ROOTS AND USES OF AN EMERGING NOTION IN AGRONOMY: FARMER-DESIGNERS

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1. Why emphasizing the design part in farmers’ activity?

2. What is the design part in farmers’ activity?

3. What implications for agronomists?

4. Distributed design or multiple design activities in interaction?
Breaking with the diffusionist idea that best farming systems could be disseminated without local, farmers’ led adaptation.

Agricultural systems and actors face typical innovative design issues:

> ill-defined directions of transformations required
> uncertainties, difficulties to define the paths
> context-dependent and fundamentally unknown

"Design is concerned with how things ought to be, with devising artifacts to attain goals" (Simon, 1969)

A desirable and unknown future + a transformative intent (of situations, objects, actions)
« farmer-designer »: why emphasizing the design part in farmers’ activity?

Designing farming systems ♦ dealing with interconnections
- between techniques, or between techniques & socio-institutional contexts
- between scales
- between time steps

(Meynard et al., 2012)

But who designs and how?

Usual design methods for agricultural scientists:
- modelling (e.g. Bergez et al., 2010)
- experimentation (e.g. Debaeke et al., 2009; Silva and Tchamitchian, 2018)
- prototyping workshops (e.g. Vereijken, 1997; Jeuffroy et al. 2022)

The DISCS method (Le Bellec et al. 2012)
Designing farming systems dealing with interconnections

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Farmers don’t just apply or use agricultural systems or techniques, but build and adapt them in their activity and creativity


Trajectories of practices change (Mawois et al. 2019)

The human aspects of farming systems (aesthetics, sense, values) (Darnhofer et al. 2012, Brédart et Stassart, 2017)
The design part in farmers’ activity: individual and collective

Individual design of (sub)systems

Collective experimentation and knowledge sharing supporting design activities

Breeding with the Simmental breed (Agri’novateurs, 645°)

Rapeseed under clover cover (Agri’novateurs, 645°)

Building - self-built tool by a farmer (Atelier Paysan)
The design part in farmers’ activity: iterative and long term process

**Ex:** a farmer introducing a leguminous cover crop to reduce the use of N fertilizers in a crop sequence based on wheat and corn.

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**Diagram:**

- **Long term:** a cropping system progressively refined

- **2009**
  - Vetch between wheat and maize

- **2010**
  - Vetch sown earlier
  - Vetch sown much earlier

- **2011**
  - Winter wheat

- **2012**
  - Vetch sown much earlier
  - Intercropping alfalfa in wheat

- **2013**
  - Winter wheat

- **2014**
  - Mixture (vetch, rye, faba bean)

- **2015**
  - Winter wheat

- **2016**
  - Vetch sown earlier

- **2017**
  - Winter wheat

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**Questions:**

- How to reduce fertilizer purchase with a legume cover crop?
- How to optimize legume development?
- Interest of diversifying legume species (pure crop or mixture)?

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**Short term:** each annual test nurtures the next one

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**Not enough** organic matter produced!

**Better but not enough yet!**

**Why not intercrop with wheat?**

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**Catalogna, 2018**

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**From Catalogna**
What implications for agronomists?

A role in design-support rather than only design \textit{(e.g. Le Gal 2011)}

- Which methods and tools to support farmers’ creativity and design processes?
  - From decision support tools to \textit{design support tools}
  - \textit{Tracking farmers’ innovations} acknowledging of farmers’ creativity and inspiration for other farmers
  - \textit{Combine methods} to intertwine time scales (events, follow up) and \textit{reach situated processes}
  
\hspace{3cm} \textbf{Ex.}: (Périnelle et al. 2022)

\begin{tikzpicture}[node distance=2cm]
  \node (innovation) [fill=green!30,rounded corners,draw] {on-farm innovation tracking};
  \node (prototyping) [fill=green!30,below of=innovation] {prototyping trials};
  \node (adaptation) [fill=green!30,below of=prototyping] {adaptation trials};
  \node (legume-based) [fill=blue!30,rounded corners,draw,above of=innovation,anchor=north] {legume-based locally tailored systems in Burkina Faso};

  \path (innovation) edge (prototyping)
  (prototyping) edge (adaptation)
  (adaptation) edge (legume-based)

  \draw[->] (innovation) -- ++(4,0) -- ++(0,-2)
  (prototyping) -- ++(4,0) -- ++(0,-2)
  (adaptation) -- ++(4,0) -- ++(0,-2)
  (legume-based) -- ++(4,0) -- ++(0,-2);

\end{tikzpicture}
What implications for agronomists?

A role in **design-support** rather than only design *(e.g. Le Gal 2011)*

- Which methods and tools to support farmers’ creativity and design processes?
  - From *decision support tools* to *design support tools*
  - *Tracking farmers’ innovations* → acknowledgement of farmers’ creativity and inspiration for other farmers
  - *Combine methods* to intertwine time scales (events, follow up) and *reach situated processes*  
    Ex.: *(Périnelle et al. 2022)*

- Which **scientific knowledge** to fuel these design processes?
  - *disruptive* knowledge to inspire farmers
  - knowledge about *what the design problem actually is*
  - Knowledge to *assess the impacts of changes* on farmers' design goals
What implications for agronomists?

A need to acculturate ourselves to design sciences?:

- mobilize proven methods and theories to support design events and processes in farmers’ activities

Agronomists’ practices:
- system experiments, analysis and modelling of decision systems

Applications rules, Technical Innovations

Farmers’ practices:
- Optimized systems of practices, local constraints and opportunities

Reasoned Empiricism, « physicists farmers »

System of practices, Combinations of decision rules

Co-design, farmers-designers, design-support tools, ...

(Jouve 2007, Salembier et al. 2018)
Distributed design or multiple design activities in interaction?
Farmers don’t design alone

• The farmers’ work systems are transverse to biological and technical, socio-economic and family subsystems (Chizallet et al. 2020)
  ✓ farmers design more than systems of practices

• Multiple actors interact with farmers’ design activities: advisors, citizens, consumers, local institutional actors, researchers, etc.
  ✓ distributed or collaborative design in open innovation infrastructures?

• Intertwined activities within territories
  ✓ Territorial design? coupled innovations? (equipment manufacturers, plant breeders, water providers, etc.)
The design part in farmers’ activity