Seed Diversity and Participatory Research for Organic Farming

Véronique Chable
September 2020, 23rd – Agrocampus Ouest
UC “The challenges of Agroecology”
The presentation in few words,

• Year 2000: Organic agriculture is looking for seed
• The conceptual foundation of organic farming
• Organic farming, health and microorganisms, the holobiont hypothesis
• Research paradigm and plant breeding, diversity is a key component of sustainability
• The revival of peasant seed, participatory research and collective organisation
Our organic context

Organic agriculture needs seed
Regulation for Organic Agriculture: CE/1935/95

Organic production with organic seeds

The biological seeds with special regard to the vegetable seed sector [1999]

Quagliotti, L.
Portis, E. (Turin Univ. (Italy). Dipartimento di Valorizzazione e Protezione delle Risorse Agroforestali)

Resumen

From the year 2000 EC regulation 1935/95 will force organic growers to use seeds that have been produced through biological methods for at least one generation. The biological seeds are difficult to find in trade and often show poor quality (i.e. low germination capacity, physical purity, sanitary conditions, etc.). Therefore, the problems related to plant breeding, agrotechnical methods, safeguard of genetic resources and seed certification are particularly important
The origin of the question
20 years ago

- European regulation
- Evolution of breeding methods, more and more incompatible with organic principles
- Empowerment of farmers and collective organisation
A first look at DIVERSITY of concepts!
From where agroecology and organic agriculture knowledge come from?

**Agroecology**
- **1928** – Bensin, ‘Agroecological characteristics description and classification of the local corn varieties Chorotypes’
- **1930** – Friederichs, ‘Die Grundfragen und Gesetzmäßigkeiten der land- und forstwirtschaftlichen Zoologie’
- **1938** – Papadakis, ‘Compendium on crop ecology’
- **1942** – Klages, ‘Ecological crop geography’
- **1956** – Azzi, ‘Agricultural ecology’
- **1965** – Tischler, ‘Agrarökologie’
- **1979** - Cox and Atkins, ‘Agricultural ecology: an analysis of world food production systems’
- **1983** – Altieri, ‘Agroecology’
- **1984** – Douglass (ed.), ‘Agricultural sustainability in a changing world order’
- **1987** – Arrignon, ‘Agro-écologie des zones arides et sub-humides’
- **1990** – Gliessman, (ed.) ‘Agroecology: researching the ecological basis for sustainable agriculture’
- **1991** – Caporali, ‘Ecologia per l’agricoltura’
- **1995** – Altieri, ‘Agroecology: the science of sustainable agriculture (3rd edition)’
- **1997** - Gliessman ‘Agroecology: ecological processes in sustainable agriculture’
- **2007** – Gliessman, ‘Agroecology: the ecology of sustainable food systems’

**Organic agriculture**
- **1924** – Rudolf Steiner’s Agriculture Courses based on Anthroposophy approach
- **1928** : creation of Demeter
- **1938** – Ehrenfried Pfeiffer, ‘Bio-Dynamic Farming and Gardening’ and association
- **1940** – Sir Abert Howard, ‘An agricultural testament’.
- **1946** : Creation of the Soil association
- **1930** - Organic-biological agriculture Hans Mueller and Hans Peter Rusch then, influence on Bioland creation.
- **1960** – « Agriculture biologique » by AFAB (French Association Française of Organic agriculture)
- **1964** : creation of Nature&Progrès in France
- **1975** – Masanobu Fukuoka, ‘The One-Straw Revolution’ and ‘The Natural Way of Farming’
- **1978** – Bill Mollison and David Holmgren, ‘Permaculture’
- **2006** - Ernst Götsch, Syntropic agriculture https://lifeinsyntropy.org/en/
From where agroecology and organic agriculture knowledge come from?

**Agroecology**
- 1928 – Bensin, ‘Agroecological characteristics description and classification of the local corn varieties Chorotypes’
- 1930 – Friederichs, ‘Die Grundfragen und Gesetzmäßigkeiten der land- und forstwirtschaftlichen Zoologie’
- 1938 – Papadakis, ‘Compendium on crop ecology’
- 1942 – Klages, ‘Ecological crop geography’

**Organic agriculture**
- 1924 – Rudolf Steiner’s Agriculture Courses based on Anthroposophy approach
- 1928 : creation of Demeter
- 1938 – Ehrenfried Pfeiffer, ‘Bio-Dynamic Farming and Gardening’ and association

Re-thinking agriculture on the basis of ecological knowledge and re-questioning the food systems organisation

Agroecology / organic agriculture
Let’s Miguel Altieri explain ... 

• “Those who adhere to organic agriculture have the highest degree of consciousness consistency of their thinking.

• Their approach to the problems distinguishes them from industrial agriculture, not by the refusal of “progress”, but by the rejection of a project and a particular vision of life, and the management designed and developed in the Western part of the World.

Howard 1940
Instead of breaking up the subject into fragments and studying agriculture in piecemeal fashion by the analytical methods of science, appropriate only to the discovery of new facts, we must adopt a synthetic approach and look at the wheel of life as one great subject and not as if it were a patchwork of unrelated things. All the phases of the life cycle are closely connected; all are integral to Nature's activity; all are equally important; none can be omitted.

Fukuoka called his agricultural philosophy shizen nōhō (自然農法?), most commonly translated into English as "natural farming". It is also referred to as "the Fukuoka Method", "the natural way of farming" or "Do-Nothing Farming". The system is based on the recognition of the complexity of living organisms that shape an ecosystem and deliberately exploiting it.

https://en.wikipedia.org/wiki/Masanobu_Fukuoka

Biodynamics is thus not just a holistic agricultural system but also a potent movement for new thinking and practices in all aspects of life connected to food and agriculture.
https://www.biodynamics.com/what-is-biodynamics
From the inspiration of the pioneers to scientific evidences
It was observed in the course of these studies that the maintenance of soil fertility is the real basis of health and of resistance to disease.

The various parasites were found to be only secondary matters: their activities resulted from the breakdown of a complex biological system -- the soil in its relation to the plant and to the animal -- due to improper methods of agriculture, an impoverished soil, or to a combination of both.

AND UNSUITABLE SEED
• The mycorrhizal association therefore is the living bridge by which a fertile soil (one rich in humus) and the crop are directly connected and by which food materials ready for immediate use can be transferred from soil to plant. How this association influences the work of the green leaf is one of the most interesting problems science has now to investigate.

• Is the effective synthesis of carbohydrates and proteins in the green leaf dependent on the digestion products of these soil fungi? It is more than probable that this must prove to be the case. Are these digestion products at the root of disease resistance and quality? It would appear so.

If this is the case it would follow that on the efficiency of this mycorrhizal association the health and well-being of mankind must depend.
Tomato Seeds Preferably Transmit Plant Beneficial Endophytes

Alessandro Bergna,¹,² Tomislav Cernava,²,¹ Manuela Rändler,² Rita Grosch,³ Christin Zachow,¹ and Gabriele Berg²

¹Austrian Centre of Industrial Biotechnology, Petersgasse 14, 8010 Graz, Austria; ²Institute of Environmental Biotechnology, Graz University of Technology, Petersgasse 12, 8010 Graz, Austria; and ³Department Plant-Microbe Systems, Leibniz Institute of Vegetable and Ornamental Crops, Theodor-Eissing-Weg 1, 43322 Göttingen, Germany

Accepted for publication 28 September 2018.

Endophytes with plant growth-promoting activity can improve the health and development of plants during all life stages. However, less is known about their stability and transmission across plant genotypes, habitats, and generations. By combining community and isolate analyses, we found that each plant habitat and genotype harbored distinct bacterial communities and plant growth-promoting bacteria (PGPB). Soil, root endosphere, and rhizosphere were the habitats with the highest bacterial diversity, while seeds hosted more selective communities. Seeds generated under field conditions showed traces of a bacterial community composition connected to the suppression of plant pathogens. In contrast, seeds of the successive generation grown in a pathogen-free and low-nutrient environment showed a predominance of bacteria that facilitate the uptake of nutrients. These modifications of the microbiome can be explained by an adaptation to prevalent environmental conditions.
Publications SEED MICROBIOME

https://doi.org/10.1038/s41396-017-0028-2

Perspective

Saving seed microbiomes

Gabriele Berg1, Jos M. Raaijmakers2

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Regular Article

The Cucurbita pepo seed microbiome: genotype-specific composition and implications for breeding

Eveline Adam1, Maria Bernhart1, Henry Müller1, Johanna Winkler1, Gabriele Berg2
Rybakova et al. Microbiome (2017) 3:104
DOI 10.1186/s40168-017-0130-6

Research

The structure of the Brassica napus seed microbiome is cultivar-dependent and affects the interactions of symbionts and pathogens

Daria Rybakova1, Riccardo Mancinelli1, Marianne Wikström3, Ann-Sofie Birch-Jensen3, Joek Postma4, Ralf-Udo Ehlers5, Simon Goertz6, Gabriele Berg1
The seed microbiome was shaped by breeding.

A healthy seed microbiome is:

- Highly diverse, rich and evenly structured
- Contain bacteria, archaea & fungi
- Contain microorganisms known for beneficial as well as for pathogenic interaction
- Cultivar specific

According to Gabriele Berg
Graz University of Technology
Difference according to the origin of the cultivars, **modern vs ancient**

- The filtration of OTUs likely to be pathogens, is more effective in wheat populations. In addition, modern varieties when mixed cropping are more colonized by pathogens than when grown alone.

- Population varieties appear to promote bacterial and fungal microbiota providing more benefits than modern varieties.

- It would therefore be important to consider the history of cultivars and its consequences on the performance of the cultivated varieties.
Crop strength through diversity

Martin S. Wolfe

In conventional farming, single varieties of crop plants are grown alone. But mixing varieties may be a better option: several rice strains, planted together on a large scale, are more resistant to a major fungal disease.
Breeding for organic farming

Considering in the field

• The strong relationship between soil and plants
• The strong need of diversity
Cultivated varieties?
What is the choice?

Two paradigms coexist

Their foundation and history ...
From uniformity to diversity
A new paradigm is called for after one century of standardisation in the agro-food system.

"From uniformity to diversity: a paradigm shift from industrial agriculture to diversified agroecological systems" is the title of the report of the International Panel of Experts on Sustainable Food systems (IPEFood 2018). DIVERSIFOOD witnesses experiences from the ground to design more precisely this paradigm shift and to provide elements to involve a large community - from research to market - in redefining food chain organisations based on a holistic knowledge of living processes involved in resilience.

Diversity and living processes

Uniformity invading all levels of modern societies has covered the overall food production and has broken the intrinsic link of agriculture with the living systems. At the other end of the food chain, most of consumers have no more idea of the farming realities, of the needs of their own body and of the quality of their food.

DIVERSIFOOD is deeply influenced by the messages of pioneers of organic agriculture as Howard (An agricultural testament, 1943) who pointed out the close connections between health of soil, plants, animals and humans, meaning all living beings are interdependent. According to this vision, alternative food systems should be conceived through the holistic approach. Indeed, the new paradigm addresses all the practices from farming to food processing, distribution and consumption.

DIVERSIFOOD promotes organic farming and agroecological farming systems based on diversity and respect of biological processes and societal needs (or, in other words, based on living systems). To do that, DIVERSIFOOD engages in recovering and enriching crop diversity by reintroducing underutilised and forgotten species, adopts multi-actor and participatory plant breeding methods to increase diversity and the capacity to manage it, promotes community-agrobiodiversity management to empower local farming systems and collective approaches, and explores the conditions to create sustainable local markets able to appreciate diverse products.
1908: F1 hybrids appeared in agriculture ... The foundation of market-oriented paradigm

- “When hybrid maize was invented and presented to US farmers in the first decades of the twentieth century, it was based on two new operations, one biological and the other socio-economic.

- First, strange manipulations (forced inbreeding and controlled hybridization) produced biological products that had never before existed in nature.

- Second, farmers gave up their time-honoured practice of saving their own varieties of seed in favour of annual purchases of hybrid maize seed.

1944

Une variété doit être stable et homogène pour être évaluée

Dans sa publication déterminante de 1944 (1), Jean Bustarret distingue trois types de variétés : « la variété-lignée pure (2), la variété clone (3) et la variété population (4) ». Dans les deux premiers types de variétés, tous les individus sont génétiquement identiques et homozygotes pour tous leurs caractères, alors que les variétés populations, dites aussi « de pays » sont des mélanges d'individus, susceptibles d'évoluer dans l'espace et le temps. Jean Bustarret voit en la variété-lignée pure « la forme la plus « parfaite » de la variété, car elle est prévisible et possède des caractères stables qui permettent d'établir sa valeur agronomique. Il introduit les notions d'« homogénéité », de « stabilité » et de « caractères distinctifs ». Ces normes, dites DHS – distinction, homogénéité, stabilité – seront exigées par le CTPS pour l'inscription de toute nouvelle variété sur le Catalogue officiel et pour sa mise sur le marché (5), excluant alors les variétés de pays.

Cette vision de la variété devient très vite la vitrine de l'école de sélection française. Sous l'action des experts français, elle s'étend à l'Europe et sous-tend le catalogue communautaire des espèces et variétés de plantes cultivées.

Une vision de la variété insérée dans le modèle de développement des trente glorieuses

Cette vision de la variété correspond au modèle de développement de l'après-guerre, basé sur la productivité et l'efficacité,
A variety must be stable and homogeneous to be evaluated

In his landmark publication of 1944, Jean Bustarret distinguishes three types of varieties: "the pure variety-line, the clone variety and the population variety".

- In the first two types of varieties, all individuals are genetically identical and homozygous for all their characters,
- whereas the so-called landraces varieties are mixtures of individuals that can evolve in space and time.

Jean Bustarret has seen in the pure variety-line "the most perfect form" of the variety, because it is predictable and possesses stable characters which make it possible to establish its agronomic value.

It introduces the notions of "homogeneity", "stability" and "distinctive characters". These standards, known as DUS - distinction, uniformity, stability - will be required by the CTPS for the registration of any new variety on the Official Catalogue and market, excluding then landraces

*Under the action of the French experts, this vision has been extended in Europe with the Community catalogue of species and varieties of cultivated plants.*
The modern variety is a standardizable product

- Distinct
- Uniform
- Stable

http://www.gnis-pedagogie.org
History of plant breeding according to GNIS (Groupement National Interprofessionnel des Semences)

The variety finds again its place, in a mode of agricultural development respecting the man and his environment.

Variety remains a technological product, designed by seed professionals, for industrial and artificial agriculture.
History of plant breeding according to GNIS

Il y a 10 000 ans
Hétérogénéité des cultures

Cueillette des espèces intéressantes

DOMESTICATION DES ESPÈCES

Choix d'une population et semis des plus belles plantes
Sélection intrapopulation

AMÉLIORATION DE POPULATIONS

Maitrise des techniques d'amélioration des plantes
Semis d'une variété

CRÉATION DE VARIÉTÉS

18ème siècle

La variété reste un produit technologique, conçu par des professionnels de la semence, pour une agriculture industrielle et artificialisée.

La variété retrouve une place, dans un mode de développement agricole respectant l'homme et son milieu.
Genetic uniformisation of agricultural landscapes

- ‘Modern’ breeding (20-21th c.) led to a drastic decrease in the cultivated crop diversity => standardization among species, and within and among varieties
Modern plant breeding and loss of diversity: ancient varieties are more diverse

André Gallais : ÉVOLUTION DE LA DIVERSITÉ GÉNÉTIQUE DES VARIÉTÉS DE PLANTES CULTIVÉES
Modern plant breeding and loss of diversity: variety « life » is reducing
Breeding for organic farming

Considering the farming systems

• The strong relationship between plant breeding activity and socio-economic organisation

• The strong relationship between plant breeding science and cultural vision of life
The world of agricultural research has established the break with nature.

The 40th anniversary of the Plant Breeding division at INRA: part of the introductory speech of a former director

This process of plant breeding has introduced and disseminated in the social body a scientific culture marked by a kind of distancing, separation and even break vis-à-vis nature, in order to understand it, to transform and to exploit it. This is a trivial process, inherent in any scientific approach. The specificity of plant breeding is its incompatibility with the common vision of nature inherited from peasant societies.

The revival of peasant seed

A multi-actor and transdisciplinary research to sustain the development of cultivated diversity for the organic and peasant agricultures
Une vision de la variété insérée dans le modèle de développement des trente glorieuses

- Cette vision de la variété correspond au modèle de développement de l’après-guerre, basé sur la productivité et l’efficacité, dans l’objectif de couvrir les besoins alimentaires de la France. Les facteurs de production doivent être standardisés pour se prêter à la mécanisation comme à la transformation industrielle.

- La variété fixée (lignée pure, clone ou hybride F1) devient elle-même un facteur de production isolable et standardisé, un « input » dans une agriculture pensée comme un système industriel de production (6).

Evolutions, sinon révolutions...

- Les normes DHS, complétée par la norme de de « Valeur agronomique et technologique » (norme VAT) et par un dispositif d’évaluation expérimentale des variétés (Geves) constituent l’instrument national de pilotage du « progrès génétique », axé pendant longtemps sur le rendement.

- Néanmoins, le contexte a depuis considérablement évolué, avec un progressif retour vers la diversité. L’Inra participe à cette évolution. L’Institut a œuvré en particulier pour l’adoption par le CTPS d’une procédure originale d’évaluation adaptée à l’agriculture biologique et a inscrit en 2011 les deux premières variétés de blé spécifiquement sélectionnées pour l’agriculture biologique. Lire l’article.

- D’autre part, d’autres modèles d’innovation variétale ont émergé dans les années 80 : sélection participative par des réseaux de paysans, retour des variétés populations dans les négociations réglementaires (lire l’article) ou, à une autre extrémité du spectre, « modèle d’innovation intégré » des firmes internationales, avec le développement des biotechnologies.
A vision of the variety embedded within the model of development of the “trente glorieuses”

This vision of variety corresponds to the post-war development model, based on productivity and efficiency, with the aim of covering France's food needs. The factors of production must be standardized to lend themselves to mechanization as to industrial transformation.

• The fixed variety (pure line, clone or hybrid F1) itself becomes a factor of production isolable and standardized, an "input" in an agriculture thought as an industrial system of production(6).

Evolutions, or even more, revolutions...

• The DHS standards, supplemented by the standard of "Value for Cultivation, Use and Sustainability (VCUS)" and by an experimental variety evaluation system (GEVES), constitute the national instrument for steering "genetic progress", which has for a long time focused on the yield.

• Nevertheless, the context has since changed considerably, with a gradual return to diversity. INRA participates in this evolution. In particular, the Institute worked on the adoption by the CTPS of an original evaluation procedure adapted to organic farming and in 2011 included the first two wheat varieties specifically selected for organic farming.

• On the other hand, other models of varietal innovation emerged in the 1980s: participatory selection by farmers' networks, the return of population varieties in regulatory negotiations or, at another end of the spectrum, "Integrated innovation model" of international firms, with the development of biotechnologies.
Peasant seed changes values ...
The story of a reconnexion of men and nature

• A new organisation for science
• A new economy to be invented
Peasant communities supports a renewal of agricultural practices
Empowerment of peasants’ networks or organisations

LE PAYSAN SOUVERAIN
La recherche paysanne pour l’autonomie des agriculteurs

À Munster (Alsace, France)
Du 9 au 13 janvier 2017

www.bio-dynamie.org
Small Scale Farmers Produce 70% of the Worlds Food

The only practical way to feed the world is to grow the food locally where it is needed by small holder farmers.

It is important to increase the resilience of small holders at local level to ensure adequate food security for the world.
Beginning of 2000’s: organic seed were missing

The creation of Réseau Semences Paysannes in France
Peasant seeds

Definitions established by Réseau Semences Paysannes

• selected and reproduced by farmers on farms and gardens in conditions of organic farming or biodynamic farming

• Diversified and evolutionary populations, resulting from natural methods of selection and conservation, without biotechnologies

• reproducible and not appropriated by intellectual property right,

• adaptable, exchangeable between farmers and gardeners in respect of the rights of use defined by the collectives that have selected and conserved them
Peasant seed

- sélectionnées et reproduites par les paysans dans les fermes et les jardins menées en agriculture paysanne biologique ou bio dynamique

- populations diversifiées et évolutives, issues de méthodes naturelles de sélection et de renouvellement, non transgressive et à la portée des paysans

- reproductibles et non appropriables par un droit de propriété

- adaptables, échangeables entre paysans et jardiniers dans le respect des droits d’usage définis par les collectifs qui les ont sélectionnées et conservées

Bred where the plant will produce

Diverse, evolutive, natural

Free, no property right

Can be exchanged within communities
The issue of Seed and organic agriculture and the connexion with peasant seeds
Organic agriculture is diversified

Various forms of agriculture based on natural processes have emerged for a century. Systems based on a detailed understanding of forest dynamics.
An International federation

120 countries – 800 movements

PRINCIPLES OF ORGANIC AGRICULTURE

**Principle of Health**
Healthy soil, plants, animals, humans = a healthy planet.

**Principle of Ecology**
Emulating and sustaining natural systems

**Principle of Fairness**
Equity, respect and justice for all living things.

**Principle of Care**
For the generations to come.
Organic agriculture/peasant seeds

• **Principle of Health**
Organic Agriculture should sustain and enhance the health of soil, plant, animal, human and planet as one and indivisible.

| Peasant seed enhance local adaptation and health |

• **Principle of Ecology**
Organic Agriculture should be based on living ecological systems and cycles, work with them, emulate them and help sustain them.

| On farm plant breeding favours natural processes |

• **Principle of fairness**
Organic Agriculture should build on relationships that ensure fairness with regard to the common environment and life opportunities.

| On farm breeding stimulates collective organizations of seeds exchanges without intellectual property |

• **Principle of care**
Organic Agriculture should be managed in a precautionary and responsible manner to protect the health and well-being of current and future generations and the environment.

| On farm plant breeding avoids all forms of biotechnologies |
Our first experience

On cauliflowers in Brittany
Since 2001
A favourable context ...

- Cabbage and cauliflowers: urgent need of organic varieties
- Professionals were organised
- Genetic resources were available
- A scientific project INRA-CIAB
Le brocoli « violet du Cap », est ce que l’on peut appeler une variété originale. Il fait partie de ces légumes oubliés, qui aujourd’hui, grâce au travail des paysans, se retrouve sur les étals. On parle ici de sélection participative, une collaboration étroite entre paysans et chercheurs qui mettent à profit leurs compétences afin d’étudier et de développer des variétés de légumes répondant aux critères et surtout à l’éthique de l’AB. Le brocoli « violet du Cap » est ainsi issu de semences fermières, c’est à dire des variétés sélectionnées et multipliées dans les fermes ; le producteur reproduit lui-même ses semences d’une année sur l’autre, elle est dite « variété de population » contrairement aux hybrides F1 qu’il faut racheter tous les ans.

http://www.biobreizh.org/
Today, the message: vegetable without any biotechnology (CMS)

http://kaolkozh5.blogspot.com/

Kaol Kozh gère depuis 2017 l'attribution de la mention "Légume issu de Semence Paysanne". Il s'agit d'une démarche pour identifier les légumes issus de semences paysannes auprès du consommateur, aussi bien sur les marchés, dans les magasins bios et les grandes surfaces. Les maraîchers candidats doivent suivre un cahier des charges technique qui définit les règles à respecter pour prétendre à la mention. Il faut notamment pratiquer la sélection et la multiplication de semences sur sa ferme et ne pas utiliser de biotechnologies comme les CMS.
Le contrôle s'effectue sur le principe d'un SPG (Système Participatif de Garantie) inspiré de ce qui se fait chez Nature et Progrès. Un groupe de producteurs se déplace chez le candidat et effectue le contrôle.
2019, la création du "Bricoli" de Kaol Kozh

Le bricoli Kaol Kozh récolté actuellement est un brocoli issu des semences paysannes.

À la ferme de René et Malou Léa, on récolte, pour la première année, le « bricoli Kaol Kozh ». Issu de semences paysannes, sa période de récolte et son goût, plaisent à plusieurs restaurants.

« À cuire à la vapeur et à déguster al dente ! » c’est la recommandation culinaire de Malou et René Léa, en pleine récolte de leur première production de bricoli Kaol Kozh, un brocoli nouvellement sélectionné.
The organization of the seed networks

In France (Maison des semences paysannes/associations semences)

and in Europe (Community Seed Banks/seed savers)
Creation of Réseau Semences Paysannes in 2003
With the French associations
About 90 in 2020
Participatory research Choux et choux-fleurs en Bretagne (2001)
Maïs et tournesol en Aquitaine (2001)
Blé tendre des paysans-boulangiers français
Blé dur en Camargue *(2001)
Tomates en Languedoc-Roussillon (2002)

The Beginnings 2001-2002
Réunir les acteurs d’une Agri-Culture riche de sens participante à la santé de la terre et des hommes pour : partager co-naisance et patrimoine s’accompagner dans la mise en œuvre de nos expérimentations et recherches en matière de biodiversité, d’agronomie, de transmission. Créée en 2006

Pour le développement de la Biodiversité en Bretagne

Sélection participative, Multiplication, et Mise en commun des semences bio
Crée en 2007
La sélection participative et/ou paysanne
Participatory Plant Breeding/ on farm breeding

Bretagne - Normandie : cultures maraîchères, blé, sarrasin, orges, cameline…

Aquitaine, Limousin: Maïs, tournesol, carthame, soja, sarrasin

Pays de Loire: Cultures maraîchères, carthame, cameline, orge, avoine, sorgho

PACA : potagères, blés Touzelle

Rhône-Alpes : Maïs, potagères

Poitou- Charente : tournesol, maïs, sarrasin, fourragères

Languedoc- Roussillon: Blé dur, potagères

Nord -Pas de Calais : plantes maraîchères

Blé tendre des paysans-boulangeurs sur tout le territoire

2002-2012
Les associations pour la sélection paysanne des blés
Associations involved in on-farm breeding of soft wheat

Bretagne – Normandie – Pays de Loire : Triptolème 2006

Pays de Loire :
CAB Pays de Loire et GABB Anjou

Poitou-Charentes :
Cultivons la Bio Diversité ,CBD) - 2009

Aquitaine :
Centre d’Etudes et Terres d’Accueil des blés (CETAB) - 2009

Midi – Pyrénées :

Bourgogne :
Graines de Noé (2010)

Rhône-Alpes :
ARDEAR (2004)

Alsace :
Kerna ̀n Sohma (2012)

Pays de loire :
CAB Pays de Loire et GABB Anjou

Languedoc-Roussillon :
Syndicat Touselles

Provence-Côte d’Azur :
Les Acteurs de l’association Triptolème en Bretagne
(Actors of Triptolème association in Brittany)

Members on the overall Westen part of France

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Répartition Géographique de l’Association et ses différents acteurs
At the moment the members of EC-LLD are the following organizations: 

- the Scottish Crofting Federation (Scotland) 
- Pro Specie Rara (Swizerland) 
- Réseau Semences Paysannes (France) 
- BEDE (France) 
- Red de Semillas “ Resembrando e Intercambiando” (Spain) 
- Centro Internazionale Crocevia - CIC (Italy) 
- Rete Semi Rurali (Italy) 
- Dachverband Kulturpflanzen- und Nutztiervielfalt e. V. Dachverband (Germany) 
- Ecoruralis (Roumanie) 
- Seeds (Luxembourg)
Collective organisations at several levels

Farmers’ Rights

Farmers’ contribution to agrobiodiversity
Since the dawn of agriculture, farmers all over the world have sown, harvested and selected seed and planting material, actively exchanging these resources among each other. In so doing they have developed an incredible abundance of crops, their knowledge and skills paving the way for the food plants that we use in agriculture and breeding today. This indispensable contribution to shaping the world’s agrobiodiversity has been largely unnoticed and unrewarded. Moreover, the global transformation of agricultural systems worldwide is increasingly threatening their important role in this respect.
It is the diversity of human communities and the richness of exchanges that has made it possible to create this infinite plant diversity. But there is no doubt that plant diversity has influenced the diversity of human beings and their cultures.

All the memory of the plant is in the seed ... to adapt to the conditions of tomorrow

Patrick de Kochko – Réseau Semences Paysannes
## Two models of Community Seed Banks Initiatives in Europe

<table>
<thead>
<tr>
<th></th>
<th>The dual model: Seed savers organisations in Central &amp; North. Europe</th>
<th>Farmers networks in Western and Southern Europe</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Foundation</strong></td>
<td>“old” organisations of seed – founded before the 1980(^{th}) until 1995</td>
<td>Founded from 1995</td>
</tr>
<tr>
<td><strong>Role models</strong></td>
<td>US- and AU-Seedsavers´ associations</td>
<td>Farmers’ organisations - Initiatives in countries of the South?</td>
</tr>
<tr>
<td><strong>Network vs. organisation</strong></td>
<td>“Dual” structures: Members´ network AND organisational centralized structures . Often 1 to few organisations operating nationwide</td>
<td>“Network of organisations”: Many initiatives and organisations organized in national networks</td>
</tr>
<tr>
<td><strong>Activities</strong></td>
<td>Organisations developed multiple, differentiated fields of activities – CSB being one of them, they are integrated and associated with the organisation.</td>
<td>Multiple activities in a shared responsibilities between member-organisations and roof-organisations</td>
</tr>
<tr>
<td><strong>Members</strong></td>
<td>large numbers of individual members. Members mainly from other professions, often active as private gardeners. Farmers are a small, important stakeholder group.</td>
<td>Generally smaller numbers of individual members –mainly farmers and gardeners.</td>
</tr>
<tr>
<td><strong>Concept</strong></td>
<td>“Conservation by use”</td>
<td>„Dynamic Management“</td>
</tr>
</tbody>
</table>
From a rough estimation, probably 130 initiatives, or more, have been established in Europe so far.
Organisation of the research

(mainly in the frame of organic food chains and genetic resources management)
Interactions with the agroecosystem
Multi-actor and transdisciplinary research to support the development of cultivated diversity for organic and peasant farming
Thanks to
A continuation of successive projects for 12 years in Europe

Based on
Informal interactions for 20 years between farmers, millers, bakers, SME, facilitators, ... researchers

With a common objective:
more resilient and environmental friendly agriculture and high quality food

• We have learnt together
• We have created a common culture based on evolutionary concepts
Progresses through EU 3 projects

Common hypothesis: DIVERSITY

**Farm Seed Opportunities**
(FP6 2007-2010)
- Situation Europe of « non conventional varieties »
- Observation and testing diversified crop populations
- On farm research
- Seed regulation recommendations
- Strategies for performance and quality
- Working on key-concepts
- Participatory research
- Policy recommendations on seed, research and food system
- 4 species

**Solibam**
(FP7 2010-2014)
- 7 species

**Diversifood**
(H2020 2015-2019)
- Broadening crop diversity
- Multi-actor and transdisciplinarity
- Social organisation
- Economic impact
- Culture about food
- 15 species
The concept of “multi-actor approach”, a practical translation of the interactive innovation,

Concept introduced for the first time in the Horizon 2020 work programme 2014-2015 under the Societal challenge addressing agriculture and forestry

BEFORE the project

Farmers rediscover the species, initiated the actions several years ago, and first collection

Scientists enhanced the research of genetic resources

They experiment together on farm new forms of diversities conceived together

Scientists adapt experimental design and analysis to on farm conditions

They organise together groups for end-use evaluation

Millers, bakers, artisans experiment new technics and recipes

Farmers determined qualities and bottlenecks

Project Activities
A complementary roles in order to be efficient all along the food chain

Example of Rivet wheat: to re-discover, to evaluate to breed new populations, to innovate for diversified end-use qualities

From genetic resources

‘Poulard bleu’ (Blue Rivet wheat)

To products

Bread and pasta with Poulard wheat from Triptolème association, a farmers-bakers’ association in France
SOLIBAM strategies for farmers
On farm strategies to manage quality of bread for farmer-baker

Variety

Environment

Practices

Miller – bakery

Taste

Texture
New approaches of plant breeding for diversified and high quality food
New approaches of experimentation for diversity and sustainable farming system
Similar organisations and questions for different species

Collecting knowledge on seed conservation, collective organisation on farm breeding, policy recommendations

Emergence of common culture and research organisation

Market organisations, cost studies, questions of labelling, policy recommendations

Analysis, synthesis and actions

Generation of co-ownership of concepts

Cross-fertilisation of ideas between actors
Creation of new diverse populations
(heterogeneous and evolving)
Our sources of diversity

Seeds of gardeners

Forgotten varieties come back to field and creation of new one

Seed from peasants

Seed from genetic resources centres
Looking for diversity and evaluation: a continuous process

Genetic resources have been stored from about 1970 in Europe

![Bar chart showing the number of accessions per genus](chart.png)
Community seed banks

On-farm plant breeding and seed multiplication

Learning together
Jean-Martial Morel’s farm
Chavagne-France
15 September 2020
Kaol Kozh meeting
Carrots collection
September 15th 2020
Chavagne
France
Farmers and breeders grow / breed a range of populations / heterogeneous « varieties »

=> a range of management approaches has been developed including those based on social organisation

(E Serpolay)
Exploring collectively new methods to recover diversity

2 examples

Buckwheat

Bread wheat

MIXING
Dynamic population

CROSSING
Composite Cross Population

EVOLUTION AND ADAPTATION YEAR AFTER YEAR
Creating new populations on farm

Learning together
Actors of maize groups

Bakers, caterers, chefs, peasants, researchers, consumers...
Quelles qualités ?

Transformation
- mouture
- préparation en cuisine

Organoleptique
- tests de dégustations avec des consommateurs

Nutritionnelle
- protéine
- antioxydants
- polyphénols...
Examples with
3 varieties
Agurtzan (French)
Sponcio (Italy)
From on-farm research to new seed law for organic agriculture

The recognition of the need for diversity
SOLIBAM Bread Wheat Evolutionary Population

- 200 parental lines
- 1996 crosses
- Constituted in 2009
- Seed shared among farmers...
Assessing adaptation of same Evolutionary Population (EP) to two different regions
The rules on IPRs, the seeds are not protected by PVP but there is an open source pledge

The name of the CCP, SOLIBAM

The « social » rules you agree on opening the seed wrap

A well defined graphical identity

The history of the CCP and the breeding process

SOLIBAM TENERO FLORIDDIA POPOLAZIONE

SOLIBAM TENERO LI ROSI POPOLAZIONE
From seed
to flour..
SOLIBAM Bread Wheat Evolutionary Population

...until certified seed became commercially available in 2017 thanks to 2014/150/EU
The new Organic Regulation (EU 848/2018) has given a place to diversity.

It has recognised that “Research in the Union on plant reproductive material that does not fulfil the variety definition as regards uniformity shows that there could be benefits of using such diverse material, in particular with regard to organic production,

for example to reduce the spread of diseases, to improve resilience and to increase biodiversity.
The inclusion of Organic Heterogeneous Material (OHM) in the new Organic Regulation will however enable certification of genetically heterogeneous seeds via organic certification.

• OHM has a broader definition than that of heterogeneous populations within 2014/150/EU, with no quantitative limitations and covers all crop species.
Complex seed situation in Europe

Seed sharing

Community seed banks

On farm conservation

decentralised participatory research

Informal seed systems

Community agrobiodiversity management

Farm-based/local seed enterprises

“artisan-semenciers”
INTEGRATED SEED SYSTEM

DIVERSITY FARMERS

OWN SEED
selection
USE

SEED NETWORKS

COMMUNITY SEED BANKS

GENE BANKS (PUBLIC)

SHARED PROCESS

constitutions
maintenance
multiplication

EXCHANGE

participatory plant breeding
access for research and use

BREEDERS (PUBLIC)

SEED COMPANIES (PRIVATE)

QUALITY CONTROL (PUBLIC)

MARKET

seed production costs recovery

organic database

FINANCING
public funding (national/EU)
citizens and consumers
private foundations
FROM ITS ROOTS, ORGANIC INSPIRES LIFE

20th Organic World Congress
New Dates: 6 - 10 September 2021

PRELIMINARY PROGRAM  REGISTRATION

NEW DATES!
6-10 SEPTEMBER 2021
RENNES, FRANCE

Couvent des Jacobins Congress Center

6-7 SEPT. 2021  PRE-CONFERENCES
7 SEPT. 2021  OPENING CEREMONY
(IN THE EVENING)
8-10 SEPT. 2021  CONFERENCES
Date TBC  TOURS AND VISITS /
GENERAL ASSEMBLY
(IFOAM – ORGANICS
INTERNATIONAL)

OWC 2020 | France

ORGANIC WORLD CONGRESS
CONGRÈS MONDIAL DE L’AGRICULTURE BIOLOGIQUE

https://owc.ifoam.bio/2020/

https://www.voyageenterrebio.org/le-congres/
Merci de votre attention