

Towards ecological and societal resilience through systems-based plant breeding

Problems

Breeders need to develop – in a societally acceptable manner – high-yielding, good quality, resource-efficient cultivars that are climate-robust, culturally acceptable and contribute to ecosystem services. We analysed several challenges towards ecological and societal resilience given the current and future climatic, agronomic, economic and societal environment, which a single approach in plant breeding alone cannot solve.

Practical recommendations

We identified four paradigmatic breeding orientations: community-based, ecosystem-based, trait-based, and corporate-based (Fig.1). These orientations differ because they have different ways of thinking, values and economic models. Each approach has significant value and impact, such that no approach alone will achieve all relevant sustainability targets:

- food security and safety,
- food and seed sovereignty,
- social justice,
- agrobiodiversity,
- ecosystem services,
- climate robustness.

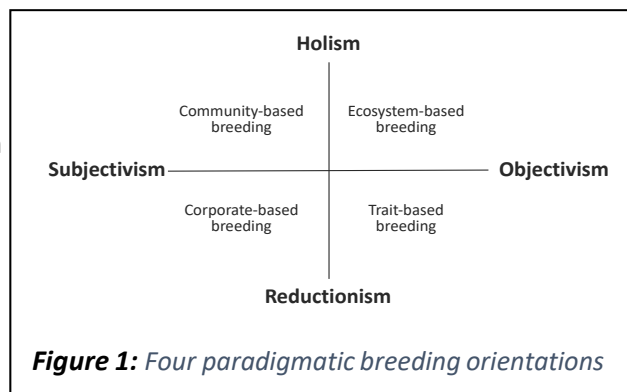


Figure 1: Four paradigmatic breeding orientations

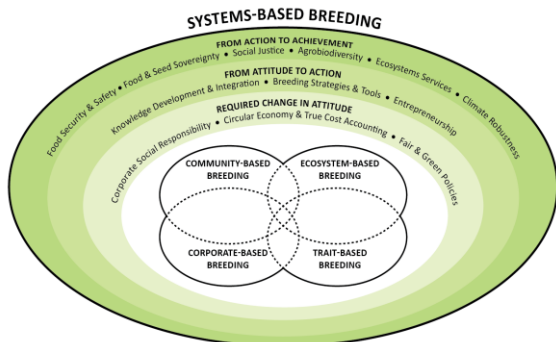


Figure 1: System-based breeding

Achieving these targets requires i) knowledge development and integration, multiple breeding strategies and entrepreneurs, but also a change in attitude based on ii) corporate responsibility, circular economy and true cost accounting, and fair and green policies. We therefore define a new approach: 'systems-based breeding' (Fig.2). It is a methodological orientation, which maximizes the synergy between the strengths of the ways of thinking of the four paradigmatic orientations. Based on this concept of systems-based breeding, we picture a perspective where breeders can be initiators of developments towards an ecologically and societally resilient crop production.

Further information

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LIVESEED: Boosting organic seed and plant breeding across Europe. LIVESEED is based on the concept that cultivars adapted to organic systems are key for realising the full potential of organic agriculture in Europe. Research project 2017-2021.

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