

# Planning in uncertainty: vegetable producers adaptations to perturbations affecting production and demand

Author(s) [A. Graner; C. Lesur-Dumoulin; M-H. Jeuffroy, R. Le Velly, L. Hossard]

[axel.graner@inrae.fr](mailto:axel.graner@inrae.fr)

Institutions

UE Maraîchage



# Context

Fresh vegetable long value chains facing uncertainty

## • First middlemen

- value chain actors who buy production directly to farmers, and are involved in crop planning (Tordjman et al., 2005)
- “convert a production **dispersed and fluctuating** into a **concentrated and steady supply**” (Nozières-Petit 2014, p.125)

## ➤ Planned supply calendar (Capillon & Valceschini, 1998)

- Coordinated between farmers and middlemen

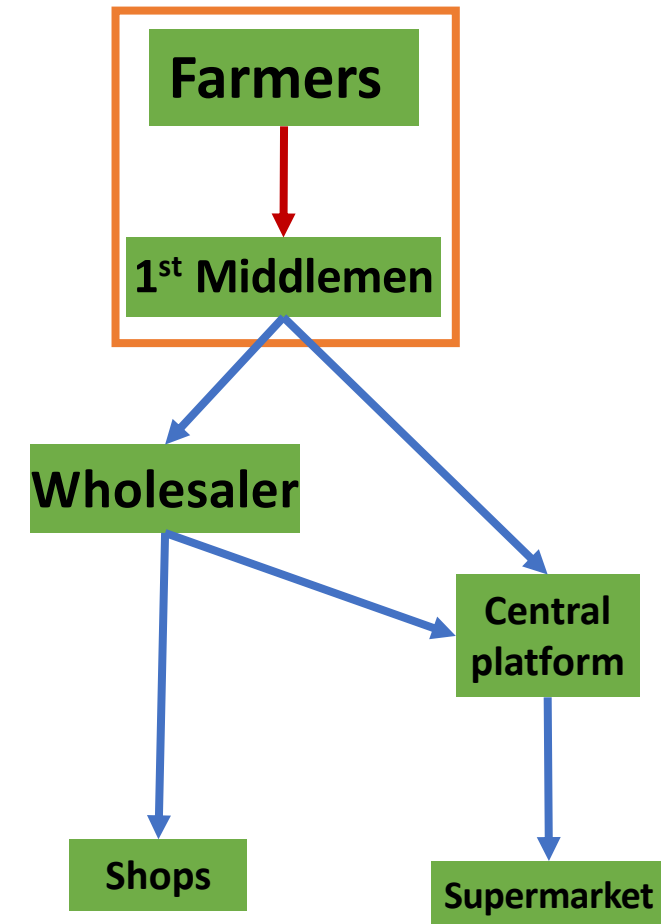
## ➤ But perturbations more frequent and intense

- Need to adapt ?



Perturbation =

“changes in environmental or socio-economic constraints which cannot be anticipated” (Urruty et al., 2016, p.2)



Non exhaustive  
(Adapted from Levet et Hutin 2019)

## Research question

- **What factors enable (or not) farmers to adapt their planned supply calendar to face perturbations?**

# Study site

Roussillon Plain: features and perturbations

## • Features

- One of main french vegetable production basin (Avelin, 2020)
- Historically oriented on long value chain
- Targets specifically winter and early produce

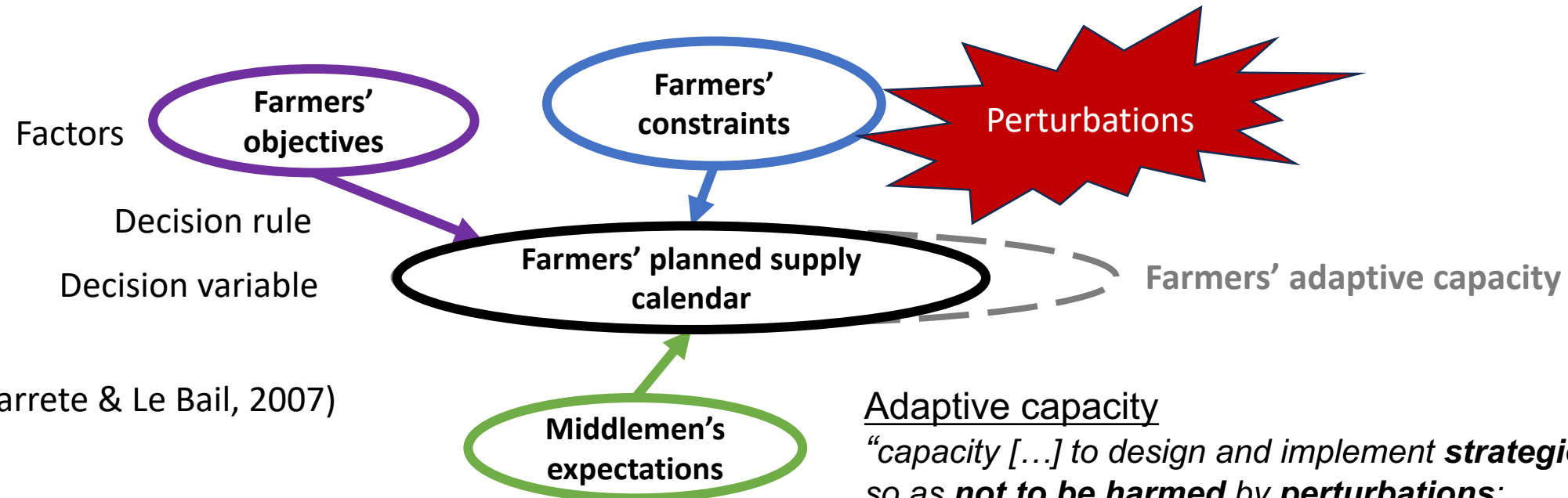
## • Perturbations faced:

- Impacting production
  - Climate events (e.g. **drought**)
  - Change in seasonal pattern
  - Pests
- Impacting demand
  - **Overproduction**
  - Organic sector crisis



# Conceptual framework

Farmers decision-making process and adaptations to perturbations



## Adaptive capacity

*“capacity [...] to design and implement **strategies** so as **not to be harmed by perturbations**; and to maintain system function, structure, identity, and feedback”*  
(Van der Lee et al., 2022, p.3).

# Material and Methods

- **Diagnosis of uses** (Cerf et al., 2012)
  - Diagnosis of crop planning
  - Semi-structured interviews
    - How farmers and middlemen plan production
    - Which perturbations are faced
    - How farmers adapt to perturbations
- **Snowball sampling method** (Parker et al., 2019)
  - Diversity of situations
  - Symetric viewpoints of farmers and middlemen
  - 18 farmers, and 6 middlemen
- **Analysis**
  - Identify adaptations in planned supply calendar
  - Compare answers and link it to factors influencing planned supply calendar
  - Deduce farmers adaptive capacity

Type of actor	Organic/ conventional	Size	Number of vegetable crops for long value chain
<b>Farmers</b>	Organic : 9	<5 ha : 8	≤3 crops : 7
	Conventional : 5	5-9ha : 4	5-6 crops : 6
	Mixed : 4	10-56 ha : 6	8 - 10 crops : 5
<b>Middlemen</b>	Organic : 3	5 farmers: 2	≤5 crops : 2
	Conventional : 1	5-15 farmers: 2	6-10 crops : 2
	Mixed : 2	30-40 farmers: 2	> 10 crops : 2

# Planned supply calendar

- 2 campaigns per year (Autumn-winter and spring-summer)

*The **amount** that you want to sell, **when** I can produce it and **what** I can produce (F10)*

Planned supply calendar N  
based on appraisal N-1

	Before seedlings ordering	After seedlings ordering
<b>Crops</b>	Possible	Impossible
<b>Volume</b>	Possible	Limited by planted area
<b>Period</b>	Possible	Limited by perishability

➤ Settled planning procedure

# Strategies implemented: change in period

## Example of overproduction

*By doing temporary products, on a specific period but not the whole campaign, it's russian roulette (F9)*

*Middlemen say that when you « open a line » of market, you have to hold it until the end (F1)*

Farmer	Crop	Nov	Dec	Jan	Feb	Mar
F1 (10 ha)	Brocoli (5ha)	X	X	X	X	X
F6 (5 ha)	Brocoli (0,8ha)			X	X	

**Over production**

*I didn't want to have broccoli in december [...] because everybody produce it in december (F6)*

- Strategies based on change in period
- Difference between farms size
  - Due to differences in middlemen's expectations



# Strategies implemented: change in crop, volume, and period

Example of drought

**Drought**

Plot type	Open air plots			Greenhouse plots	
	Decrease volume of a crop	Change period	Change location	Decrease volume of a crop	Change period
<b>Greenhouse farms (greenhouse area &gt;50%)</b>	F2, F4			<b>F12</b>	<b>F4, F12</b>
<b>Other farms</b>	F7, F10, F15, <b>F16</b> , F8, F13, F18	<b>F5</b>	<b>F5, F11</b>		<b>F16</b>

*I didn't cancel, I changed date. Because it would have been hard economically if I had not filled this greenhouse (F4)*

*We can't engage into plantation without knowing if we will be able to water it (F7)*

Crop choice : prioritize crops to maintain

- Already planted and trees
- Less risky
- Dedicated to outlets more profitable (e.g. short value chain)
- Productive crops (VS green manure)

6 farmers did not change their planned supply calendar (F14, F1, F6, F17, F19, F9)

- **Strategies differ between farms open air/greenhouse plots and water access**
  - Due to differences in farmers constraints and objectives

# Discussion and conclusion

- Farmers can adapt by changing their planned supply calendar (crop, volume, period)
  - Differences in adaptive capacity
    - Factors influencing adaptations (e.g. size, greenhouse/open air)
    - Differences between recurring (overproduction) and unprecedented (drought) perturbations
      - Importance of appraisal and past experience to change planned supply calendar
- Short and long term
  - Decrease volume on short-term: economically viable on long-term?
  - Reduce non-productive water use (e.g. green manure) on short-term -> impact on soil quality
- Is adaptation enough to face perturbations? -> transformability (Meuwissen et al., 2019)
  - Change feedbacks: share risk between farmers and middlemen (Scholten & Schilder, 2015)
    - e.g. middleman committing to refund bought seedlings if not harvested
  - Change identity: produce crops less water demanding
    - e.g. replace vegetable by wine

# References

- Avelin, C. (2020). *Les chiffres-clé de la filière Fruits & Légumes frais et transformés—2018*. France AgriMer.
- Capillon, A., & Valceschini, E. (1998). La coordination entre exploitations agricoles et entreprises agro-alimentaires. *Études et Recherches sur les Systèmes Agraires et le Développement*, 259-274.
- Cerf, M., Jeuffroy, M.-H., Prost, L., & Meynard, J.-M. (2012). Participatory design of agricultural decision support tools : Taking account of the use situations. *Agronomy for Sustainable Development*, 32(4), 4. <https://doi.org/10.1007/s13593-012-0091-z>
- de Raymond, A. B., Bonnaud, L., & Plessz, M. (2013). *Introduction : Les fruits et légumes dans tous leurs états. La variabilité, la périssabilité et la saisonnalité au cœur des pratiques sociales*.
- Lrevet, A.-L., & Hutin, C. (2019). *Le diagramme de la distribution des fruits et légumes en 2018 / Marketing channels of the fresh fruit and vegetable sector in 2018*.
- Meuwissen, M. P. M., Feindt, P. H., Garrido, A., Mathijs, E., Soriano, B., Urquhart, J., & Spiegel, A. (2022). *Resilient and Sustainable Farming Systems in Europe : Exploring Diversity and Pathways*. Cambridge University Press.
- Meuwissen, M. P. M., Feindt, P. H., Spiegel, A., Termeer, C. J. A. M., Mathijs, E., Mey, Y. de, Finger, R., Balman, A., Wauters, E., Urquhart, J., Vigani, M., Zawalińska, K., Herrera, H., Nicholas-Davies, P., Hansson, H., Paas, W., Slijper, T., Coopmans, I., Vroege, W., ... Reidsma, P. (2019). A framework to assess the resilience of farming systems. *Agricultural Systems*, 176, 102656. <https://doi.org/10.1016/j.agsy.2019.102656>
- Navarrete, M., & Le Bail, M. (2007). SALADPLAN : A model of the decision-making process in lettuce and endive cropping. *Agronomy for Sustainable Development*, 27(3), 209-221. <https://doi.org/10.1051/agro:2007009>
- Nozières-Petit, M.-O. (2014). *La commercialisation des produits, source de flexibilité pour les éleveurs?*
- Parker, C., Scott, S., & Geddes, A. (2019). Snowball Sampling. *SAGE Research Methods Foundations*. <http://methods.sagepub.com/foundations/snowball-sampling>
- Scholten, K., & Schilder, S. (2015). The role of collaboration in supply chain resilience. *Supply Chain Management: An International Journal*, 20(4), 471-484. <https://doi.org/10.1108/SCM-11-2014-0386>
- Tordjman, S., Navarrete, M., & Papy, F. (2005). Les formes de coordination technique entre une structure de première mise en marché et ses fournisseurs : Le cas de la salade en Roussillon. *Cahiers Agricultures*, 14(5), 5.
- Urruty, N., Tailliez-Lefebvre, D., & Huyghe, C. (2016). Stability, robustness, vulnerability and resilience of agricultural systems. A review. *Agronomy for Sustainable Development*, 36(1), 15. <https://doi.org/10.1007/s13593-015-0347-5>
- Van der Lee, J., Kangogo, D., Gülzari, Ş. Ö., Dentoni, D., Oosting, S., Bijman, J., & Klerkx, L. (2022). Theoretical positions and approaches to resilience assessment in farming systems. A review. *Agronomy for Sustainable Development*, 42(2), 27. <https://doi.org/10.1007/s13593-022-00755-x>

Thank you for your attention !

Questions