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Boosting Organic Seed and Plant Breeding across Europe 2017-2021

Legal framework and temporary experiment on organic varieties

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Eucarpia General Congress

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Definitions

Cultivar: comprises registered varieties, landraces, populations, composite cross populations, organic heterogeneous material etc.

Organic plant breeding (OPB): Organic cultivars are obtained by an organic plant breeding program as defined by the IFOAM International norms of 2014. All breeding steps from crossing till final selections take place under organic conditions and the applied breeding techniques are in accordance with the techniques listed in the Annex of the position paper of IFOAM International for organic breeding from November 2017. Moreover, cultivars derived from OPB shall also not be patented.

Breeding for Organic (BfO): are more product oriented and 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), they do not use critical breeding techniques and selection occurred at least partially under organic conditions.

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Policy recommendations on new cultivar types

- **Temporary experiment on heterogeneous population of cereal (2014-2021)**
- **New organic regulation (2018/848) put into force January 2022**
  Commercialization of **organic heterogeneous material (OHM)**
  - Definition of organic varieties suited for organic production
  - **Temporary experiment of characterization of organic varieties** (2021-2027)

→toolbox for characterization and proposal for adjustment in Seed directives in Milestons 2.8 (May 2019)

→ toolbox for identification and description of organic heterogeneous material (D2.8, Dec 2019) → commented delegated acts of new organic regulation (EU 848/2018)

→ case studies on adjusted DUS for organic varieties with carrot and kohlrabi

→ bottlenecks & recommendations on procedures to improve cultivar release to be tested in the scope of temporary experiments on organic varieties suited for organic production (2021 – 2028) → www.liveseed.eu > Results > WP2 > **D2.4 adapted DUS and VCU testing of organic varieties**

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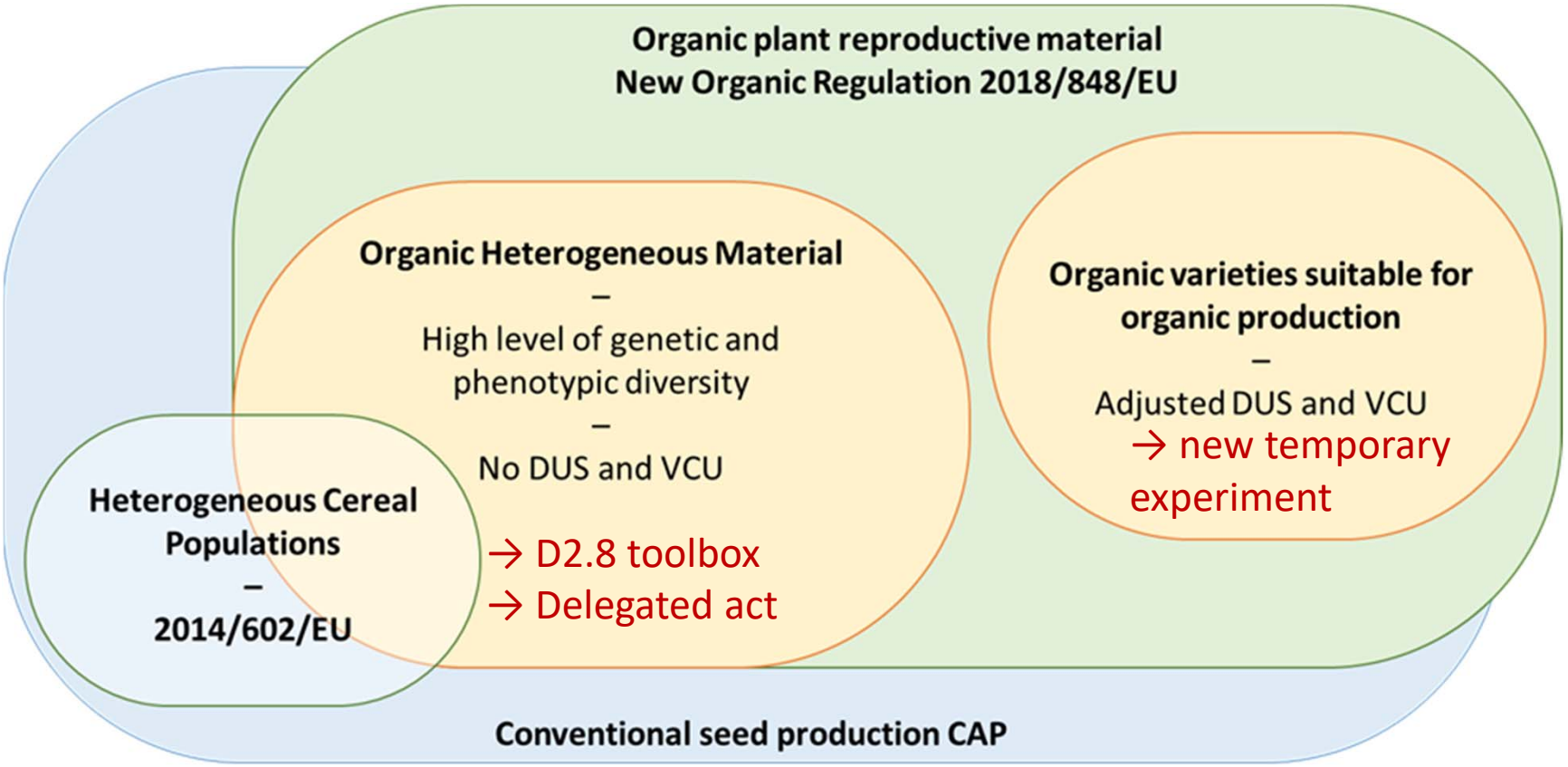
Novel Cultivar Types



- Definition of organic plant breeding
- Definition of organic heterogeneous material for all crops
- www.liveseed.eu > **Results > WP2 cultivar testing**

  > MS18 report on SWOT analysis of characterization of heterogeneous populations

  > D2.1 overview of organic variety testing in Europe
- > D2.4 Guidelines for DUS and VCU testing of organic varieties

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New Organic Regulation
Organic Heterogeneous Material

New organic regulation (EU) 2018/848 put into force January 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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Political Framework
Organic Heterogeneous Material

New organic regulation (EU) 2018/848 put into force January 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.

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New organic regulation
Organic varieties

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 organized **in accordance with Directives** …. 66/401/EEC, 66/402/EEC, 68/193/EEC, 2002/53/EC, 2002/54/EC, 2002/55/EC, 2002/56/EC, 2002/57/EC, 2008/72/EC and 2008/90/EC for a term of **seven years**, should involve sufficient quantities of plant reproductive material and should be subject to yearly reporting 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 [potential Start 2022]

→Development of implementing act is ongoing

New organic regulation
Organic Varieties

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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Why we need adjusted variety release for organic varieties?

- Organic breeding initiatives aiming to develop a broad portfolio of crops and many cultivars within crops

→ even with increasing market share of organic, breeding activities for such broad portfolio cannot be refinanced via royalties or seed sale. More than 50% of turnover of organic breeding initiatives is financed by non profit foundations, more public and contribution of the value chain is needed

- Based on LIVESEED farmers' survey most organic farmers claim that the lack of organic seed of locally adapted cultivars is the main bottleneck for organic production
- Application of certain breeding techniques like genetic engineering or cell fusion are not accepted by organic farmers and consumers and limit choice of farmers

→ high demand for organic varieties suitable for organic agriculture

- Organic breeders cannot invest too many resources to fulfill thresholds that are not relevant for farmers, processors or consumers
- Registration fee if often a bottleneck for small organic breeding initiatives

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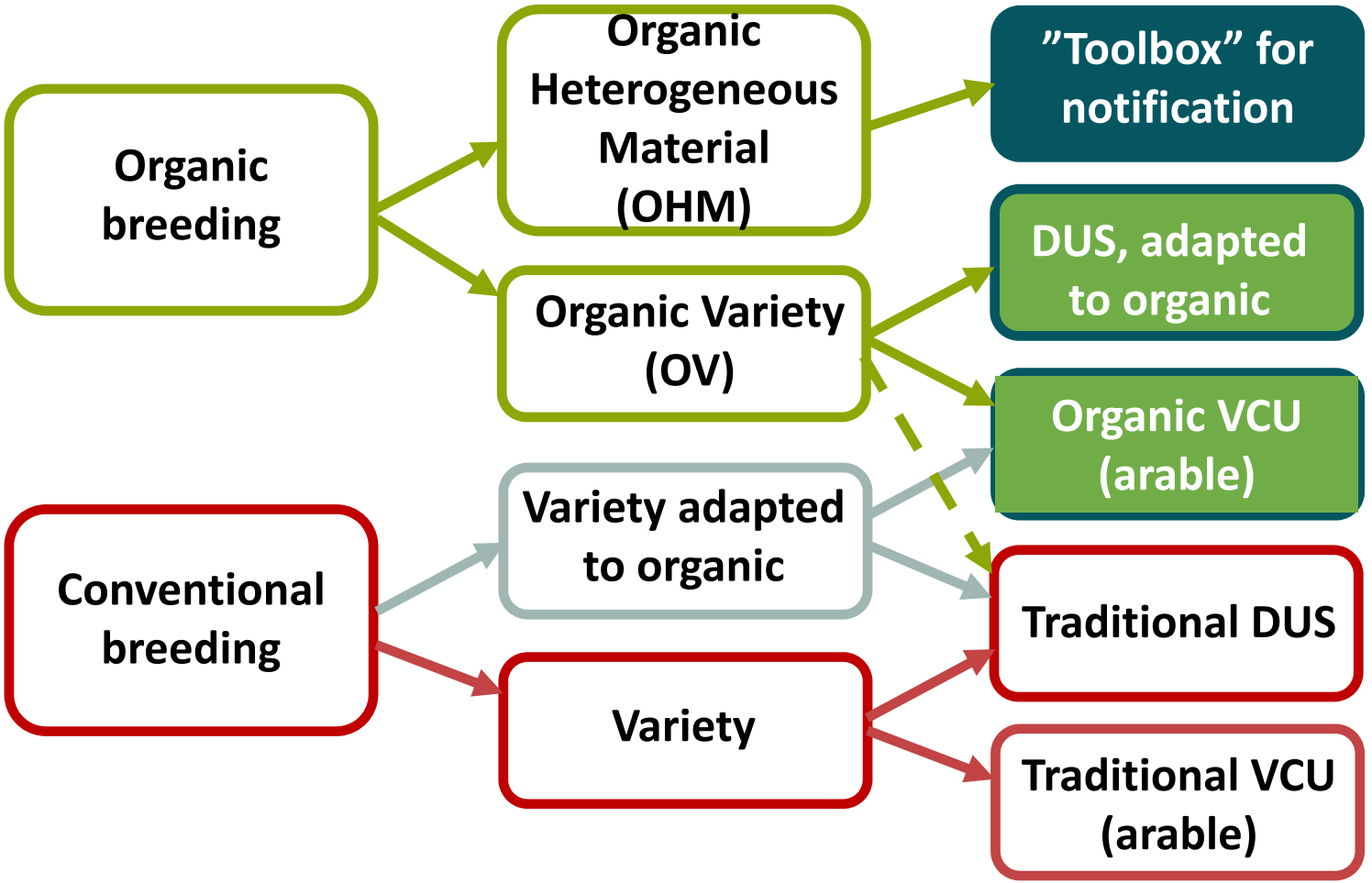
Breeding Strategies and Registration of Organic Varieties



Regi-stration	IPR
"notifi-cation"	✗
✓	?
✓	✓

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Adjusted protocols for 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
- Allow preregistration to test market acceptance first before investing in registration (e.g. for apples, grapes)

www.liveseed.eu > **Results > WP2 cultivar testing**
> D2.1 overview of organic variety testing in Europe
> D2.4 Guidelines for DUS and VCU testing of organic varieties

Temporary experiment
Preparation by working groups

Proposed priority species from DG Sante

Arable crops:

- Wheat
- Rye
- Maize
- Soybean
- Alfalfa/Lucerne
- Potato

Vegetables:

- Carrot
- Kohlrabi
- Tomato
- Onion

already attended to in the pre-project conducted by Naktuinbouw, Louis Bolk Instituut and ECO-PB together with LIVESEED in 2020

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Adjusted DUS

Example: ***carrots for bundling***)

UPOV Nr.	asterix characteristics	characteristics of the UPOV protocol for carrots usable for fresh market (bundling and marketing with leafs)	relevance of utility for: farmers / producers	relevance of utility for: trade / processors	relevance of utility for: consumers	importance for selection: organic carrot breeders	ECO-PB proposal for adapted protocol: Characteristics to be considered mandatory	ECO-PB proposal for adapted protocol: characteristics to be considered optionally on request (or recommendation) of the applicant
			(0=none, 1=medium, 2=great)			(0=none, 1=medium, 2= great)		
2		Leaf: attitude	2	1	0	1	1	0
4	(*)	Leaf: division	0	1	0	1	0	1
6	(*)	Leaf: anthocyanin coloration of petiole	0	1	0	1	0	1
14	(*)	Root: external colour	1	2	2	2	1	0
17		Root: extent of green colour of skin of shoulder	2	2	2	2	1	0
18		Root: ridgning of surface	2	2	1	2	1	0
19	(*)	Root: diameter of core relative to total diameter	0	1	1	2	0	1
22	(*)	Root: colour of cortex	1	2	1	2	1	0
25	(*)	Root: extent of green coloration of interior (in longitu[illegible])	2	2	2	2	1	0
		characteristics in total:					20	11

31

20 + 11

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The cooperative project in process - impressions

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The cooperative project outcomes

Partners of the case study agree, that the project helps

- to get a better understanding of the views of examination officers (focusing on safe registration processes) and organic breeders (focusing on market needs);
- to synchronize the views and assessments on expressions of plants;
- to set up a **basis for discussion of methods for the temporary experiment (support for the expert groups applied by the COM**);
- to commonly develop sets of reference varieties;
- **to encourage other examination officers to participate in following common projects to gain more experiences for successful discussions and widely supported solutions during the temporary experiment**.

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ECO·PB European Consortium for Organic Plant Breeding

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Adjusted protocols for VCU

- Option to test organic bred cultivars under organic farming systems (=target environment)
- Also allow for testing under mixed cropping systems e.g. pea – cereal which is very common in organic agriculture
- Adjusted parameter assessed under organic VCU that reflect specific traits needed in organic farming (e.g. weed competition, seed born diseases, early vigor)
- Adjusted thresholds that account for sustainability parameters and other ecosystem services not mainly yield
- 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)

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Next steps

- DG Sante started a working group in 2021 for the temporary experiment on organic varieties to develop the implementing act
- The temporary experiment should start beginning of 2022 and each EU Member State can apply to participate
- It is foreseen that the organic breeders can send their cultivar candidates for registration as organic varieties to national examination offices of participating Member States against a fee
- LIVESEED and ECO-PB is presently developing crop specific suggestions for adjusted DUS similar to the carrot example
- Organic breeders should get prepared to have sufficient seed of cultivar candidates for application
- Examination should inform their Member States to participate early in the temporary experiment
- Common field trials should be set up for achieving agreement on adjusted DUS and VCU testing involving examination offices, breeders and researchers. For this additional funding is needed.

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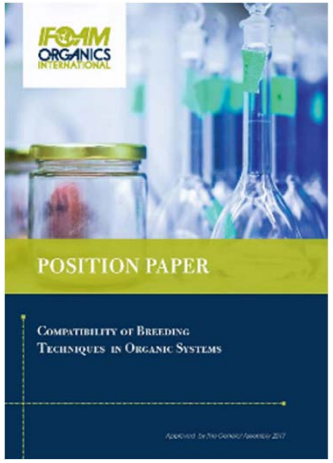
Criteria for Organic Plant Breeding

- **Ethical issues of position paper of Eurpean Consortium for Organic Plant Breeding (ECO-PB) 2013**
- Genom and cell is respected as indivisible entity, no technical/physical intervention (e.g. isolated DNA) → no technical/physical intervention (e.g. cell fusion)
- Maintain reproducibility in species specific manner
- No legal or technical barriers to restrict breeders' privelige
- Natural crossing barriers are respected
- Promotion of open pollinated varieties as alternative to F1 hybrids to enable farm saved seed
- Transparency
- https://www.eco-pb.org/fileadmin/eco-pb/documents/discussion_paper/ECO-PB_Postition_paper_2012_Translated2019_French_Version.pdf

IFOAM International: Position Paper on New Breeding Techniques 2017
Draft February 2017, consultation and final approval on General Assembly of IFOAM in November 2017 https://www.ifoam.bio/compatibility-breeding-techniques-organic-systems



Transparency & traceability to allow freedom of choice for farmers & consumers