Exploring Agroecological Practices in Canada

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Presentation outline

• Background
  ➢ Agroecology
  ➢ Elements of Agroecology
  ➢ Levels of Agroecology

• Agroecological Practices in Canada

• Agroecology as a Science in Canada

• Future research – Agroecology in Canada

• Questions and Answers
The term agroecology was first used by Bensin in 1928.

**Definitions of Agroecology**

- the study of the *interactions* between plants, animals, humans and the *environment* within agricultural systems.

- integration of research, education, action and changes that brings sustainability to all parts of the food system: *ecological*, *economic* and *social*.

(Wezel *et al.*, 2009; Altiere 2012; Gliessman, 2018)
Agroecology
the study of the interactions between plants, animals, humans and the environment within agricultural systems.

- Enhanced recycling of biomass (organic matter and nutrient cycling)
- Minimize losses of energy, water, nutrients and genetic resources
- Increase soil biological activities
- Diversified species and genetic resources overtime and space
- Enhance beneficial biological interactions and synergies
- Strengthen the resilience of agricultural systems

(Altieri, 2012; Dalgaard et al. 2003)
Concerns

- Declining response for increasing application of inputs (Law of Diminishing Return)
- Resistance to pesticides and herbicides
- Low energy efficiency
- Increased greenhouse gas emissions
- Polluted water, soil and air
- Affected wildlife, biodiversity and human health
- Food insecurity
- Low resilience and adaptability

(Altieri, 2012)
Elements of Agroecology

- Diversity
- Synergies
- Efficiency
- Recycling
- Co-creation & sharing of knowledge
- Resilience
- Culture and Food Traditions
- Human & social values

Governance

Circular Economy

(FAO, 2018)
Levels of Agroecological Practices

- Level 1 Improve input use efficiencies
- Level 2 Substitute alternative practices and inputs (BNF, Cover crop)
- Level 3 Redesign whole agroecosystems (diversity, resilience)
- Level 4 Connections between growers and consumers
- Level 5 Integrated and fully developed food system

(FAO, 2018; Gliessman, 2014)
Agroecological Practices in Canada

❑ Level 1 Improve input use efficiencies

• Fertilizer / Irrigation use efficiencies
• Precision application of pesticides, nutrients
• Reduced energy usage

❑ Level 2 Substitute alternative practices and inputs (BNF, Cover crop)

• Inclusion of legumes and perennial crops
• Cover crops
• Intercropping
• No-till or reduced tillage
• Shelterbelt

(FAO, 2018)
Agroecological Practices in Canada

Level 3 Redesign whole agroecosystems (diversity, resilience)

- Complex crop rotations
- Diversified production for more resilient system against environmental stress
- Spatial and temporal diversification
- Agroforestry
- Integration of crop-livestock systems
- Regenerative / rotational grazing

Level 4 Connections between growers and consumers

- Community Support Agriculture
- Organic farming

(FAO, 2018)
## Agroecology as a Science in Canada

- University of British Columbia
- University of Alberta
- University of Manitoba
- University of Saskatchewan
- University of Guelph
- Trent University
- Fleming University
- McGill University
- Dalhousie University

*(Dalhousie University, 2018)*
Agroecology as a Science in Canada

**Background**

**Practices**

**Science**

**Future**
Agroecology as a Science in Canada

- Investigated soil health indicators in response to long-term tillage in the lower Fraser Valley, British Columbia

- No tillage for 21 years led to significantly greater:
  - Soil Active Carbon ↑ 24%
  - Wet Aggregate Stability ↑ 2 fold
  - Available Water Capacity ↑ 9%

*Thomas, Hunt, Bittman, Hannam et al. 2019, Canadian Journal of Soil Science*
Optimizing systems productivity, resilience, and sustainability in major Canadian ecozones

- Conventional rotation system (control)
- A pulse or oilseed intensified systems, with improved BMP’s
- Multiple – commodity diversified with ‘nutrient balance model’
- A free-style, market driven, profit maximization system
- High-risk, potentially high reward innovative system
- Green manure incorporated system

(Gan et al., 2017)
# Agroecology as a practice / Movement in Canada

## Food: Locally Embedded, Globally Engaged - FLEDGE

**USC Canada**

## National or Regional Organic and CSA Networks

**The Young Agrarians**

**Ecological Farmers of Ontario - EFAO**

**Just Food Farm**

**The Bauta Family Initiative on Canada**

(USC-Canada, 2019)
India – Sikkim State

Brazil – Campesino a Campesino

Europe – A European Association for Agroecology
Future – Agroecology in Canada

❖ Recognition of agroecological practices

❖ Research on effects of advanced agroecological practices on ecosystem processes - modeling

❖ More research on redesigning of agricultural systems for more resiliency

❖ Utilization of digital technologies to assess agroecology
THANK YOU

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Q&A