LIVESEED – ECO-PB & CPVO Workshop on Heterogeneous Material and Organic Varieties

- *Monika Messmer, Research Institute of Organic Agriculture (FiBL), CH*
- *Ambrogio Costanzo & Charlotte Bickler, Organic Research Center (ORC), UK*
- *Riccardo Bocci, Rete Semi Rurali (RSR), IT*
- *Tove Pedersen, SEGES, DK*
- *Gebhard Rossmanith, Bingenheimer Saatgut, DE*
- *Dirk Theobald, CPVO*

Workshop attached to Annual Meeting of Examination Offices (MEA),
Angers, France, 6th December 2018

Monika.Messmer@fibl.org

www.LIVESEED.eu www.ECO-PB.org www.CPVO.Europa.eu www.FiBL.org

Outline of the Workshop

Part I: Why heterogeneous material (13:30 – 14:10)

- Concepts of heterogeneous populations and organic varieties and new organic regulation

Part II: Experiences from the temporary experiments on heterogeneous material (14:10 – 15:15)

- Challenges of commercialisation
- LIVESEED toolbox for characerization of heterogeneous material
- Discussion on implementing notification of «organic heterogeneous material»

Coffee Break (15:15 – 15:30)

Part III: Upcoming temporary experiment on organic varieties suited for organic production (15:30 – 16:30)

- LIVESEED survey on organic DUS, VCU, and post-registration trials
- Concepts of adjusted DUS and VCU protocols for organic varieties
- Discussion on adjusted protocols for upcoming temporary experiment on organic varieties

European Consortium for Organic Plant Breeding (ECO-PB) *www.eco-pb.org*

Founded in 2001 to promote organic breeding through

- provision of a platform for discussion and exchange of knowledge and experiences
- initiation, support of organic plant breeding programmes,
- development of scientific concepts of organic plant breeding
- provision of independent, competent expertise for developing and promoting appropriate standards, practice and legal frameworks for organic plant breeding
- Organizing meetings and workshops on organic seed and organic plant breeding issues
- Providing discussion papers on plant breeding issues to support decision making processes

Dez 2018: 14 full membership and 28 associated members

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www.liveseed.eu

Boosting organic seed and Plant breeding across Europe 2017-2021

Bram Moeskops IFOAM EU, Project Coordinator
Monika Messmer, FiBL-CH, Scientific Coordinator
www.liveseed.eu

Horizon 2020 Project

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Boosting organic seed and plant breeding

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35 partners

14 linked parties

18 countries

23 breeding & research institutes

7 breeding companies

8 seed companies

11 organic associations

Sister projects:

ecobreed
IMPROVING CROPS

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ECO·PB
European Consortium for Organic Plant Breeding

LIVESEED in a nutshell

- Budget: 7.4 M EUR EU funding & 1.5 M EUR Swiss funding
- Duration: 4 years
- Coordinator: IFOAM EU
- Scientific coordinator: FiBL (Switzerland)
- Goal: **Boosting organic seed and plant breeding in order to improve the performance, sustainability and competititveness of the organic sector**

- Approach:
  - Inter- and transdisciplinary
  - Policy – economy – science interface
  - Multi-actor & stakeholder involvement
  - Wide geographic representation

Aim: 100% organic seed of adapted cultivars

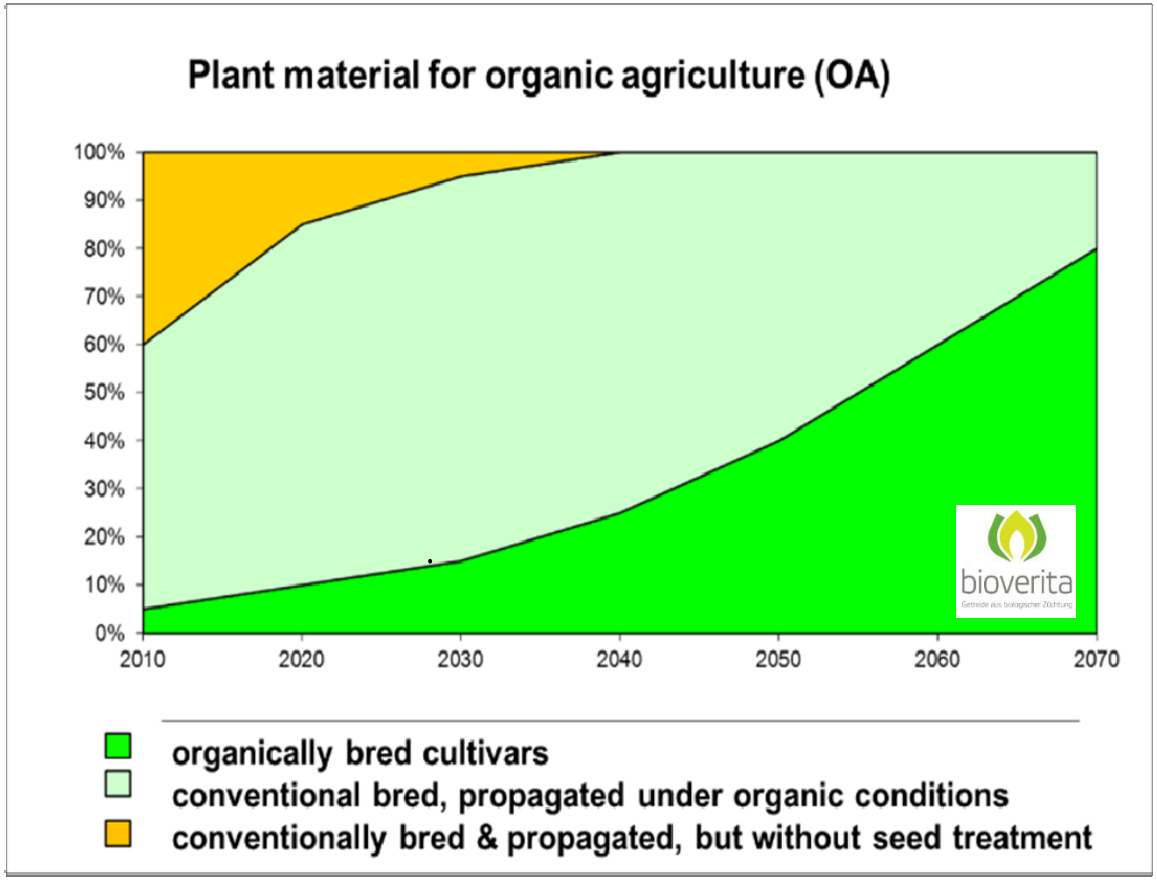

Figure 1 : Schematic time line to reach the goal of 100% organically propagated seed of suitable cultivars (light green) in short term and to foster cultivars specifically bred for organic farming systems (bright green) in the long term

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Main objectives

Policy & regulation
Provide a level playing field for the use of organic seed and variety registration across Europe

Research & development
Innovative approaches in organic plant breeding and improve quality of organic seeds

Socio-economics
Increase accesability of organic seed and adoption of new cultivars

Economy & market
Improve the competitiveness of the organic seed supply chain

Communication & network
Enhance knowledge & rise awareness on the benefits of organic plant breeding and seed

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Crop categories

Research activities of LIVESEED will cover five main crop categories:

- Legumes (lupin, pea)
- Vegetables (carrot, tomato, broccoli, cauliflower)
- Fruit trees (apple)
- Cereals (wheat, barley, maize)
- Fodder crops (lucerne, grasses)

→ considering different farming systems (mixed cropping, agroforestry) pedoclimatic zones across Europe

LIVESEEED ambitions

- Co-development of knowledge by transdisciplinary multi-actor approach
- Holistic approaches for breeding and seed production in complex environment
  - Plant – Plant interaction
  - Plant – Soil microbiome interaction
  - Plant – Seed microbiome interaction
- Enabling more sustainable food production systems
  - Mitigate risks of crop failure through breeding for diversity
  - Safeguard genetic resources for future generations

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What LIVESEED will do:

- Foster **harmonised implementation of the EU organic regulation** on organic seed. Strengthen organic seed databases in the whole EU.
- **Widen the choice of organic cultivars** meeting the demand of farmers, processors, retailers and consumers
- Develop **innovative breeding and seed health strategies**
- Investigate socio-economic aspects related to **production and use of organic seed**
- Improve availability and quality of organic seed. Develop **guidelines for organic cultivar testing and registration**

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Framework of organic seed and plant breeding

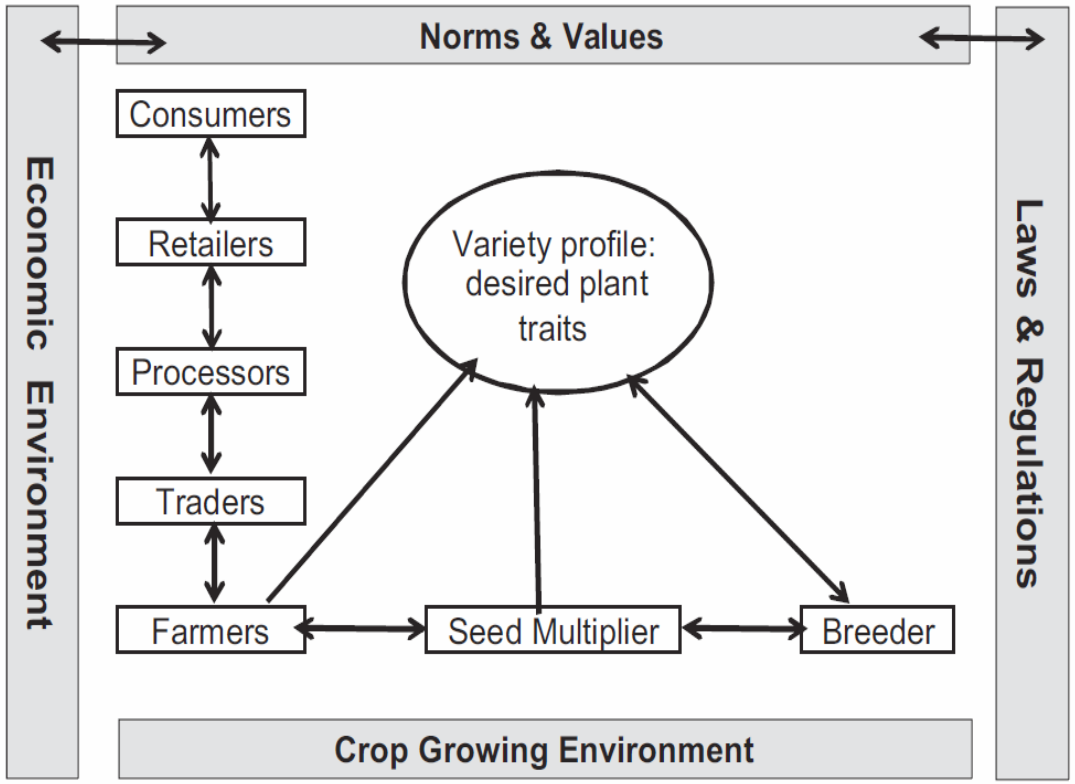
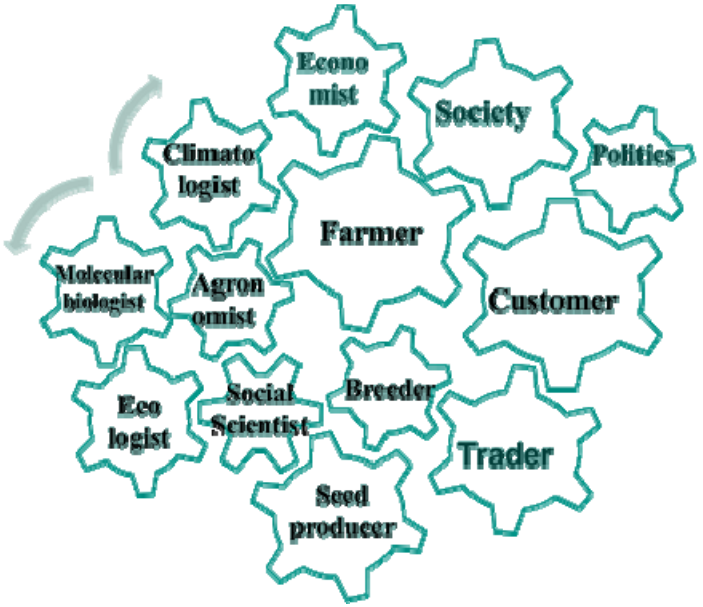


Figure 2. Situational context influencing organic plant breeding and seed production adapted from Osman et al., 2015

Support participatory processes in breeding and cultivar testing



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LIVESEED engagement in policy recommendations

New organic regulation (2018/848)

- phasing out of derogations to the use of non-organic plant reproductive material latest by 2036
- Definition of organic varieties suitable for organic farming
- Definition of organic heterogeneous material and their use in organic farming for all crops

  ⟶ engage in temporary experiment on heterogeneous material (prolonged till 2022)

  ⟶suggestions for the notification of heterogeneous material, description, definition of process, traceability, packaging till end of 2020

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LIVESEED engagement in policy recommendations

New organic regulation (2018/848)

- Temporary experiment to foster research and **to develop organic varieties suitable for organic production** shall be establish adapted DUS and VCU, as well as the definition of the production and marketing conditions for that material (2021 up to 2027)

  → suggest alternative DUS and VCU testing till end of 2020

- Regular update of national organic seed database

  → develop EU-wide router data base for organic seed

- In 2026 report on the availability of organic seed and reasons of a possible limited access of organic operators

  → national workshops to improve implementation of organic regulation with respect production and use of organic seed

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Organic Plant Breeding aims at

Ecological instensification of organic production through

- Focused breeding for target environments with limited external inputs
- Selection for specific traits, like seed- borne diseases, weed competition
- Meeting market demand and expectation of farmers and consumer
- Alternative breeding programs refraining from genetic engineering and certain breeding techniques

Enabling more sustainable food production systems through

- Large portfolio of crops on farm level to mitigate risks of crop failure
- Functional biodiversity on field level to reach high level of self regulation and closed nutrient cycle
- Safeguarding and evolving genetic resources for future generations

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Breeding for functional biodiversity

Combining breeding & agronomic innovations for Organic

Breeding for increased diversity

- Breeding for diversity within cultivars
- Breeding for mixed cropping systems
- Breeding for improve diversity of associated soil microbes
- Decentralized participatory breeding for local conditions

Embedding diversity into markets

- Involving all stakeholders (farmer, value chain and community driven breeding)
- New concepts for the ownership of cultivars and their financing
- Changing regulatory framework to foster greater agrobiodiversity (official variety testing, seed regulation)
- Valorization of organic plant breeding along the value chain (www.bioverita.org)

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Harnessing Diversity

Using genetic diversity in crop breeding
Able et al. (2007)

1

- Create cultivars able to provide given services
  - McIntosh (1998)
  - Witcombe et al. (2008)
- Create cultivars adapted to organic and low-input growing conditions
  - Dambroth and El Bassam (1983)
  - Murphy et al. (2007)

Deploying genetic diversity in crop management
Newton et al. (2009)

2

- Grow mixed stands of different cultivars
  - Finckh et al. (2000)
  - Kiær et al. (2009)
- Grow genetically heterogeneous cultivars through an evolutionary breeding approach
  - Phillips and Wolfe (2005)
  - Döring et al. (2011)

Deploying species diversity in crop management
Malézieux et al. (2009)

3

- Include an intercrop in wheat crop cycle
  - Hauggaard-Nielsen et al. (2001)
  - Poggio (2005)
- Include a living mulch in wheat crop cycle
  - Hiltbrunner et al. (2007a)
  - Hartwig and Ammon (2002)

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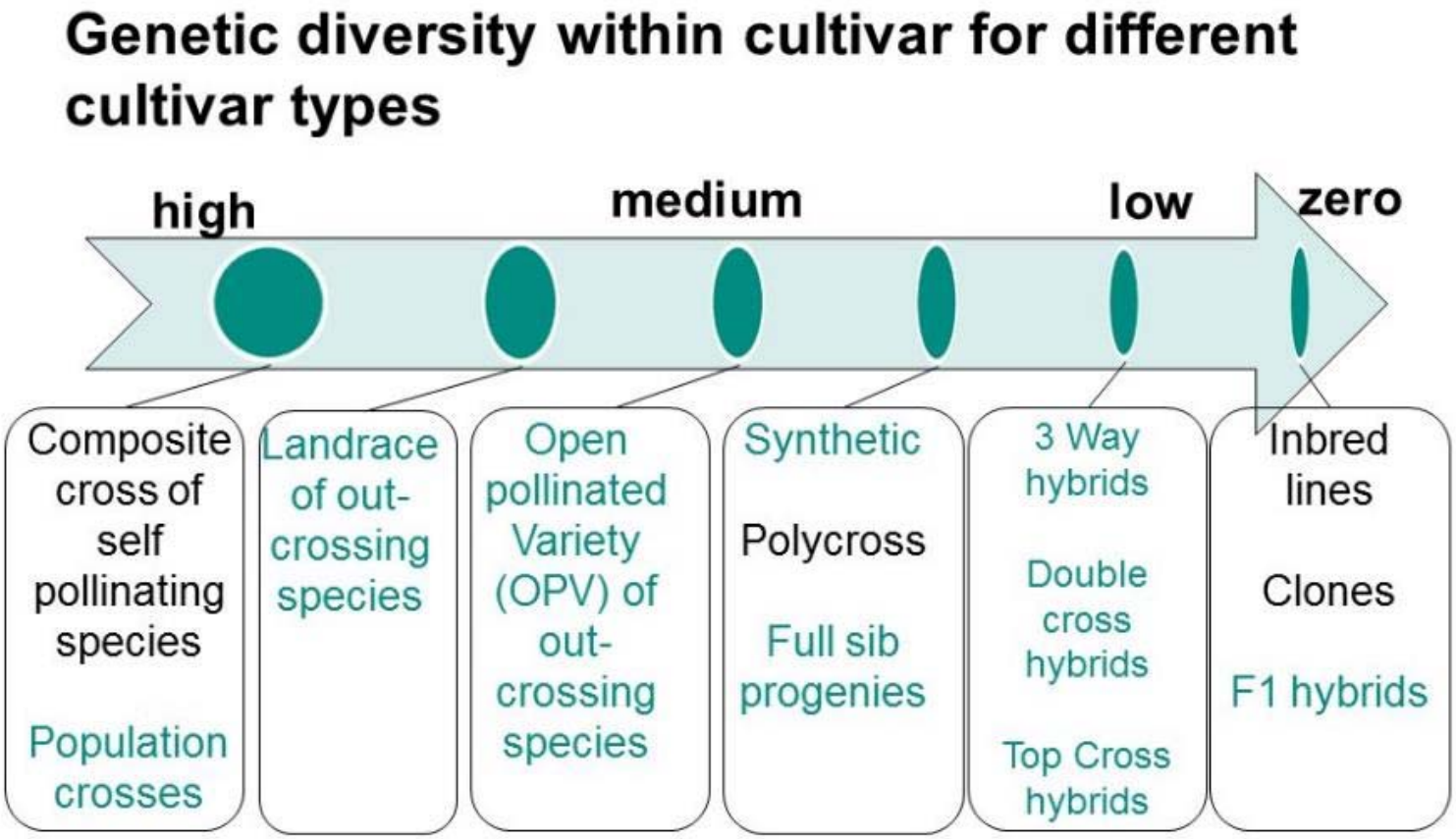
Costanzo & Barberi 2014 Agron. Sustain. Dev. 34:327–348

Harnessing diversity



Important for the organic sector to have the full range of species & cultivar types that are adapted to variable organic growing conditions and the demands of different value chains

Why harness diversity?

Benefits that only a genetically diverse crop can ensure

Genetically homogeneous	**Genetically diverse**
• Minimise within crop competition • Can tolerate and resist **predictable** stresses within certain limits • **Maximise** yield especially under high input conditions (=target environment)	• Allow for compensation under multiple stresses • Can tolerate and resist **unpredictable** stresses or diseases → **resilience** • **Stabilise** yield • Progressively **adapt** especially under challenging environmental and low external input conditions

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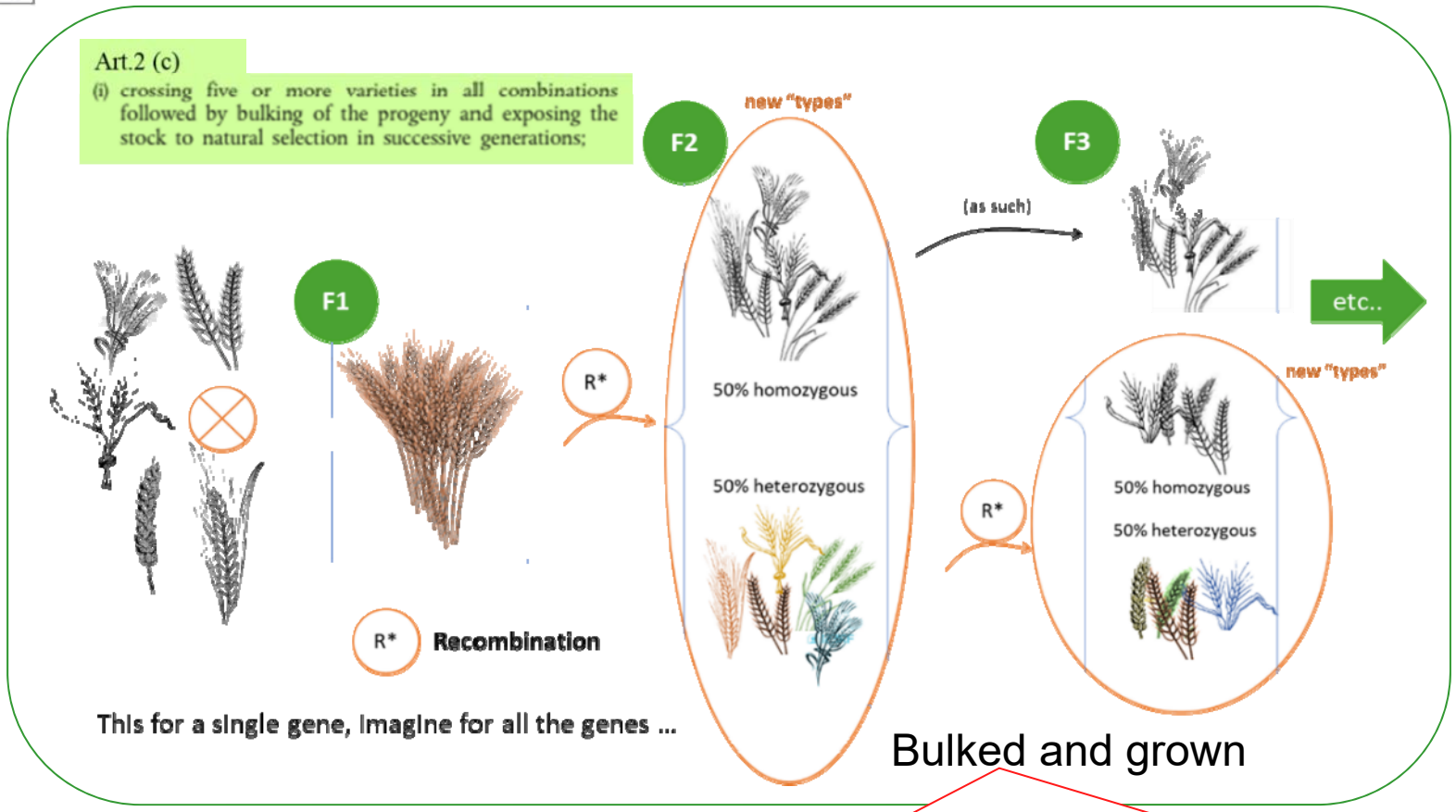
Breeding scheme



- **Not Uniform = resilient to unpredictable conditions**
- **Not Stable = adaptable to environment over time**

Winter wheat CCPs of ORC: Parent germplasm

- The parent material provides the **genes** that, rearranged in all possible ways, will constitute the population

	Bezostaya	Cadenza	Hereward	Maris Widgeon	Mercia	Monopol	Pastiche	Renan	Renesansa	Soissons	Spark	Thatcher	Buchan	Claire	Deben	HTL	Norman	Option	Tanker	Wembely
Bezostaya		*yq*	*yq*	*yq*	*yq*	*yq*	*yq*	*yq*	*yq*	*yq*	*yq*	*yq*	Y	Y	Y	Y	Y	Y	Y	Y
Wembley	*yq*	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	Y	Y	Y	Y	Y	Y	Y	
Tanker	*yq*	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	Y	Y	Y	Y	Y	Y		
Option	*yq*	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	Y	Y	Y	Y	Y			
Norman	*yq*	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	Y	Y	Y	Y				
HTL	*yq*	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	Y	Y	Y					
Deben	*yq*	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	Y	Y						
Claire	*yq*	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	Y							
Buchan	*yq*	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ								
Thatcher	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q									
Spark	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q										
Soissons	Q	Q	Q	Q	Q	Q	Q	Q	Q											
Renesansa	Q	Q	Q	Q	Q	Q	Q	Q												
Renan	Q	Q	Q	Q	Q	Q	Q													
Pastiche	Q	Q	Q	Q	Q	Q														
Monopol	Q	Q	Q	Q	Q															
Mercia	Q	Q	Q	Q																
Maris Widgeon	Q	Q	Q																	
Hereward	Q	Q																		
Cadenza	Q																			

UK: DEFRA-funded projects (2001-12)

Three main Populations:

Y = “Yield CCP” of 8 high yielding parents

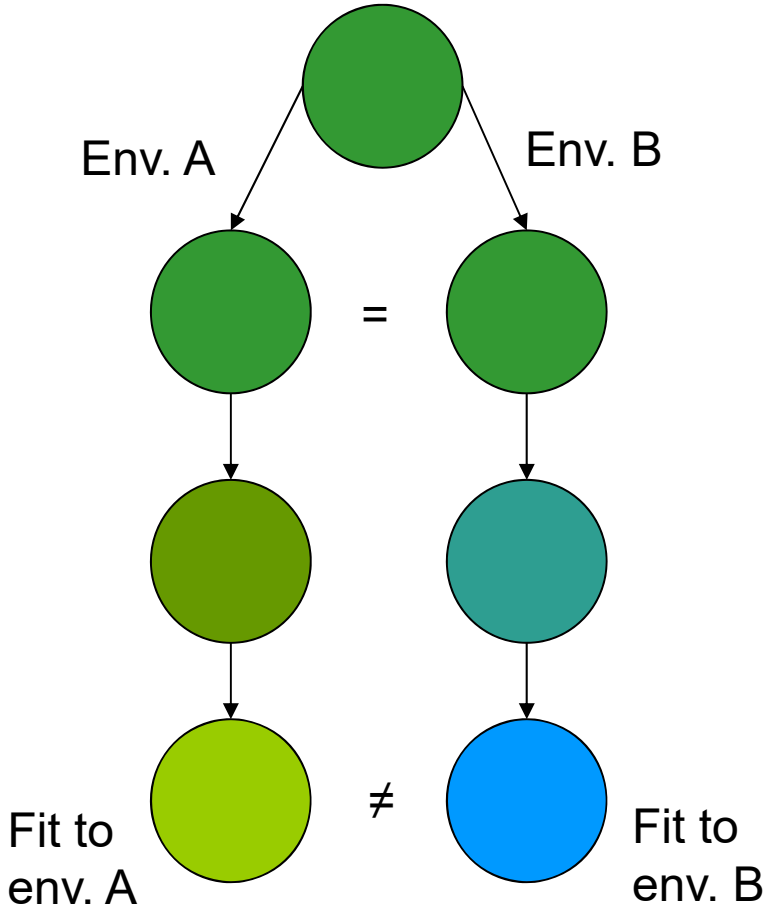
Q = “Quality CCP” of 12 high quality parents

YQ = “Yield-Quality CCP” (20 parents)

Region of production

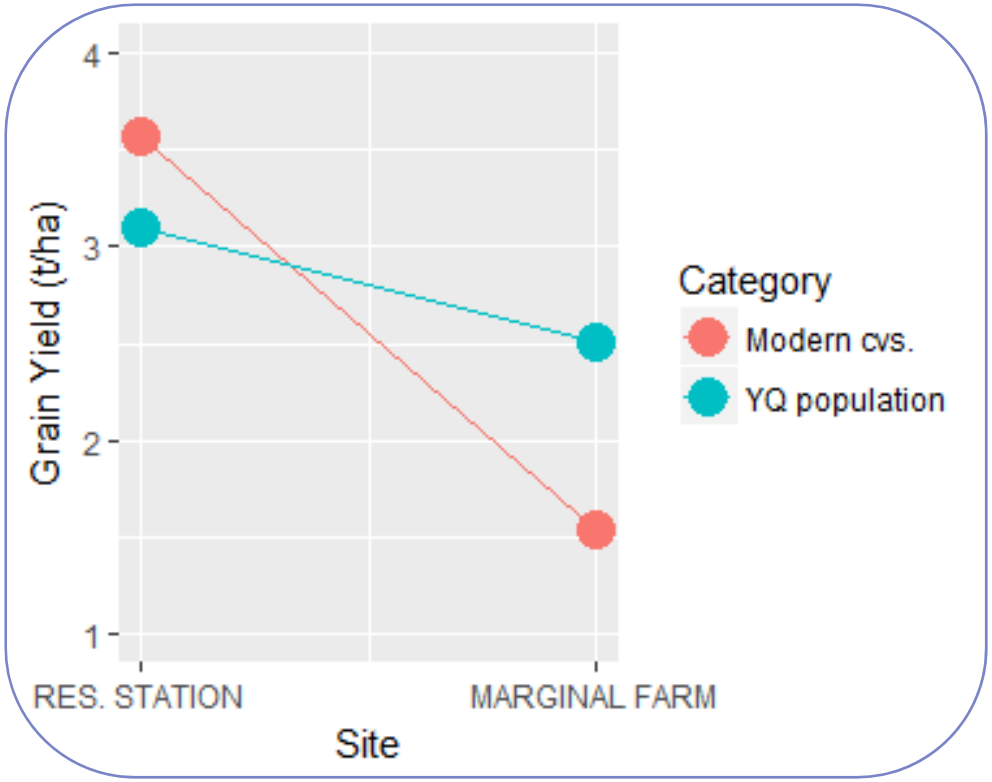
The ‘evolutionary’ hypothesis according to which different environments exert different selection pressure

- How big is the “region”?
- Is it just the region, what about the management?
- Is “region” that important (provided full traceability is available)? Should not limit the use



Performance

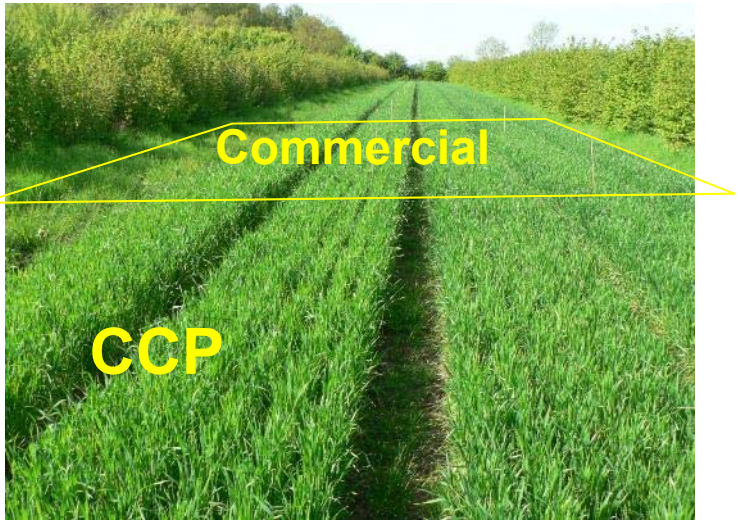
- Greater yield stability
- Protein content and hardiness were significantly increased
- Baking quality
- As nutritious
- Suitable as animal feed
- **Resilience**



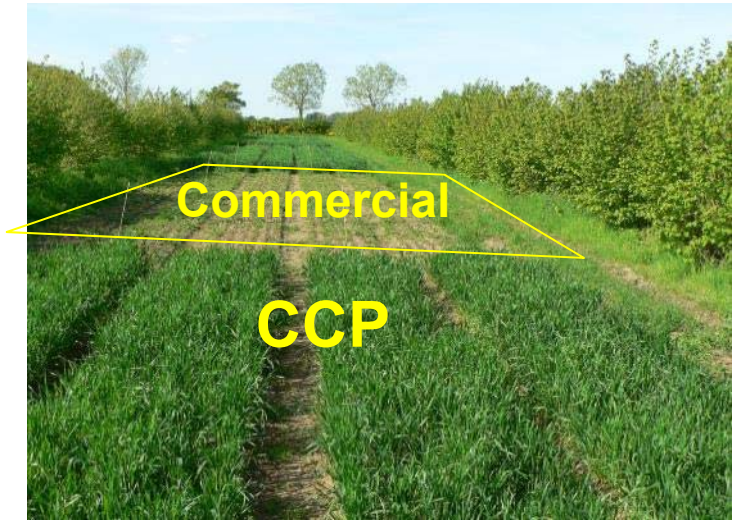
"YQ population" compared to two sets of modern varieties in two organic locations (harvest 2017)

Performance

- Greater yield stability
- Protein content and hardiness were significantly increased
- Baking quality
- As nutritious
- Suitable as an animal feed
- **Resilience**



"Normal" situation (early sowing)



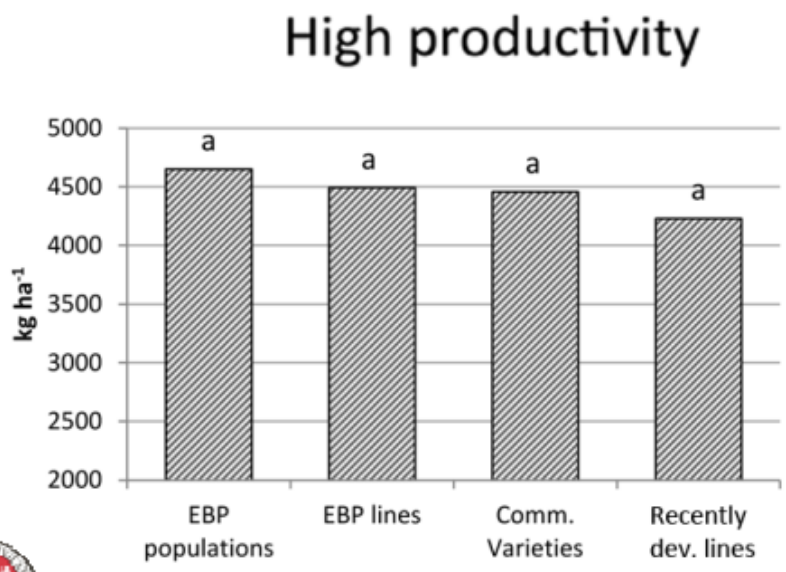
"Stressful" situation (late sowing)

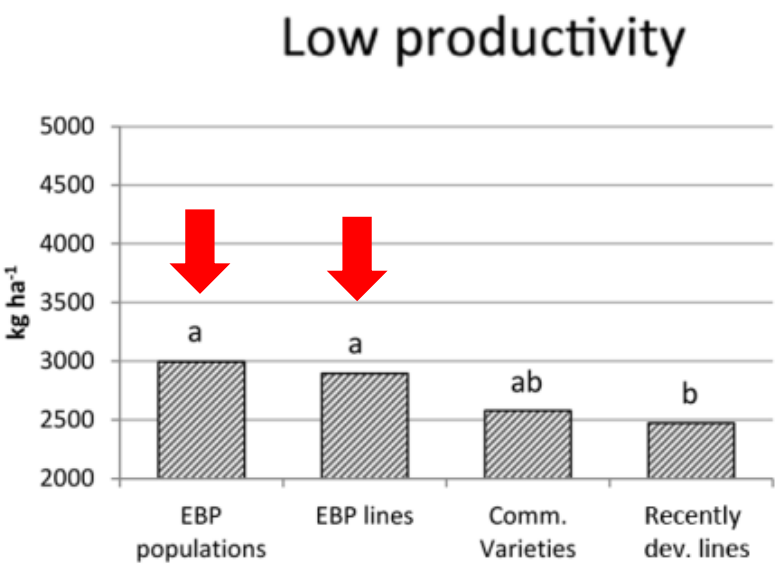
Agronomic evaluation of populations in Italy

EBP populations and EBP pure lines have comparable HIGH YIELD

Characterised by higher yield

in “low productivity” environments ($P \leq 0.05$)





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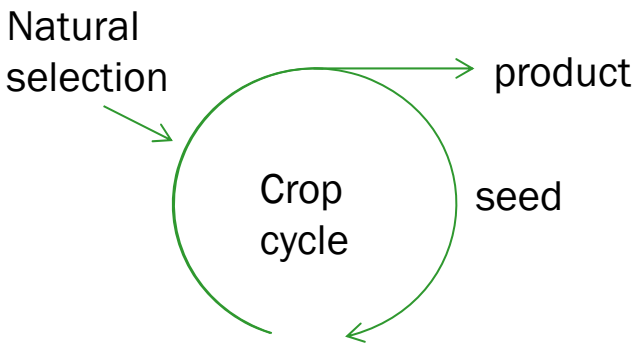
Populations: why do they matter?

Four positive "Cs"

- **Capacity**:
  more phenotypic and genotypic variation
- **Complementation**:
  optimise use of resources across time & space
- **Compensation**:
  if some fail, others take their place
- **Change**:
  adaptive shifts in response to selection

Functional diversity

Evolutionary breeding



One (potentially) negative "C"

- **Competition**:
  intra-varietal competition may work against the above Cs

In conclusion

Far beyond a niche experience: responding to broad global and EU development goals

– Enabling sustainable production

Populations perform well with very low inputs like organic

– Enabling resilience to climate change

Response to unpredictability is one of the most apparent strengths

– Enabling experiences of 'circular economy'?

'improve efficiency' **: low-input and low-cost breeding and farming**

'design for the future' **: evolutionary approach**

'collaboration to create joint-value' **: along supply chains**

New organic regulation 2018/848 (from 01.01.2021)

Preface

(36) Research …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.

(37) plant reproductive material that does not belong to a variety, but rather **belongs to a plant grouping within a single botanical taxon with a high level of genetic and phenotypic diversity** between individual reproductive units, should be available for use in organic production.

... should be allowed to market plant reproductive material of organic heterogeneous material **without having to comply with the requirements for registration and without having to comply with the certification categories of pre-basic, basic and certified material…**

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New organic regulation 2018/848 (from 01.01.2021)

Preface

(38) In order to **ensure quality, traceability, compliance** with this Regulation and adaptation to technical developments, the power to adopt certain acts should be delegated to the Commission in respect of **setting out certain rules for the production and marketing of plant reproductive material of organic heterogeneous material** of particular genera or species.

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New organic regulation 2018/848 (from 01.01.2021)

Article 4 – Objectives

(h) contributing to the development of the supply of plant genetic material adapted to the specific needs and objectives of organic agriculture;

(i) contributing to a **high level of biodiversity**, in particular by using diverse plant genetic material, such as **organic heterogeneous material** and **organic varieties suitable for organic production**;

(j) fostering the development of organic plant breeding activities in order to contribute to favourable economic perspectives of the organic sector.

New organic regulation 2018/848 (from 01.01.2021)

Article 3 – Definitions

(18) '**organic heterogeneous material**' means a plant grouping within a single botanical taxon of the lowest known rank which:

(a) presents common phenotypic characteristics;

(b) is characterised by a high level of genetic and phenotypic diversity between individual reproductive units, so that that plant grouping is represented by the material as a whole, and not by a small number of units;

(c) is not a variety within the meaning of Article 5(2) of Council Regulation (EC) No 2100/94 (1);

(d) is not a mixture of varieties; and

(e) has been produced in accordance with this Regulation;

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New organic regulation 2018/848 (from 01.01.2021)

Article 13 – Specific provisions for the marketing of plant reproductive material of organic heterogeneous material

1. Plant reproductive material of **organic heterogeneous material may be marketed without complying with the requirements for registration** and without complying with the certification categories of pre-basic, basic and certified material or with the requirements for other categories, which are set out in Directives 66/401/EEC, 66/402/EEC, 68/193/EEC, 98/56/EC, 2002/53/EC, 2002/54/EC, 2002/55/EC, 2002/56/EC, 2002/57/EC, 2008/72/EC and 2008/90/EC or acts adopted pursuant to those Directives.

2. …….Such organic heterogeneous material shall fulfil the requirements laid down in the delegated acts adopted in accordance with paragraph 3.

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New organic regulation 2018/848 (from 01.01.2021)

Article 13 – Specific provisions for the marketing of plant reproductive material of organic heterogeneous material

2. Plant reproductive material of organic heterogeneous material as referred to in paragraph may be marketed **following a notification of the organic heterogeneous material by the supplier to the responsible official bodies** ….by means of a dossier containing:

(a) the contact details of the applicant;

(b) the species and denomination of the organic heterogeneous material;

(c) the description of the main agronomic and phenotypic characteristics that are common to that plant grouping, including breeding methods, any available results from tests on those characteristics, the country of production and the parental material used;

(d) a declaration by the applicant concerning the truth of the elements in points (a), (b) and (c); and

(e) a representative sample.

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New organic regulation 2018/848 (from 01.01.2021)

Article 13 – Specific provisions for the marketing of plant reproductive material of organic heterogeneous material

3. The Commission is empowered to **adopt delegated acts** in accordance with Article 54 supplementing this Regulation by setting out rules governing the production and marketing of plant reproductive material of organic heterogeneous material of particular genera or species, as regards:

(a) the description of the organic heterogeneous material, including the relevant breeding and production methods and parental material used;

(b) the minimum quality requirements for seeds lots, including identity, specific purity, germination rates and sanitary quality;

(c) labelling and packaging;

(d) information and samples of production to be kept by the professional operators;

(e) where applicable, maintenance of the organic heterogeneous material.

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New organic regulation 2018/848 (from 01.01.2021)

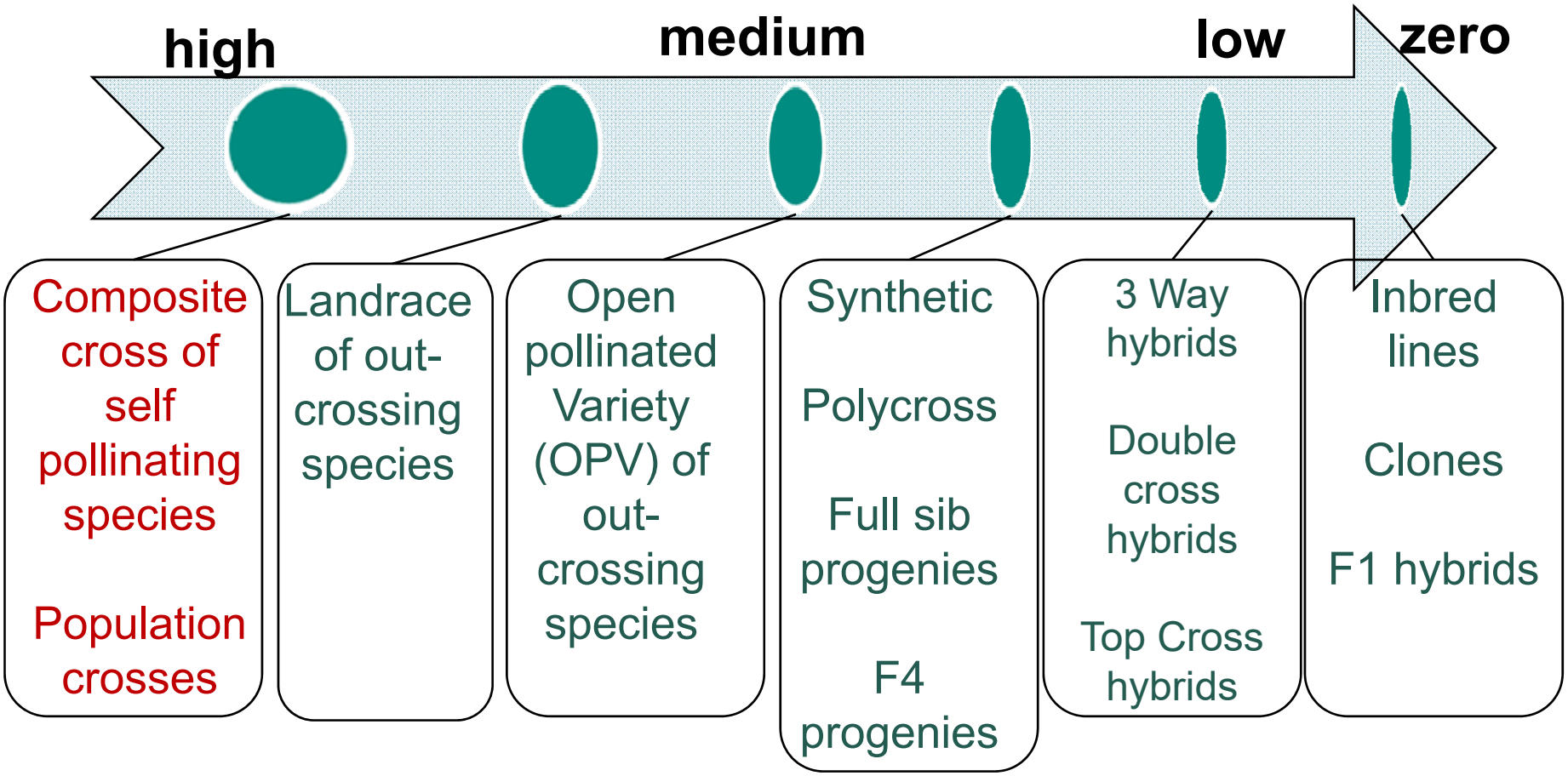
Article 54 – Exercise of the delegation

4. Before adopting a delegated act, the **Commission shall consult experts designated by each Member State** in accordance with the principles laid down in the Interinstitutional Agreement of 13 April 2016 on Better Law-Making.

Different organic cultivar categories

	D	U	S	Remarks
Inbred lines, clones, F1 hybrids	YES	YES	YES	Highly Homogeneous, dominating varietiy tpyes
Open pollinated varieties (OPV)	YES	Less uniform, defined ranges or frequencies of parameters in comparison to reference OPV	YES	Adjusted DUS to foster/enable release of OPV
Heterogeneous populations (CCP, Evolving Population, population crosses)	?	NO	NO	Shift of gene frequencies to adjust for local conditions, characterized by breeding history, main features and target cultivation system

Genetic diversity within cultivar for different organic cultivar types



New organic regulation 2018/848 (from 01.01.2021)

Preface

(39) In order to meet the needs of organic producers, to foster research and to **develop** **organic varieties suitable for organic production**, taking into account the specific needs and objectives of organic agriculture such as enhanced genetic diversity, disease resistance or tolerance and adaptation to diverse local soil and climate conditions, **a temporary experiment** should be organised …. for a term of seven years,… It should help to establish the criteria for the description of the characteristics of that material and to determine the production and marketing conditions for that material [Start Mid 2021]

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New organic regulation 2018/848 (from 01.01.2021)

Article 3 – Definitions

(19) '**organic variety suitable for organic production**' means a **variety** as defined in Article 5(2) of Regulation (EC) No 2100/94 which:

(a) is characterised by a high level of genetic and phenotypical diversity between individual reproductive units; and

(b) **results from organic breeding activities** referred to in point 1.8.4 of Part I of Annex II to this Regulation

Annex II: 1.8.4. For the production of organic varieties suitable for organic production, the organic breeding activities shall be conducted under organic conditions and shall focus on enhancement of genetic diversity, reliance on natural reproductive ability, as well as agronomic performance, disease resistance and adaptation to diverse local soil and climate conditions.

All multiplication practices except meristem culture shall be carried out under certified organic management

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New Organic Regulation (2018/848) Summary

- Phasing out of derogations to the use of non-organic plant reproductive material latest by 2036
- Definition of organic plant breeding
- Definition of organic heterogeneous material and their use in organic farming for all crops
  → engage in temporary experiment (prolonged till 2022)
  →suggestions for the notification of heterogeneous material, description, definition of process, traceability, packaging till end of 2020
- Temporary experiment to foster research and **to develop organic varieties suitable for organic production** shall be establish adapted DUS and VCU, as well as the definition of the production and marketing conditions for that material (2021 up to 2027)
  → suggestions to define adjusted DUS and VCU testing till end of 2020
- Regular update of national organic seed database
- In 2026 report on the availability of organic seed and reasons of a possible limited access of organic operators

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Different breeding strategies

- **Conventional breeding:** **Status quo**
  - Selection with application of seed treatments, herbicides, optimal nutrient supply
  - Breeding goals and variety development for conventional / IP farming
  - Test registered varieties under organic farming (organic variety trials)

- **Breeding for organic farming** **Product oriented**
  - Considering of the breeding goals of the organic agriculture
  - No GMO (no cell fusion)
  - Selection partly under organic farming conditions
  - Last multiplication step under organic farming conditions

- **Organic plant breeding:** **Process oriented**
  - Breeding specifically /exclusively for organic agriculture
  - Every selection step under organic conditions
  - Breeding technics in harmony with the organic farming
  - Multiplication steps under organic conditions

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Definition of Organic Plant Breeding

IFOAM International Norms 2012 and updated 2014

- Basic definition on organic plant breeding

ECO-PB Position Paper on Organic Plant Breeding 2012

- Detailed definition on organic plant breeding agreed among European organic breeders and research organisations

Private labels have often stricter guidelines or regulations

- Demeter Germany, Bioland, Bio Suisse
- Bioverita label for products derived from organically bred cultivars with own certification across different labels

→ **All are in line with IFOAM and ECO-PB**

Definition of Organic Plant Breeding according to IFOAM Norms 2014

4.8 Breeding of organic varieties

General Principles

- Organic plant breeding and variety development is sustainable, enhances **genetic diversity** and relies on natural **reproductive ability**. Organic breeding is always creative, cooperative and open for science, intuition, and new findings. Organic plant breeding is a holistic approach that respects natural **crossing barriers**. Organic plant breeding is based on fertile plants that can establish a **viable relationship with the living soil**. Organic varieties are obtained by an **organic plant breeding program.**

Definition of Organic Plant Breeding
according to IFOAM Norms 2014

Requirements:

4.8.1 To produce organic varieties, plant breeders shall select their varieties **under organic conditions** that comply with the requirements of this standard. All multiplication practices except meristem culture shall be under certified organic management.

4.8.2 Organic plant breeders shall develop organic varieties only on the basis of genetic material that **has not been contaminated by products of genetic engineering**.

4.8.3 Organic plant breeders shall **disclose the applied breeding techniques**. Organic plant breeders shall make the information about the methods, which were used to develop an organic variety, available for the public latest from the beginning of marketing of the seeds.

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Definition of organic plant breeding

according to IFOAM Norms 2014

Requirements:

4.8.4 The **genome is respected as an impartible entity**. Technical interventions into the genome of plants are not allowed (e.g. ionizing radiation; transfer of isolated DNA, RNA, or proteins).

4.8.5 The **cell is respected as an impartible entity**. Technical interventions into an isolated cell on an artificial medium are not allowed (e.g. genetic engineering techniques; destruction of cell walls and disintegration of cell nuclei through cytoplast fusion).

4.8.6 The **natural reproductive ability** of a plant variety is respected and maintained. This excludes techniques that reduce or inhibit the germination capacities (e.g. terminator technologies).

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Definition of Breeding for Organic (BfO)

Breeding programs for organic are more product oriented

- have a special focus on the **breeding goals** which are specific for organic agriculture (e.g. tolerance against seed born diseases, weed tolerance, nutrient use efficiency),
- do not use **critical breeding techniques listed in IFOAM Position Paper 2017**
- **Selection occurred at least partially under organic conditions**
- **Cultivar testing and seed production** under organic conditions

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Position paper on Organic Plant Breeding from ECO-PB 2012

- **Principles of Organic Plant Breeding (OPB)**
  - **dignity of living organisms**
  - **goals of organic plant breeding**
  - **ethical criteria** – cell integrity, reproductive capacity, scope for extended breeding, respect for crossbreeding boundaries, reproducibility
  - **strategic breeding criteria** – whole phenotypic selection under organic cropping conditions
  - **socioeconomic criteria** - no patenting, transparency regarding breeding parents and breeding techniques, participatory breeding, as many breeding programmes as possible

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Organic Varieties and Organic heterogeneous material

	D	U	S	Remarks
Inbred lines, clones, F1 hybrids	YES	YES	YES	Highly Homogeneous, adjustments of DUS needed for certain crops
Open pollinated varieties (OPV)	YES	Less uniform, defined ranges or frequencies of parameters in comparison to reference OPV	YES	Adjusted DUS to foster/enable release of OPV
Heterogeneous populations (CCP, Evolving Population, population crosses)	?	NO	NO	Notification only, no DUS or VCU required, outside the scope of variety protection, no varieties

Importance of Variety Testing under target environments

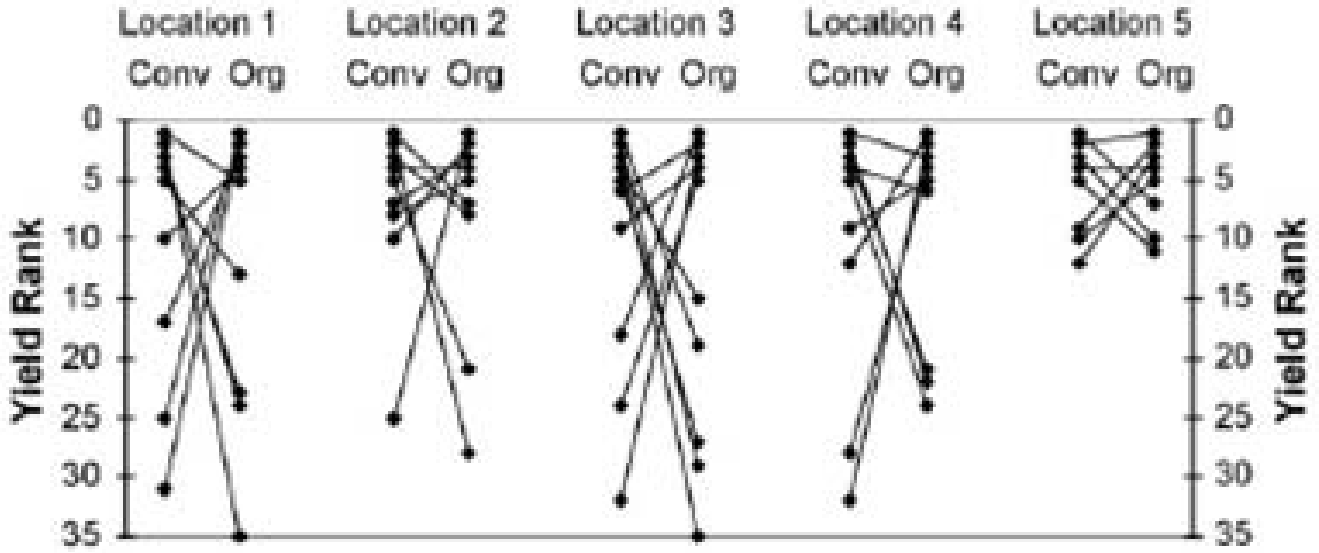
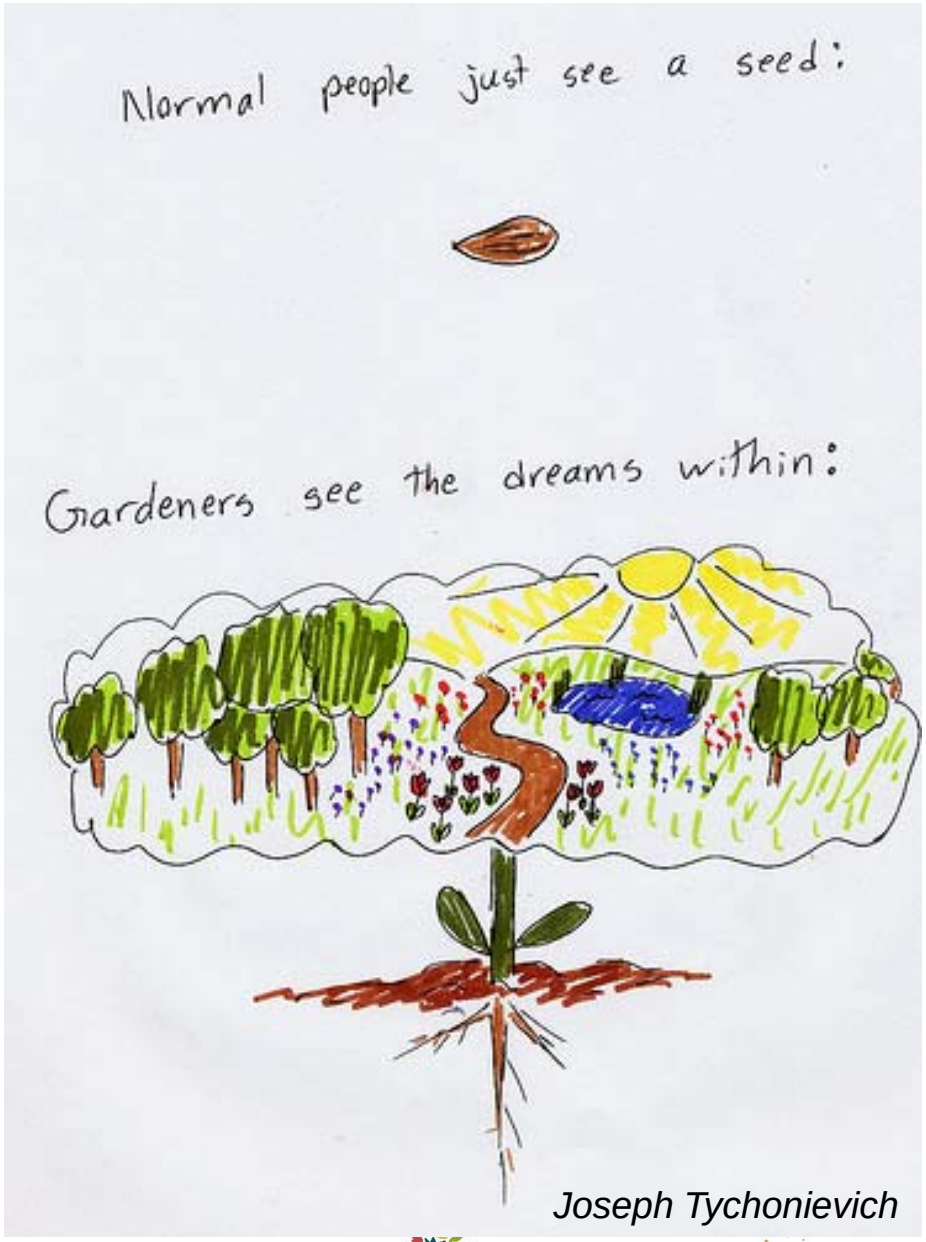


Fig. 1. Genotypic change in rank between organic and conventional wheat nurseries. The top five ranking genotypes for yield in both organic and conventional systems were compared at each location. Genotypes are ranked from 1 = highest yield to 35 = lowest yield.

Murphy et al. (2007)



Thanks a lot for your attention

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Next steps

- Getting your feedback and input
- building an expert group working on the delegated for notification of heterogeneous material and implemening acts for the new temporary experiment for adjusted release of organically bred varieties
- requesting additional research funds for realizing temporary experiments on release of OHM and OV (similar to Farm Seed Opportunities when implementing conservation varieties)

Adapted methods to assess DUS

- Proper implementation of DUS for OPV, correct references, own category for testing
- Take more emphasis in D and S instead of Uniformity
- **Restrict the uniformity levels to a minimum required for product quality and use** to allow higher adaptation and yield stability
- Use less parameters for assessment of US
  - restrict to only morphological traits with no effect on yield stability
  - Restrict homogeneity to only xx % of the defined traits
- Accept higher tolerance levels for U
  - Defined standard deviation or frequencies of traits for OPV that allows for certain variability
- Allow more parameters including marker analysis for D

Adjusted VCU Testing

- Option to test organic bred cultivars under organic farming systems (=target environment)
- Adjusted parameter assessed under organic VCU that reflect specific traits needed in organic farming (e.g. weed competition, seed born diseases, early vigor)
- Seed of all cultivars should be organically propagated to avoid bias due to different seed source (e.g. untreated conventional seed versus organic seed)
- Optional VCU for arable crops for speciality markets (e.g. triticale for breadmaking)

LIVESEED work in progress

D 2.1
Overview of the organizational models of **cultivar trials** for organic agriculture in some key EU countries (May 2019)

D 2.3
Guidelines for optimized **cultivar trials** for organic agriculture
(November 2020)

D 2.4
Guidelines for **adjusted protocols for organic DUS and VCU testing** for variety release and validated **protocols for the release of heterogenous populations** (November 2020)

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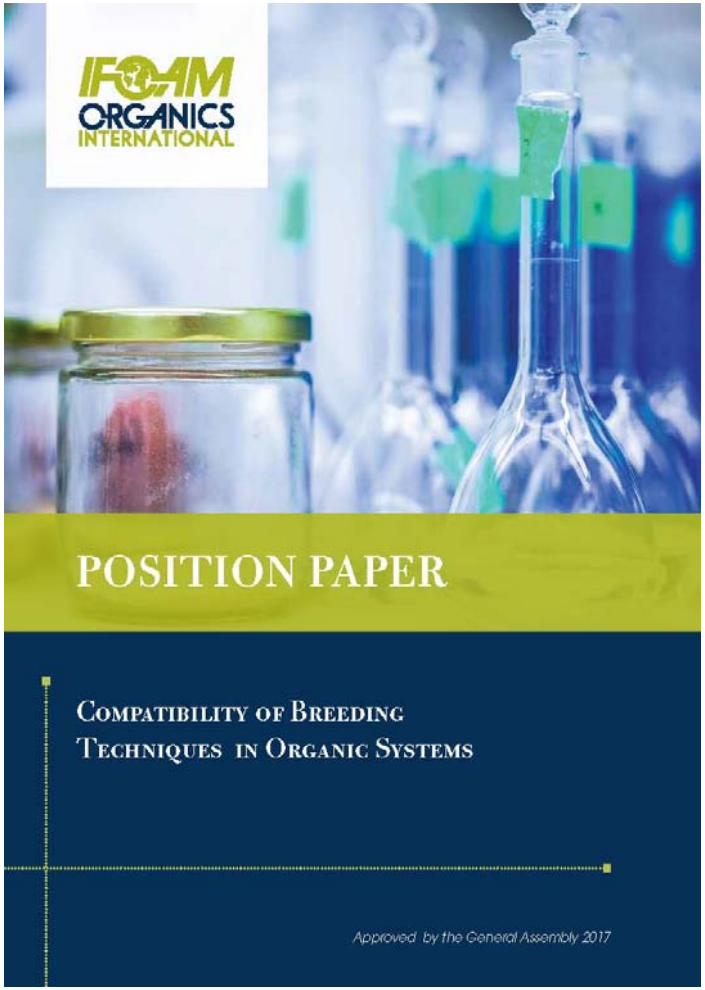
Position of the Organic Sector on the complience of New Breeding Techniques (NBT)

- **Position Paper of ECO-PB on Organic Plant Breeding 2013:**
  - Organic plant breeders in Europe will refrain from any breeding technique that technically interfers below the cell level
  - www.eco-pb.org/fileadmin/ecopb/documents/ecopb_PostitionPaperOrganicPlantBreeding.pdf
- **IFOAM EU Position Paper on New Plant Breeding Techniques 2015:**
  - NBT are not compatible with organic farming
  - Should be declared as GMO according to EU regulation and labelled accordingly
  - http://www.ifoam-eu.org/fr/file/position-paper-new-plant-breeding-techniques
- **IFOAM International: Position Paper on New Breeding Techniques 2017**
  - Draft February 2017, consultation and final approval on General Assembly of IFOAM in November 2017
  - Transparency & traceability to allow freedom of choice for farmers & consumers
  - https://www.ifoam.bio/sites/default/files/position_paper_v01_web_0.pdf

Compatibility of Breeding Techniques in Organic Systems
Ifoam International Position Paper approved Nov 2017



Clarity & transparency on the criteria used to determine which breeding techniques are compatible with Organic Farming Systems