Plant Breeding for Organic Farming

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Organic farming has experienced a steady development throughout the 1990s and now constitutes a few percent of agricultural production, mainly in Europe and North America, and in other parts of the world.

The basic axiom of organic farming has been, as clearly indicated in the name, the ban of synthetic chemical products in agriculture to decrease their possible negative impact on the environment, and to improve food safety. Even if the sustainability of organic agriculture and its impact on food safety are still debated, the technical basis has been straightforward.

Organic farmers mainly rely on the seed industry for seed. Seed companies were first asked to provide untreated seed, and later 'organic seed' produced under organic conditions. Even if the second requirement is technically less obvious, because most of the seeds produced under classical farming are strictly identical to 'organic seeds' in terms of composition, it is also quite understandable.

A new step is now under consideration by the organic community: 'organic varieties' for organic farming. Several techniques would be banned from the development of 'organic varieties': with immediate effect, genetic engineering, cytoplasm male sterile hybrids without restorer genes, protoplast fusion, radiated mentor pollen and induced mutations; then possibly in the future, embryo culture, ovary culture and in-vitro pollination. 'Organic breeding' programmes will need to be certified, in order to guarantee that only allowed techniques have been used. In some interpretation the exchange of plant material between 'organic breeding' programmes and other breeding programmes would not be allowed. ISF holds the position that the proposed evolution, in which several current and efficient breeding techniques are banned, will lead to enormous difficulties for the organic farming community:

- The necessary time for breeding an 'organic' variety will be prolonged and a lower efficiency will be reached.
- Because it is less efficient, breeding will be more expensive. This extra expense would need to be carried by the organic market.
- Restricting the exchange of material between traditional and organic breeding programs will strongly limit the possible access to genetic resources, essential for progress in plant breeding.
- Quick reactions to new biotic and abiotic stresses will be complicated and limited, because of the restricted use of efficient techniques and of the restricted exchange of breeding material.

ISF recognizes that organic farmers and consumers of organic products have the freedom to decide which breeding techniques they consider consistent with organic farming. However, ISF wishes to clearly state that:

a) It does not see the link between the proposed organic breeding methods and the very objectives of organic farming; and

b) Acceptance of these methods will negatively impact 'organic' breeding efficiency.

Annex 1 - The Impact of Restrictions on the Use of Breeding Methods on Organic Farming

NOTE: The techniques that are mentioned here are those that are considered unsuitable or not suitable but provisionally allowed in Appendix 6 of the 2nd IFOAM Draft 2002.

Inducing variation

Embryo/Ovary culture

Not permitting these techniques has the following consequences:

- Limiting crossing between different species that might be of importance to obtain resistances and other traits from related species. This is especially important for potato, winter wheat and sugar beets. Embryo culture has proved its value already clearly for potatoes, also for varieties important for organic farming.
- Most modern tomato and several pepper, lettuce and squash varieties are produced using these techniques.
- Creation of new variation for ornamentals will be limited.

In vitro pollination

Not permitting this technique has the following consequences:

- Creation of new variation for ornamentals will be limited.
- Limitation of crossings between different species that might be of importance to obtain resistances, etc. from related species. This is especially important for potato, winter wheat and sugar beets.

CMS hybrids without restorer genes

Not permitting this technique has the following consequences:

- The availability of cabbage crops, in particular summer cauliflower will become a problem, as the number of varieties that are based on self-incompatibility decreases.
- Prohibition of CMS hybrids will cause problems in the availability of rapeseed and sugar beets.
- Necessary uniformity of varieties will not be reached.

Protoplast fusion

Not permitting this technique has the following consequences:

- Difficulties in transmitting (resistance) genes in relation to crosses between species. An example is Phytophtera resistance in potato.
- Delay of the breeding process.

After several generations it is not any longer traceable in the product. Hence also with this technique control will be impossible.

Radiated mentor pollen

Not permitting this technique has limited consequences, as this technique is not used frequently in breeding programmes. However, this method is sometimes useful in the breeding of ornamentals.

Mutation-induction by using radiation and/or chemicals

Not permitting this technique has the following consequences:

- Abandon an important technique to broaden the genetic variation.

This technique was used, for example, for the development of the wheat variety Sunnan, which is commonly used in organic farming.

Recombinant DNA

Not permitting this technique has the following consequences:

- Strong limitation of the new variability that is now at the disposal of plant breeders
- Less efficiency in breeding against biotic stresses, leading to variety more susceptible to pest and diseases, a major limiting factor in organic breeding
- More difficulty to develop herbicide-resistant varieties facilitating greatly minimum tillage and no-till cultivation
- Less efficiency in breeding against abiotic stresses such as drought and salt resistance. That would be important in case of climate change

Selection methods

In vitro selection

Not permitting this technique has the following consequences:

- Delay in breeding programmes, higher costs.
- In general causing more pollution of the environment with the production of ornamentals.
- Limitation of breeding materials, hence the chance of success is smaller.