

# Towards ecological and societal resilience through systems-based plant breeding

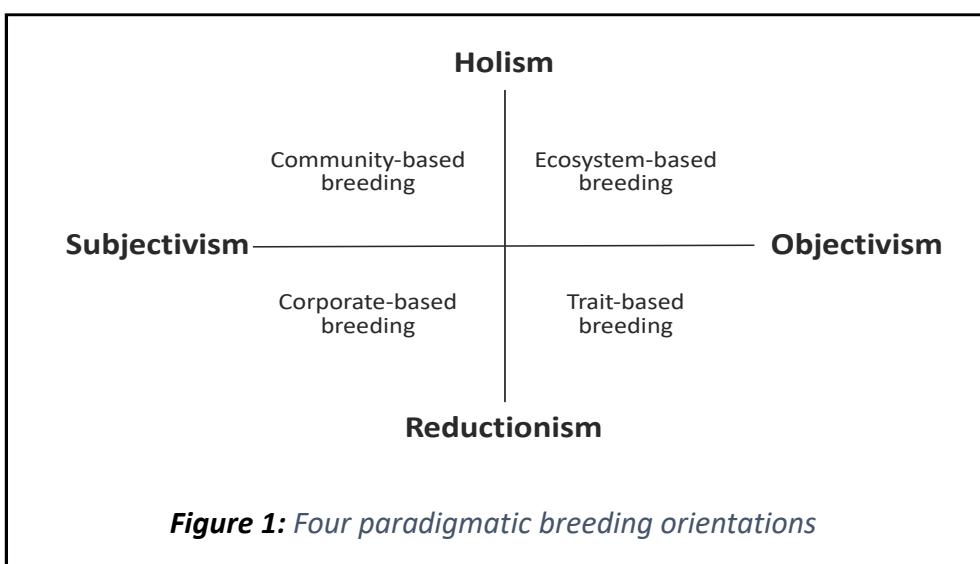
## Problems

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.

## Solutions

We identified four paradigmatic breeding orientations: community-based, ecosystem-based, trait-based, and corporate-based, see 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:

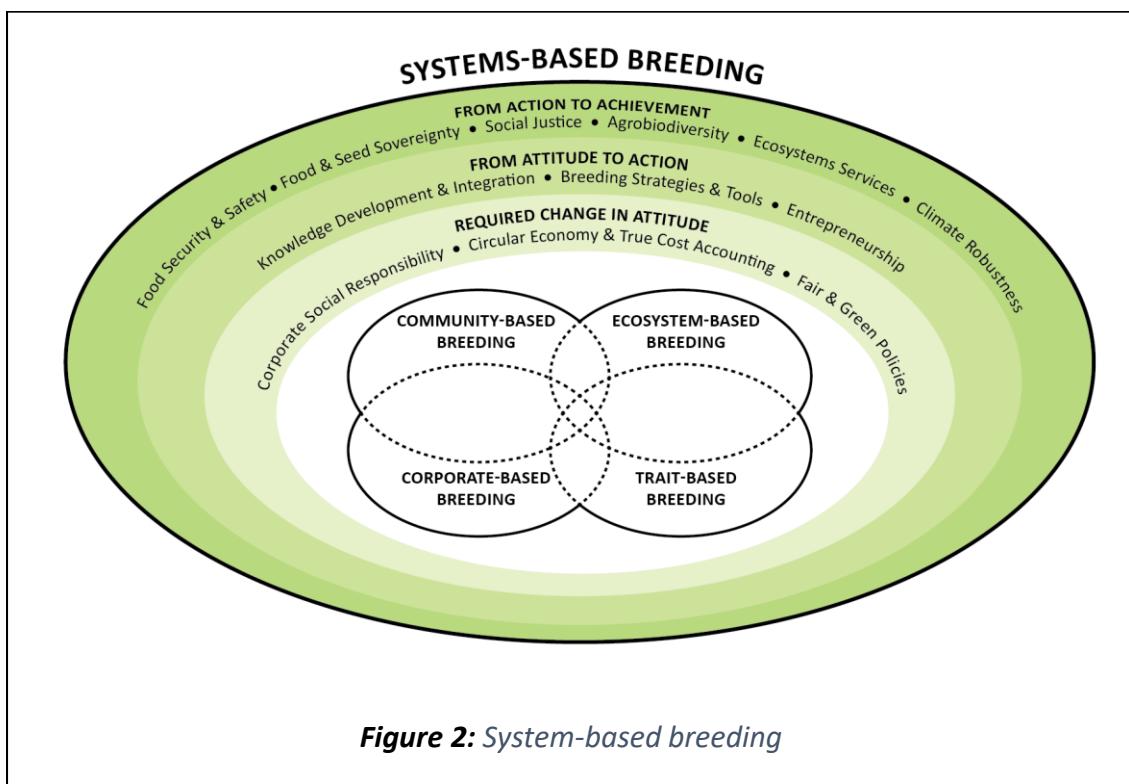
- food security and safety,
- food and seed sovereignty,
- social justice,
- agrobiodiversity,
- ecosystem services,
- climate robustness.



## Practical recommendations

Achieving these targets requires i) knowledge development and integration, multiple breeding strategies and entrepreneurship, but also a change in attitude ii) corporate responsibility, circular economy and true cost accounting, and fair and green policies. We therefore define a new approach: 'systems-based breeding', see Fig.2. It maximizes the synergy between 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.

Breeders can not do this alone, but need the help of policymakers, researchers and the whole value chain.



## Further information

Lammerts van Bueren, E.T., Struik, P.C., van Eekeren, N. et al. Agron. Sustain. Dev. (2018) 38: 42. <https://doi.org/10.1007/s13593-018-0522-6>

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