

Implementing the systems-based breeding concept

Edwin Nuijten¹, Monika M. Messmer², Pedro Mendes Moreira³, Adrian Rodriguez Burruezo⁴, Véronique Chable⁵, Edith T. Lammerts van Bueren⁶

¹ De Beersche Hoeve, Oostelbeers, the Netherlands

² Research Institute of Organic Agriculture (FiBL), Department of Crop Sciences, Ackerstrasse 113, CH-5070 Frick, Switzerland

³ Research Centre for Natural Resources Environment and Society (CERNAS), Polytechnic Institute of Coimbra, Bencanta, 3045-601 Coimbra, Portugal

⁴ Escuela Técnica Superior de Ingeniería Agronómica y del Medio Natural Universitat Politècnica de València (UPV), Camino de Vera, s/n, 46022 Valencia, España⁵ INRAE, UMR BAGAP, 65 rue de Saint Brieuc, 35042 Rennes, France

⁶ Wageningen University and Research, Wageningen UR Plant Breeding, P.O. Box 386, 6700 AJ Wageningen, The Netherlands

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Society is becoming more and more critical on variety development strategies, not only at the technical level, but also at the level of cultural and ethical aspects of breeding. Lammerts van Bueren et al. (2018) analysed several challenges towards ecological and societal resilience and six sustainability goals have been defined: 1) food security and safety, 2) food and seed sovereignty, 3) social justice, 4) agro-biodiversity, 5) ecosystem services, and 6) climate robustness. These can only be properly addressed by concerted action. Therefore, the concept of systems-based breeding aims to integrate the strengths of different breeding orientations and provides a perspective where breeders can be initiators of developments towards an ecologically and societally resilient crop production. This paper presents the first steps for operationalising this concept.

To find ways to implement the concept of the systems-based breeding, this approach has been discussed with organic breeding practitioners and with actors of the value chain in five workshops in 2018 and 2019 in the frame of EU-Horizon 2020 project LIVESEED and beyond. To be able to operationalise this methodological orientation and internalise this concept in the daily practices of plant breeding, practitioners will need to reflect on how they are currently managing their breeding, and how they can adjust their breeding practices in the future, including the socio-cultural and ethical aspects. Collaboration and value chain partnerships seem to be key elements for change towards both ecologically and socially resilient food systems. In order to achieve resilient food systems, it should not only be a government or a strong civil society pushing for a diversity of approaches, but gradual change should also come from within the breeding sector. In one of the workshops two different 178 EUCARPIA Breeding and seed sector innovations for organic food systems, March 8-10, 2021, AREI T48 organic breeding companies each assessed their present status in respect of 12 key elements and defined their own future targets for improvements in 5 and 10 years' time. As a way to inspire each

other they then presented and jointly discussed the formulated targets and critically questioned each other on the motives and feasibility. Research on multi-actor approaches showed that a continuous critical evaluation through reflection of the whole process is needed in order to develop and play a transformative role (Rossi et al. 2019). This helps to manage the process fruitfully and coherently in relation to the commitment to contribute to generate change towards resilient food systems. The higher the diversity in breeding approaches and the more initiatives, the more agrobiodiversity can be maintained and bred for, which is also important to make agriculture more climate robust. In addition, diversity in breeding approaches and initiatives will foster the development and maintenance of knowledge, and it will help keep an open mind on what seeds are: they are not only commodities, but that they are also culture and part of our common heritage.

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