

Position Paper on Organic Plant Breeding

Organic plant breeding is embedded into the general **principles of organic farming**. According to the International Federation of Organic Agricultural Movements (IFOAM), the persons acting in organic farming take care of the preservation and improvement of soil fertility, promote the genetic diversity of plants, animals and other organisms of the agro-ecosystem, conserve natural resources and strive for a stable ecological equilibrium. They take social responsibility and stand up for justice and equality. In organic farming, special responsibility is taken for the protection of the environment and for safeguarding the livelihood for present and future generations (www.ifoam.org).

Cultivated plants are the basis for our food. For thousands of years, plant breeding has been intrinsically tied to our culture. It is therefore of vital importance for our future that farmers have access to seeds and vegetative propagation material of a wide range of locally adapted crop species and varieties. They should be allowed to adapt and improve them (crop species and varieties) by cultivation in their local and on farm conditions. Genetic diversity within and between species allows plants to adapt to changing environmental conditions, and it enables us to improve our crops through breeding according to our needs.

Hereby the **dignity of creatures** has to be taken into account. Like all living organisms, plants have an intrinsic value independent of human interests. Organic plant breeding promotes genetic diversity and takes into account the ability of natural reproduction. It also respects the genetic integrity of a plant, its crossing barriers and regulatory principles and is committed to safeguard the fertility, the autonomy and the evolutionary adaptation of our crop plants. This means that when varieties are chosen for organic farming, not only their suitability for cultivation but also their breeding history has to be considered. Given the multitude of breeding methods and techniques presently applied to develop future varieties, this is not an easy task. To meet this claim and to send appropriate social and political signals, specific criteria were defined and ranked in order to allow a transparent evaluation of breeding methods and derived varieties.

Aims of Organic Plant Breeding

- The breeding goals match the respective crop species and the needs of the complete value chain of the organic sector (producers, processors, traders and consumers). The breeding goals aiming at the sustainable use of natural resources and at the same time account for the dynamic equilibrium of the entire agro-ecosystem.
- Organic plant breeding supports sustainable food security, food sovereignty, secure supply of plant products (e.g. fibre, medicine, timber), and the common welfare of society by satisfying nutritional and quality needs of animal and human beings.
- Organic plant breeding sustains and improves the genetic diversity of our crops, and thus contributes to the promotion of agro-biodiversity.
- Organic plant breeding makes an important contribution to the development of our crops and their adaptation to future growing conditions (e.g. climate change).

Ethical Criteria

1. The genome is respected as an indivisible entity and technical/physical invasion into the plant genome is refrained from (e.g. through transmission of isolated DNA, RNA, or proteins, or through artificial mutagenesis).
2. The cell is respected as an indivisible functional entity and technical/physical invasion into an isolated cell on growth media is refrained from (e.g. digestion of the cell wall, destruction of the cell nucleus through cytoplasmic fusions).
3. The ability of a variety to reproduce in species-specific manner has to be maintained and technologies that restrict the germination capacity of seed-propagated crops are refrained from (e.g. Terminator technology).

4. A variety must be usable for further crop improvement and seed propagation. This means that the breeders' exemption and the farmers' right are legally granted and patenting is refrained from, and that the crossing ability is not restricted by technical means (e.g. by using male sterility without the possibility of restoration).
5. The creation of genetic diversity takes place within the plant specific crossing barriers through fusion of egg cell and pollen. Forced hybridization of somatic cells (e.g. through cell fusions) is refrained from.
6. In complementation to the presently widely used hybrids, non-hybrid varieties shall be bred in order to give farmers the choice to produce their own seeds (farmers' privilege).
7. The principles of organic farming (the principles of health, ecology, justice and care) form the guidelines for breeding activities.

Criteria concerning breeding strategies

8. The environment in which selection takes place is in accordance with organic cultivation methods in order to account for the plant-environment interaction, to accelerate the selection gain, and to benefit from possible epigenetic effects. This means, that selection takes place under organic farming conditions.
9. The phenotypic selection in the field can be supplemented by additional selection methods (e.g. analysis of natural compounds or molecular markers for diagnostic purposes).
10. Organic plant breeders shall develop organic varieties only on the basis of genetic material that has not been contaminated by products of genetic engineering.

Socio-economic criteria

11. The exchange of genetic resources is encouraged and any patenting of living organisms, their metabolites, gene sequences or breeding processes are refrained from.
12. The breeding process, the starting material (e.g. used crossing parents, starting populations), and the applied breeding techniques will be disclosed to enable producers and consumers to choose varieties according to their values (e.g. clear declaration of varieties derived from mutation breeding).
13. Participatory breeding programmes involving all stakeholders (producers, processors, retailers and consumers) are promoted.
14. A plurality of independent breeding programs and breeders with different types of crops to increase agricultural biodiversity is aspired.

Choice of varieties in organic farming

All varieties of which seeds or propagation material have been propagated under organic growing conditions are currently allowed in organic agriculture, provided they are not declared as genetically modified varieties (Council Regulation (EC) No 834/2007 of 28 June 2007 on organic production and labeling of organic products). According to a derogation rule, untreated, non-organically propagated varieties are only permitted, if no suitable varieties from organic propagation are available. Among the varieties the following categories can be distinguished:

- I. Varieties derived from conventional plant breeding that are suitable for organic farming with the exception of genetically modified varieties (conventional breeding, organically propagated, or, if necessary, conventionally propagated but untreated),
- II. Varieties derived from plant breeding programmes with a special focus on the breeding goals or selection environments for organic farming, and organic seed propagation (product-oriented breeding for organic farming, organically propagated), and
- III. Varieties derived from organic breeding programmes or organic on farm breeding, which have been bred under organic farming conditions considering to the above mentioned criteria (process-oriented organic plant breeding, organically bred and propagated).

According to the achieved minimal consensus, varieties, which were bred using techniques that violate the integrity of the genome (e.g. transgenic plants) or the integrity of the cell (e.g. cytoplasm fusion), have to be excluded from the choice of varieties for organic agriculture. For future acceptance of varieties of Category I and II in organic farming, the above criteria (especially criteria 1-5) have to be taken into account. Thus, the above mentioned criteria provide also guidelines for breeding programmes for organic farming.

Varieties that are currently available for organic farming are mainly derived from conventional plant breeding programmes. This spectrum needs to be urgently supplemented or replaced, as for certain crops, such as cotton, soybeans, and corn, genetic engineering (violation of the first criterion) is frequently applied, while in other crops, like e.g. in broccoli or cauliflower, breeding is exclusively focused on male sterile hybrids originating from cytoplasm fusion (violation of the second criterion). In these cases, the choice of varieties for organic farming is already today severely limited. In addition, the strong monopolization on the seed market, the concentration of breeding efforts on a few major crops, and the dominance of conventionally propagated seeds lead to further restriction of the range of varieties for organic farming. Seeds and vegetative propagation material are one of our most important resources. It is therefore essential that varieties of Category II and III are promoted actively.

Distributed to the ECO-PB members on the 30th April 2012 and approved by the ECO-PB General Assembly on 6th November 2012 in Frankfurt