LIVESEED

Boosting organic seed and plant breeding across Europe
2017 - 2021

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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 competitiveness of the organic sector**
- **Approach**:
  - Inter- and transdisciplinary
  - Policy – economy – science interface
  - Multi-actor & stakeholder involvement
  - Wide geographic representation
Working together

49 partners
18 countries

23 breeding & research institutes
7 breeding companies
8 seed companies
11 organic associations

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Aim: 100% organic seed of adapted cultivars by 2037

Figure 1: Schematic timeline 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.
## Main objectives

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<th>Objective</th>
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<td><strong>Policy &amp; regulation</strong></td>
<td>Provide a level playing field for the use of organic seed and variety registration across Europe</td>
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<td><strong>Research &amp; development</strong></td>
<td>Develop innovative approaches in organic plant breeding and improve quality of organic seeds</td>
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<td><strong>Socio-economics</strong></td>
<td>Increase access to organic seed and promote use of adapted cultivars</td>
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<td><strong>Economy &amp; market</strong></td>
<td>Improve the competitiveness of the organic seed supply chain</td>
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<td><strong>Communication &amp; network</strong></td>
<td>Enhance knowledge exchange &amp; rise awareness on the benefits of organic seed and plant breeding</td>
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**LIVESEED**

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LIVESEED ambitions

• 1. Co-development of knowledge by transdisciplinary multi-actor approach

• 2. Holistic approaches for breeding and seed production
  o Plant – Plant interaction
  o Plant – Soil microbiome interaction
  o Plant – Seed microbiome interaction

• 3. Enabling more sustainable food production systems
  o Mitigate risks of crop failure through breeding for diversity
  o Safeguard genetic resources for future generations
LIVESEED ambitions

1. Co-development of knowledge by transdisciplinary multi-actor approach (farmers, breeders, scientists, seed registration staff, retailers, ministry staff, consumers/society)

- Breeding activities themselves
- Development of new breeding methodologies and approaches
  - Conventional materials and... Heterogeneous materials, mixed populations, composite cross populations, ....
- Events and workshops (e.g. gen. public, national visits)
2. Holistic approaches for breeding and seed production

- **Plant – Plant interaction**
  - e.g. Intercropping Agroforestry (trials and studies)

- **Plant – Soil microbiome interaction**
  - e.g. Microorganisms populations depending on the species, intercroppings, etc. e.g. Peas, maize

- **Plant – Seed microbiome interaction**
  - e.g. Effect of the microbiome in seed germination and vigour, differences in microbiome depending on the origin of seeds, etc.
3. Enabling more sustainable food production systems

- Mitigate risks of crop failure through breeding for diversity
  - i) a range of species,
  - ii) intraspecific variation,
  - iii) heterogeneous materials and populations,
  - iv) intercropping, agroforestry, crop rotation, etc.
  - v) including small organic initiatives/farmers and breeders

- Safeguard genetic resources for future generations

As a consequence of the latter...
Research activities of LIVESEED will cover five main crop categories:

- Legumes (lupin)
- Vegetables (carrot, tomato, broccoli)
- Fruit trees (apple)
- Cereals (winter wheat)
- Fodder crops (grasses)

considering different farming systems (mixed cropping, agroforestry) pedoclimatic zones across Europe
What LIVSEED 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.
- 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.
WP3 - Task 3.4 (as a case study)

“Supporting small existing breeding initiatives & initiating new collaborations to close gaps in various crops”

- White lupin (legume)
- Brassica (vegetable)
- Apple (fruit trees)
- Winter wheat (cereals)
- Tomato (vegetable)

Specific “GAPS-TO-BE-FILLED”
“Supporting small existing breeding initiatives & initiating new collaborations to close gaps in various crops”

- White lupin (legume)

Great potential as super-food (high protein) and feed crop

But… Anthracnose and abiotic stress (calcium soils)

And… narrow genetic base limited to sweet (low alkaloid) genotypes

ONGOING: collaborative breeding with European and other breeding companies. CCPs, phenotyping for resistances and quality + GBS
“Supporting small existing breeding initiatives & initiating new collaborations to close gaps in various crops”

- Brassica: broccoli, cauliflower, cabbages, kohlrabi

High concern from organic consumers (and retailers) about cell fusion-based CMS (and sometimes extended to any CMS...)

Most F1 cell fusion based could be replaced by: F1 SI-based, OP populations or CCPs

ONGOING: collaborative breeding with several European breeding companies. Adaptation and quality trials in Southern EU countries (e.g. Portugal, Spain, France, Italy).
“Supporting small existing breeding initiatives & initiating new collaborations to close gaps in various crops”

- Appel

Difficulties under organic. E.g. too much needing of copper
Not efficient collaborative network of farmers and breeders

ONGOING:
Development of an active EU network for Apple organic breeding
Trials for selecting more resilient, not Cu-depending varieties and rootstocks
“Supporting small existing breeding initiatives & initiating new collaborations to close gaps in various crops”

- Winter wheat

Bottleneck in a seedborne disease in wheat: Tilletia caries

ONGOING:

Supporting organic wheat breeders by providing modern breeding tools to improve resistance to several races

Lines derived from CCPs screened on the field + GBS
“Supporting small existing breeding initiatives & initiating new collaborations to close gaps in various crops”

- Tomato

Breeding for organic in tomato very weak and low diversity

ONGOING:

Spain and Italy breeding activities from different approaches
Network: scientists + small farmers + retailers + consumers
Different locations/agroclimatic conditions (5 Spain, 6 Italy)
Wide collections of landraces + CCPs + MAGIC evaluated in PPB
WP3 - Task 3.4 (as a case study)

“Supporting small existing breeding initiatives & initiating new collaborations to close gaps in various crops”

- Tomato
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Participate in:

• Surveys
• Interviews
• Workshops
• Events