Commons-based plant breeding and seed production as a social innovation to enhance resilience in the agricultural sector

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Introduction

Building resilience has been proposed in science and international policy as a future priority for food systems to meet challenges like climate change. There is little systematic research on the role of the seed sector for socio-ecological resilience in plant cultivation systems. The ongoing privatization and concentration with breeding efforts is directed to create small number of high-yielding varieties. As an alternative, (new) organizational approaches in the seed sector build upon common ownership and collective management in plant breeding and seed production, including participation of smallholder farmers in variety development and management. Such a commons-orientation appears to be a promising approach to improve food system resilience.

Theoretical Background

- We conceptualize resilience as emergent properties that contribute to the stability and adaptability of social-ecological systems in case of perturbations. These properties include:
  - The amount of disturbance a system can absorb and remain within a domain of attraction
  - The capacity for learning and adaptation and
  - The degree to which the system is capable of self-organizing (Carpenter et al., 2001, p. 766).

- In recent years Indicator-based frameworks have been developed to attempt to assess resilience. Some of these frameworks have specifically focused on agroecosystems (e.g., Altieri et al., 2015; Cabell & Oelofse, 2012, Wriehn et al., 2015).

Research Goals

- To conceptually and empirically analyze how a commons-orientation in plant breeding and seed production promotes or impedes resilience of crop systems in comparison to private property-based structures.
- To address two knowledge gaps of
  - (i) how the seed sector influences resilience of agricultural systems in general
  - (ii) how commons-structures in the seed sector affect resilience of crop systems in specific

Methods

- Building on Cabell and Oelofse (2012) this paper applies an indicator-based framework to assess the contribution of two types of governance systems of seed production (conventional and commons-based) to the resilience of crop systems. For this, we reviewed, adopted and complemented Cabell and Oelofse’s set of 13 indicators.
- Text-based document analysis of 50 publications of conventional and 50 publications of commons-based seed companies and initiatives. All analyzed documents are self-portrayals of the corresponding companies.

Discussion

The conventional seed sector has advantages in terms of production efficiency under controlled conditions as well as financial viability. However, this investigation reveals that commons-structures in the seed sector improve the resilience of crop systems (system-to-be-governed) and the resilience of plant breeding and seed production structures (governance system).

Core aspects of the commons-based seed sector positively affecting agro-ecological resilience are its polycentric organizational structure, the breeding of varieties with reproducible seeds, the rejection of intellectual property rights and the sharing of both practical breeding knowledge and variety information. Principles of organic breeding further contribute to improving agro-ecological resilience, as commons-structures are only implemented in the organic seed sector to date.

References