project, grant agreements no. 634651, from the same call as DIVERSIFOOD

food systems (IF#8, 17, 21, 22). South European countries will prefer the word 'peasant' to qualify varieties bred on farms, mainly in France where 'paysan' is an adjective which qualify what belongs to the 'pays' and what is valorised by the peasant, a farmer committed to the valorisation of his terroir. The word 'peasant' has got a positive value in Southern Europe, contrary to the North of Europe that prefers to call them farmer's variety.

Modern variety:
Modern varieties are related to their dominance of the seed market and the rules that have been created to support their development (e.g. DUS distinctness, uniformity, stability criteria). Their traits are driven by the market and don't take into account local specificities in terms of environment or food habits. They have allowed industrial agriculture and standardisation in the food system. This type of variety is not really compatible with the DIVERSIFOOD objective to embed diversity in diverse environmental, socio-economic and cultural contexts in Europe. Nevertheless, professional breeders, who are engaged to provide organic seeds to organic sectors, try to better adapt their breeding traits to organic farmers' needs, but they usually keep modern genetic structures characterised by their uniformity and their stability. However, these breeders are banning the use biotechnologies in their breeding schemes (except marker assisted selection).

Cultivar:
Sometimes, the word 'cultivar' is used to encompass all types of cultivated varieties since the word 'variety' has been captured by regulation systems to designate uniform and stable varieties (see UPOV definition). In LIVESEED project[4], the word 'cultivar' is defined as follows: "general term for officially released varieties, landraces, less homogeneous populations, niche varieties, etc." In the 1961's text of UPOV, the word cultivar had the same meaning (see box below).

The definition of a "variety", which fits to registration and Protection Certificate, is specified in the UPOV Convention (Article 1(vi) (UPOV = International Conventional for the Protection of new varieties of plants) of December 2, 1961, as Revised at Geneva on November 10, 1972, on October 23, 1978, and on March 19, 1991[5]) as "a plant grouping within a single botanical taxon of the lowest known rank, which grouping, irrespective of whether the conditions for the grant of a breeder's right are fully met, can be
- defined by the expression of the characteristics resulting from a given genotype or combination of genotypes,
- distinguished from any other plant grouping by the expression of at least one of the said characteristics and
- considered as a unit with regard to its suitability for being propagated unchanged;"
From Deliverable D1.2 "Report on the definitions of varieties in Europe, of local adaptation, and of varieties threatened by genetic erosion", FarmSeedOpportunities - Opportunities for farm seed conservation, breeding and production – European Project number: 044345 - Specific Targeted Research project - Sixth Framework Programme - Thematic Priority 8.1 Specific Support to Policies – 14 February 2009)

ACT OF 1961 - INTERNATIONAL CONVENTION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS adopted by the Diplomatic Conference on December 1, 1961[6]
Article 2
[Forms of Protection; Meaning of "Variety"]
(1) Each member State of the Union may recognize the right of the breeder provided for in this Convention by the grant either of a special title of protection or of a patent. Nevertheless, a member State of the Union whose national law admits of protection under both these forms may provide only one of them for one and the same botanical genus or species.
(2) For the purposes of this Convention, the word "variety" applies to any cultivar, clone, line, stock or hybrid which is capable of cultivation and which satisfies the provisions of subparagraphs (1)(c) and (d) of Article 6.

[4] H2020 - Grant agreement No 727230
[5] http://www.upov.int/upovlex/en/conventions/1991/act1991.html
[6] http://www.upov.int/upovlex/en/conventions/1961/w_up610_.html#_2

Synthesis

The high number of terms to qualify cultivated plants represents the several points of view to define them and the different visions behind them. These different viewpoints are related to different scientific, socio-economic and practice backgrounds, cultures and languages. Moreover, based on new insights, societal dynamics and scientific developments, interpretations of certain words may change over time. Hence, it is impossible to have clear, concise and distinctive definitions for each of the categories.

We can try to differentiate them using as criterion the type of market for which they have been bred:

1. Conventional agriculture. Modern varieties are bred for geographical wide adaptation, which means that they should be marketed and then cultivated by farmers in different regions. That is possible thanks to external inputs in farming that homogenise most of the environmental factors. This criterion is also at the core of the breeding business model producing these varieties. In order to cover the cost of breeding (more and more in the hand of private companies) the same variety should be marketed and grown on as many hectares as possible. These modern varieties are registered and protected by plant breeders' rights that permit private breeders to recover the costs of breeding through the payment of royalties.
2. Organic agriculture. Under the umbrella of varieties for organic agriculture one can find many different kinds of cultivars: from modern varieties only certified "organic seed" (and not bred organically) to local varieties or open pollinated varieties (in some cases also bred for organic). Hence, these cultivars originate from both conventional and organic breeding. The business model of organic breeding is still mainly based on donations by private foundation, because the royalties seem not work well to compensate the costs of breeding: varieties are more locally adapted than the previous category and therefore each variety is cultivated on smaller surfaces reducing the income from royalties. They can be registered or protected according to their degree of uniformity or novelty. The new organic regulation 848/2018 is opening a new space under this framework for two new categories: organic heterogeneous material and organic variety. Registration and certification processes for these new categories will be defined through delegated acts by the EU Commission in the coming years. This regulation will enter into force in 2021.
3. Local markets. In these markets, locally adapted and collectively managed varieties play still an important role. They are usually heterogeneous cultivars that can be landraces, old varieties or new farmers' varieties bred by participatory plant breeding programmes. It is difficult to find a legal space for marketing them in the current framework due to their diversity. They cannot be protected by IPRs and there is a growing interest of using open source or commons to manage them.

List of DIVERSIFOOD Innovation Fact Sheets (IF)

#1	Community Seed Banks
#2	Varieties and Populations for on-farm Participatory Plant Breeding
#3	Examples of the different kinds of population developed within DIVERSIFOOD
#4	Underutilised Crops
#5	Example of an underutilized crop: Rivet Wheat
#6	Example of an underutilized crop: Buckwheat
#7	Minor cereals: Einkorn in Hungary
#8	Labels for Underutilized Crops
#9	Farmers' Rights
#10	National crop diversity Management Systems
#11	Statistical methods for participatory plant breeding (with decision tree)
#12	The approach- Building valorisation strategies for biodiverse products
#13	Case studies- Building valorisation strategies for biodiverse products
#14	Community biodiversity management
#15	Landrace Tomatoes in Hungary
#16	A paradigmatic shift for cultivated diversity
#17	Definition of an "integrated/comprehensive approach"
#18	Methodological approach for multi-actor research (with approach, methodology, methods tools)
#19	Data management in Community Seed Banks
#20	Community biodiversity management: a modelling point of view
#21	Consumers and food
#22	Evaluation Matrix for products from underutilized crops
#23	A shift from label to the framework of commons
#24	Innovative approaches and results in breeding for beneficial soil-microbial interactions