

Seed as common property - Breeding as a source for real economy, law and culture

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Abstract

The worldwide loss of agricultural biodiversity is the result of a production process that generates maximum yields with the massive input of fertilizers and pesticides at the expense of environment and human health. On the one hand, there are enough kilocalories generated today to feed a world with a population of 14 billion people if not more than half of the primary production were not being destroyed. On the other hand, FAO has shown that 70-80% of the world's food is still produced by family farmers of which >80% cultivate a maximum of two hectares. Stabilizing and improving this production must therefore be a top priority.

FAO's extensive efforts with the International Seed Treaty (ITPGRFA) and the UN Convention on the Conservation of Biodiversity (CBD and Nagoya Protocol) have not been able to stop the loss of global (agro)biodiversity. The issue of food security is directly linked to the availability of seed. As in developing countries, seed was a common property in industrialized countries up to 100 years ago. Since then, seed has undergone a dramatic commercialization and privatization process. This process is also ongoing in the developing world, considerably affecting food supply and food sovereignty. The seed purchase not only makes a lot of farmers dependent on seed companies, but at the same time leads to the loss of the traditional adapted varieties and thus of agrobiodiversity.

Elinor Ostrom, the first Nobel Prize laureate for economics, has demonstrated how successful common property user communities (commoners) have been organized in the past and today. As often as Ostrom is cited in the commons movement – from open source software, to community projects in cities and municipalities, to agriculture, water supply, fisheries and economic theories – the «design principles» which she has identified for sustainable use of common property are rarely discussed. They are still inspiring and provocative even after more than 25 years since their first presentation.

The work of Elinor Ostrom gave reason to address the subject of seed and breeding from the perspective of the commons. However, it soon became clear that the transfer of the usage architecture of public domain natural resources such as water, pastures or fishing grounds to the conservation, utilization and breeding of seed and varieties is far from trivial. While depletion of natural

resources have always been a concern, seed is characterized by the fact that it is lost only when not used anymore! That was and still is the main reason for the alarming worldwide decline in agrobiodiversity.

Seed and crop varieties are associated with three different societal-social spheres. First, they are an economic or exchangeable commodity that is sold or passed on in the form of grains, seeds, cuttings or tubers. The same seed also forms a legal interest as a variety, whose use is regulated and protected in most countries of the world. Furthermore, it is also a fundamental cultural product and cultural heritage – similar to literature or music – which is dependent on the creativity, the perseverance and experience of a breeder or a breeder community. While the first sphere is still anchored in social consciousness, the second, and even more, the third, are prone to disappear. Modern molecular genetic methods are mostly overestimated and are of little relevance for the development of complex properties such as salt tolerance or drought resistance (see *e.g.* Gilbert 2014). Biodiversity is a result of the common evolution of man and nature (Vavilov 1932).

Organic breeding in Europe originated in the biodynamic movement and aspires to contribute to sustainable agriculture, biodiversity and food sovereignty. The spectrum of initiatives is wide and differentiated according to the objectives by each initiative. Most of them are organized as non-profit associations and thus show their closeness to common property and common good. Some initiatives are breeding for professional cultivation on a very high standard and in close interaction with their users. Others are concerned with the development of traditional cultivars and the conservation of traditional crops for agriculture and horticulture. Some projects involve participatory breeding with cooperation between scientists and farmers.

As in the objectives, the initiatives also differ in their social, political, legal and economic embeddedness. One of the major challenges for future development is to ensure the funding of future breeding activities. The requirements are particularly high when cultivating varieties for commercial organic farming, since quality expectations for organic raw materials and market products are higher and the cultivation conditions more demanding than in conventional agriculture.

Regarding the fact that nowadays only 1-5% of the varieties for organic farming are derived from organic farming, we face an enormous challenge. In contrast to the practice of organic propagation of conventional varieties, the vision of using 100% of seed from organic breeding, as is being discussed in the ongoing revision of the EU organic regulation, is desirable but can hardly be implemented at present.

The importance of non-profit breeding initiatives can be justified historically and in principle. Historically, they are the continuation of the work of user communities through which the whole variety of crops has developed. In principle, breeding includes the following three elements: the regular reproduction and the selection of varieties, their distribution during periods of migration and the free exchange of seed among the different user communities as has been the case over the last 10 000 years across all continents.

With the help of examples, non-profit organic breeding initiatives are presented together with their rights and obligations:

- They breed many crop species and varieties for professional cultivation and hobby gardening. To meet the expectations of their customers, the intensity of the breeding, the methods used and the handling of the registration and the protection of their varieties can be very different. It appears that all forms of use, registration and ownership of varieties, as long as they are not patents, are compatible with the idea of common property and their user communities.
- The size of the user community is an important factor. On the one hand, it should be manageable because personal contact and familiarity create trust. On the other hand, it is a working hypothesis that, in the case of varieties for professional cultivation, all parties involved from the farmers to the entire downstream value chain, including the retail trade, can be considered to be members of the user community.
- Organic breeding contributes to a significant extent to the optimization of the achievements of organic production and thus to other subsistence commons. Organically bred varieties can cope with the nitrogen available in the soil, so that air and water are not polluted with artificial fertilizers. The varieties are open pollinated, *i.e.* self-propagating, and thus contribute to the increase of agrobiodiversity. Because production is not dependent on herbicides and pesticides, they support the ecosystem services of the biological and biodynamic producers for the benefit of the environment and health.
- The political request to use in the future only organically bred varieties in organic farming is an ambitious goal which can be achieved only with the material and ideal support of national and international government agencies. The financing of organic breeding is not possible solely through the sale of seed or through licensing fees for locally adapted regional varieties.
- Funding concepts and financial systems of non-profit plant breeding must relate to the users and their responsibility for both executive action and costs.

Future scenarios in industrialized countries:

- Of central importance is the geographical expansion of breeding activities beyond German-speaking regions.
- For this, the training of future responsible breeders will play a prominent role.

- Key factors for success are the differentiation, rationalization, co-ordination and interlinking of the activities as well as cooperation with new partners.
- Public relations activities aimed at the authorities and for promoting research and training centers must be expanded.
- Organic breeding improves the quality of products, as well as the raw materials for the value-added chain. Therefore, models for financing should involve all partners in the chain and the farming associations. For the former, a 1/10 of a percent fee on all fresh products is proposed, the latter could contribute with a steering and incentive tax.
- Organic breeding makes contributions to other commons. Since agrobiodiversity and ecosystem services are highly subsidized by governmental agencies the promotion of non-profit ecological breeding initiatives with money from these institutions is justified.
- The contribution of foundations is large and will remain so. Donors must recognize that breeding projects are always designed for cycles of 10-15 years, and therefore dependent on long-term commitments of funds.

In developing countries, breeding, seed propagation and cultivation are largely provided by the producers and production communities. In this way, agrobiodiversity is maintained to a large extent regionally and in some cases also newly created. At the same time, the challenge is to develop the traditional varieties quickly and effectively in the course of climate change, dwindling soil fertility and the partly low yields. This challenge has to be met in a difficult political environment and under the most difficult economic conditions. The rural communities are fragile, suffering from too few financial resources and often marginal recognition by governments and the international community.

Seed as a commons is dependent on user communities with structures, as has been detailed by Elinor Ostrom.

As a vision, we are proposing to actively create new seed and breeding communities as a third pillar alongside the international contracts (CBD and Nagoya Protocol, as well as ITPGRFA) to preserve agrobiodiversity.

Available instruments and recommendations for action:

- Food security and preservation of agrobiodiversity depend on a true assessment of the global costs and benefits of food production. As Sukhdev *et al.* (2016) emphasize, neither the maximization of the yields or profits per unit area nor the orientation towards the gross domestic product is suitable for this purpose. The one-sided reference to these two parameters obscures problems that are caused by high-yield agriculture. The authors estimate that high input agriculture accounts for 60% of biodiversity losses, 24% of greenhouse gas emissions and 33% deterioration in soil fertility. Last but not least, in many developing countries as well as in industrialized countries, there is not only undernourishment but also malnutrition, both resulting in rising healthcare costs.
- Nutritional sovereignty and agrobiodiversity depend on due consideration for farming communities. Their representatives must therefore be included in all negotiations where land sales to foreign investors, free trade zones and changes to seed laws are discussed and implemented.
- The recognition of traditional agriculture is essential for food sovereignty, agrobiodiversity and ecosystem services.

- The establishment of user communities that set their strategic and operational objectives and rules themselves, monitor their compliance, and punish non-compliance is dependent on recognition by the international community and national governments. Both support the formal establishment of such communities.
- On all continents, prototypes of user communities are developed for this purpose.
- In addition to their other activities, non-governmental organizations also contribute to the formation of user communities and the concrete formulation of the design principles identified by Elinor Ostrom.
- Together with farmers, they work out a monitoring system with which successes, problems and challenges can be recognized at an early stage. They support the actors in the further development and adaptation of these principles.
- Governments and authorities recognize, in addition to international treaties, this third form of protection for agrobiodiversity and provide the necessary legal and political freedom.
- In turn, the user communities undertake, with the support of many partner organizations, to intensify their cultivation methods permanently, to develop their crops continuously, to ensure seed storage and documentation, and to make their experience and knowledge available to other communities in a suitable format.
- By intensifying production, the existing crop species and varieties must not be destroyed. The support of traditional sustainable practices with locally adapted varieties is recognized by governments and international organizations as the key to achieving this.
- The economic existence of farmer communities must not be threatened by imports of food from industrialized countries. On

the contrary, such communities should be supported in exporting any surpluses to other countries.

Keywords

Biodiversity · common property · developing countries · organic plant breeding · seed system

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