

## **Listening Session: Seeds and Breeds Research Priorities and Needs**

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### **Priorities**

- Develop networks and infrastructure to facilitate steps in breeding process.
  - Needs assessment.
  - Breeding.
  - Trials.
  - Seed production.
  - Commercialization.
- Engage social scientists and economists in developing organic seed systems including participatory models.
- Evaluate breeding technologies and identify appropriate and effective methods for organic.
- Develop seed production practices to identify research and education needs.
- Identify and prioritize traits and crops for breeding for organic, in a transparent process.
- Develop funding and economic models to support organic seed systems and traditional public breeding programs.
- Long term whole system breeding for long term organic farming success including minor crops with ecosystem benefits such as cover crops and forage crops.

### **Specific Needs**

#### *Infrastructure*

- Support for breeding research – organic winter nurseries.
- National networks for trials, seed production, breeding (seed production in ideal regions).
- Networking diverse participants.
- Seed production for locally adapted niche varieties/crops – may need economic research to support emergence of smaller seed companies.
- Phenotyping and genotyping tools – need improved tools.
- Evaluating new breeding technologies – cost, effectiveness, ethics e.g.
  - Doubled haploid use.
  - Gene editing techniques eg CRISPR, Cas9 systems.
  - Older existing methods eg cell fusion, mutagenesis.
- More efficient handling of data from decentralized trials.
- Data mining tools – open access data repositories.
- Variety introduction stations – underfunding; some collections neglected; need more support for this system to improve collection of and access to phenotypic and genotypic data.
- Public breeding programs for perennial crops with an organic focus.

#### *Social science, economics and policy*

- Relationship building for grower groups in seed production and food production, transparency in the seed system; more educational outreach to organic growers about seed – farmer-to-farmer connections across bioregions could lead to increased investment by farmers in organic seed.

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- Social science involvement with researcher-farmer partnerships, building seed systems, connecting farmer groups.
- Engage economists in policy work addressing breeding goals.
- How do we get varieties from public breeders' hands to commercial viability?
  - Dearth of mid-level companies for certain crops.
  - Models for variety release.
- Support from:
  - Crop improvement associations in different states.
  - Vegetable Breeding Institute.
- GM contamination of seed.
- Intellectual property reforms.

*Education and communication*

- Best practices for organic seed production – needs assessment for research, infrastructure, education for different crops; work with public seed breeders, producers, companies of different sizes to bring together information.
- Training farmers for high quality seed production at different scales.
- Educating organic certifiers about bottlenecks in organic seed systems, equivalency issues to do with seed quality (disease, weed seeds...).
- Educating seed certifiers about needs of organic industry (e.g. not screening seeds for certain diseases that are not problems in conventional production).
- Loss of vision and funding in public institutions for value of breeding.
- Training the next generation of breeders.

*Long term whole system breeding*

- Cover crop breeding for SOM management.
- Forages and high protein organic feed sources within bioregions.
- Identification of traits important in organic eg insect resistance, early vigor – and sources of those traits – wild relatives, indigenous varieties.
- Minor crops – breeding for organic.
- Impact of breeding techniques on integrity of crops – nutrition, disease resistance... indirect unanticipated effects of breeding methods; interdisciplinary/multidisciplinary research and a different mindset for assessing impacts on human health, environmental health, crop health, agroecosystem health.
- Long term – breeding for whole systems (interactions with other parts of system – pollinators, soil microbes...); long term assessments.
- breeding annual crops within permaculture/perennial systems (since these have greater resilience, soil building and carbon sequestration properties).
- Evaluation of regional needs.
- Revive and improve indigenous varieties for a production approach; respect for germplasm from centers of biodiversity – intellectual property models that work for organic systems.

*Seed production, post-harvest handling and planting*

- Seedborne diseases – identify problematic ones, management techniques, post-harvest treatments.
- Organic seed treatments to improve seed quality.