

PATAT'UP



Towards low-input potato production



Objective and Structure

- Study of new ways of producing potato to reduce the use of inputs (PPP, N)
- Combining levers to analyse high-performance technical itineraries in terms of reducing their environmental impact while maintaining quality production.



Robust varieties



Innovative cultural practices



Resilient cropping systems

November 2021
Start of the Project

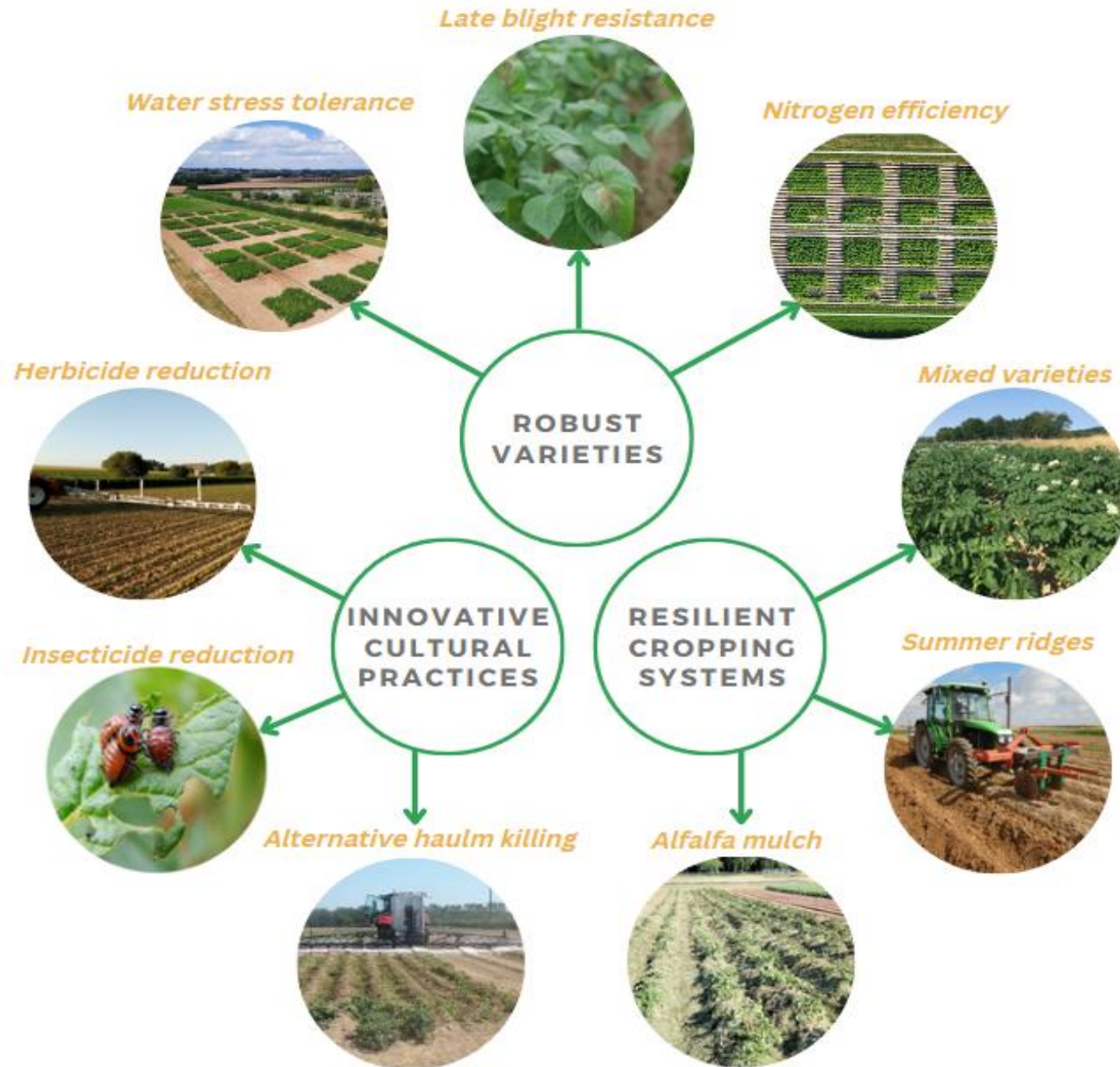
2022
First year of micro-trials

2023
Second year of micro-trials

2024
Large scale trial

December 2024
End of the project

Reinforcement and innovation



Late blight resistance

Objective : Is it possible to delay fungicide applications depending on the tolerance of varieties to mildew?

Protocol 2023 :

4 Varieties : Fontane (2) < Agria (4) < Louisa (7) < Acoustic (8) (resistance level from MILVAR's trials, CRA-W)

4 modalities of fungicide applications

Modality 1
Untreated

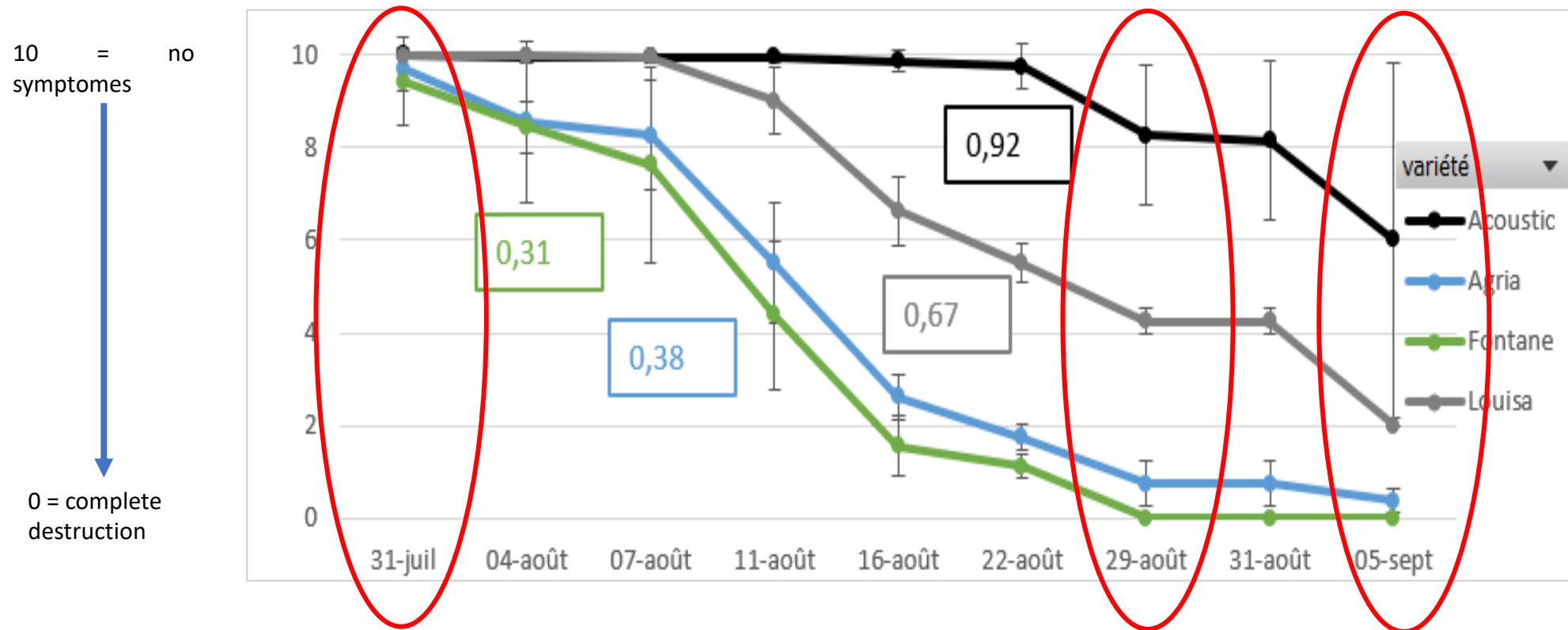
Modality 2
Full protection

Modality 3
2 delayed
applications

Modality 4
4 delayed
applications

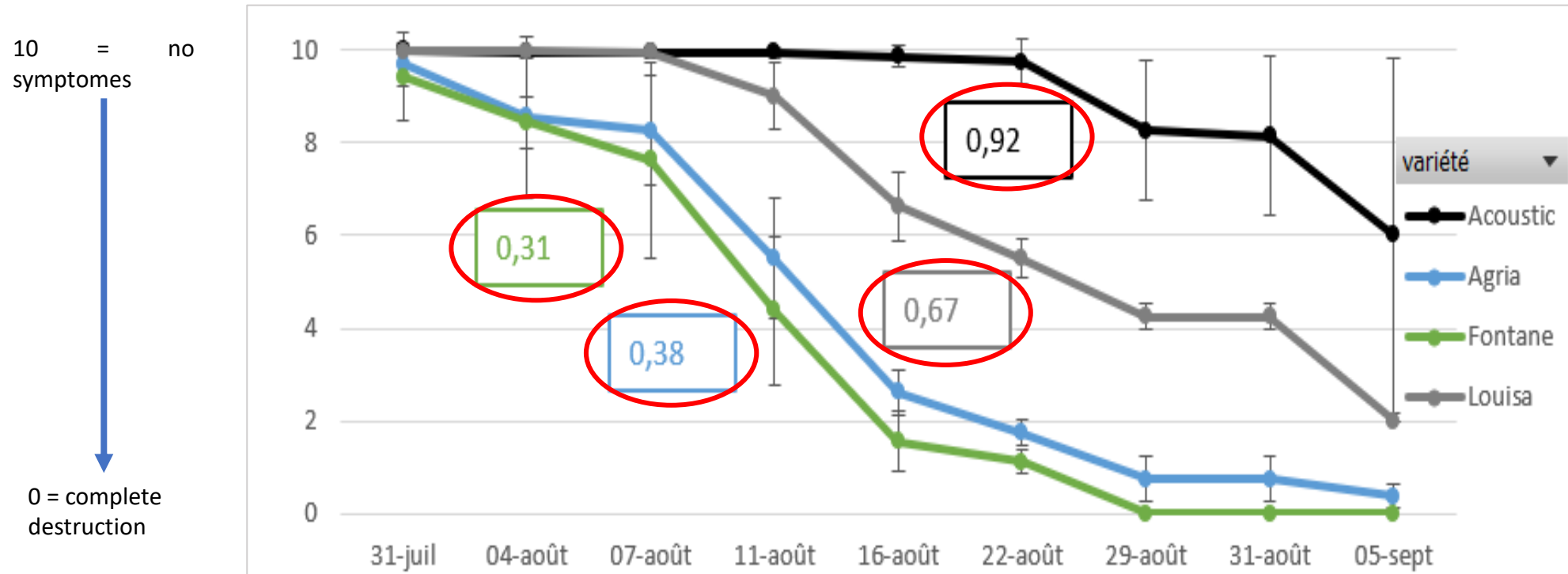


EVOLUTION OF MILDEW RATINGS FOR MODALITY 1 WITHOUT PROTECTION



- End of July, the first varieties to show symptoms of mildew were Fontane, Agria and Louisa.
- End of August, complete destruction of the foliage was observed for Fontane and almost complete destruction for Agria (rating of 0.75). Louisa had a rating of 4.25, with around 50% of foliage affected. Acoustic showed the first symptoms of mildew at the beginning of August, with no progress until the end of August.
- Beginning of September, Acoustic had a rating of 6 (corresponding to less than 10% of foliage destroyed), Louisa was rated at 2, and Agria at a value very close to 0.

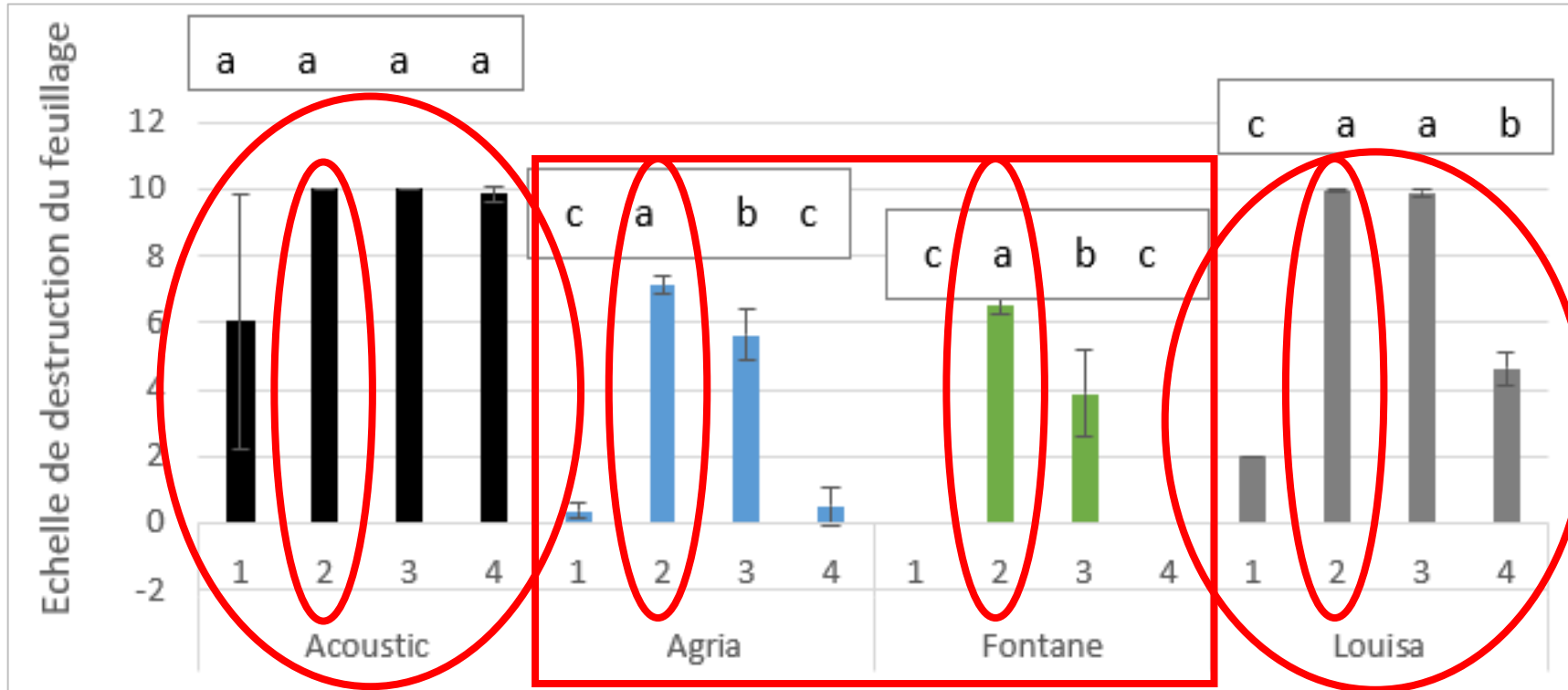
EVOLUTION OF MILDEW RATINGS FOR MODALITY 1 WITHOUT PROTECTION



The RAUDPC shows that Fontane and Agria have almost similar infection severity (0.31 and 0.38 respectively). Louisa shows an above-average value of 0.5, and Acoustic has a value of 0.92, very close to 1, indicating good resistance to leaf blight.

FOLIAGE MILDEW SYMPTOMS BY MODALITY AT 05/09/23

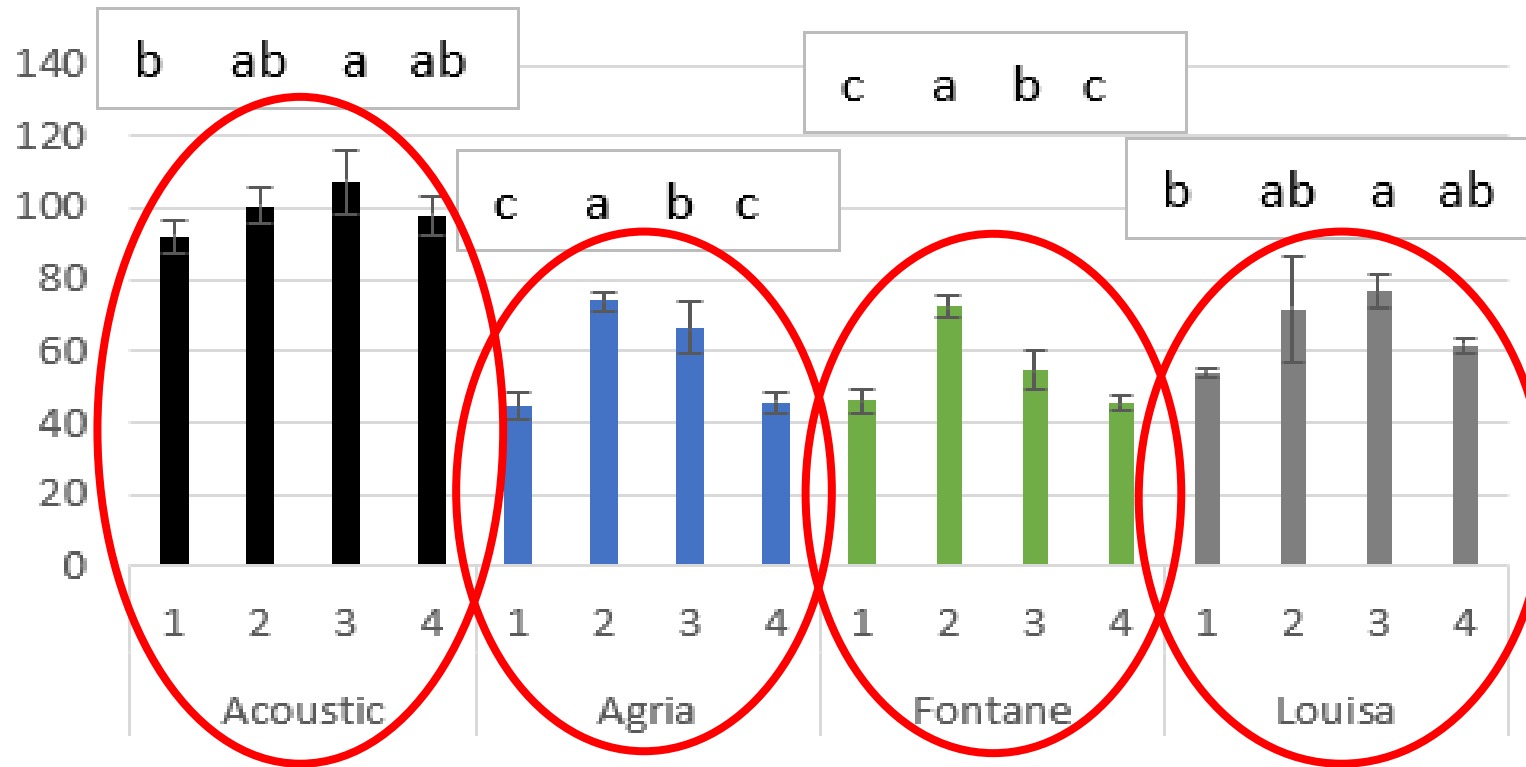
- Modality 1
Untreated
- Modality 2
Full protection
- Modality 3
2 delayed applications
- Modality 4
4 delayed applications



- Strong mildew pressure increased by inoculum strips
- Difficult positioning of plant protection products due to short optimal spraying windows
- No effect of treatment modality on mildew ratings for **Acoustic** variety
- A delay of 4 treatments induces a rather severe infection (<5) for the **Louisa** variety
- Effect of treatment modality on mildew rating for the 2 most sensitive varieties Fontane and Agria

EFFECTS OF TREATMENT METHODS ON YIELD +35mm

Modality 1 Untreated
Modality 2 Full protection
Modality 3 2 delayed applications
Modality 4 4 delayed applications



- Delay of treatment do not lead to a significative reduction of yield for **Acoustic or Louisa**
- For the most sensitive varieties, **Fontane and Agria**, the modalities lead to a yield reduction

Nitrogen Efficiency

Objective : Evaluate nitrogen use parameters of potato varieties

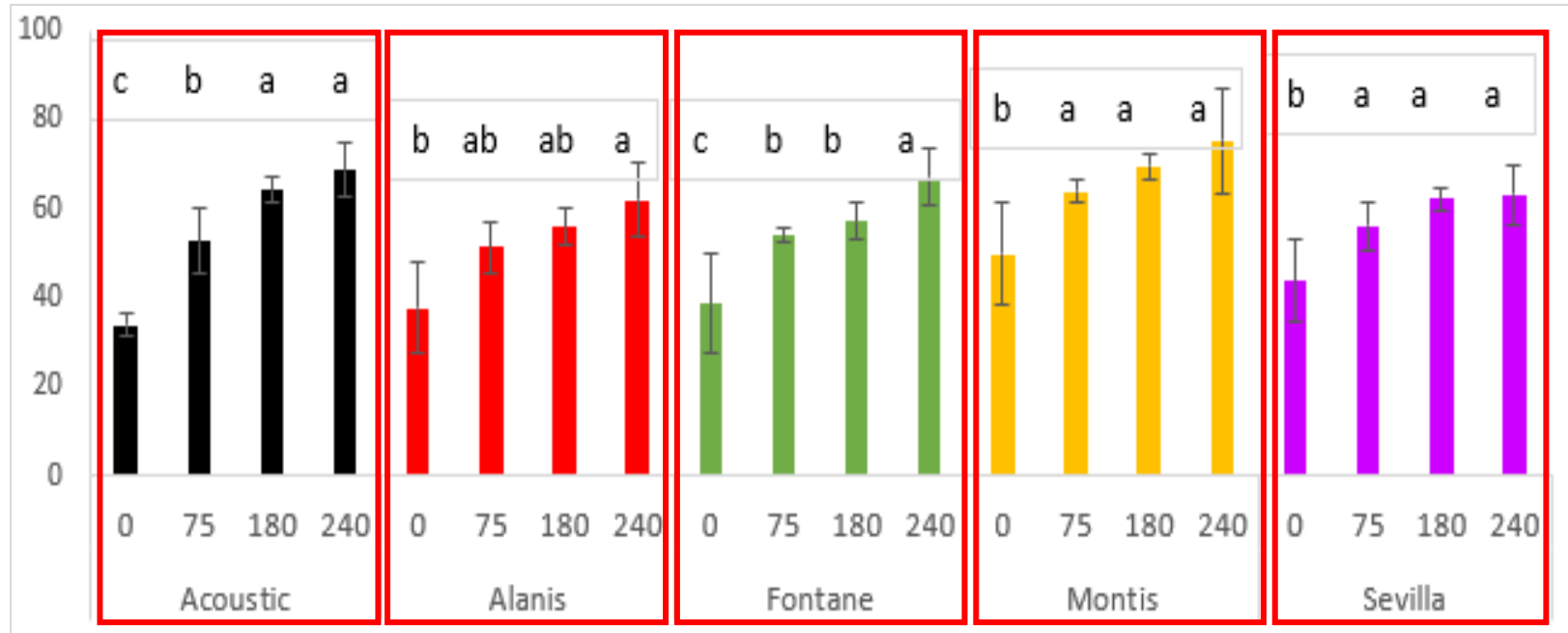
Protocol 2023 :

5 Varieties : Fontane, Sevilla, Alanis, Acoustic, Montis

4 levels of fertilization : 0 – 75 – 180 – 240 kg N/ha



EFFECT OF NITROGEN DOSE ON YIELD +35 mm FOR ALL 5 VARIETIES



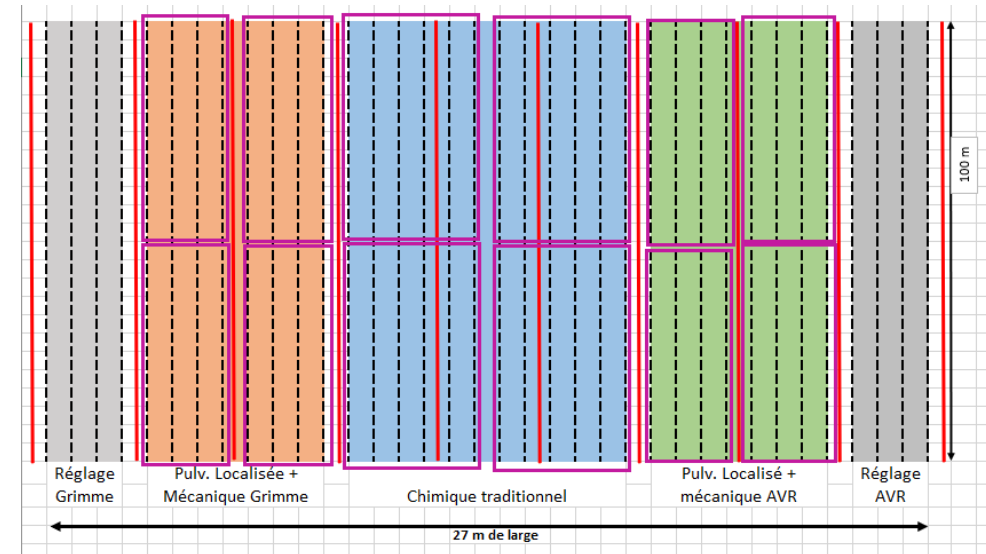
- Yields of Montis and Sevilla increase when comparing the 3 levels of fertilization with the control modality without nitrogen application. However, for the latter two varieties, there was no significant difference in yield between 75, 180 and 240 kg N/ha.
- Acoustic shows significant differences between the 75 kg/ha dose and the 2 higher doses (180 and 240 kg/ha).
- Fontane shows differences between 0 kg N/ha, the two intermediate doses and 240 kg/ha.
- Alanis discriminates yields only between the two contrasting levels (0 and 240 kg N/ha).

Reduction of herbicides

Objective: Reduce the use of herbicides by a combination of spraying the top of the ridge and mechanically working the sides (scraping in practice).

Modalities 2023:

- Full chemical weeding
- Localized chemical weeding + mechanical weeding with a Grimme weeder-burrower
- Localized chemical weeding + mechanical weeding with an AVR weeder-burrower



Alternative Haulm Killing

Objective: Evaluate the effectiveness of alternative weeding methods

7 Modalities in 2023:

1. Electric haulm killing Nufarm (15/09)



2. Thermal haulm killing (19/09)



3. Haulm puller Kloppenburg (15/09)



4. Haulm Puller Vegniek (15/09)



5. Crushing (14/09)

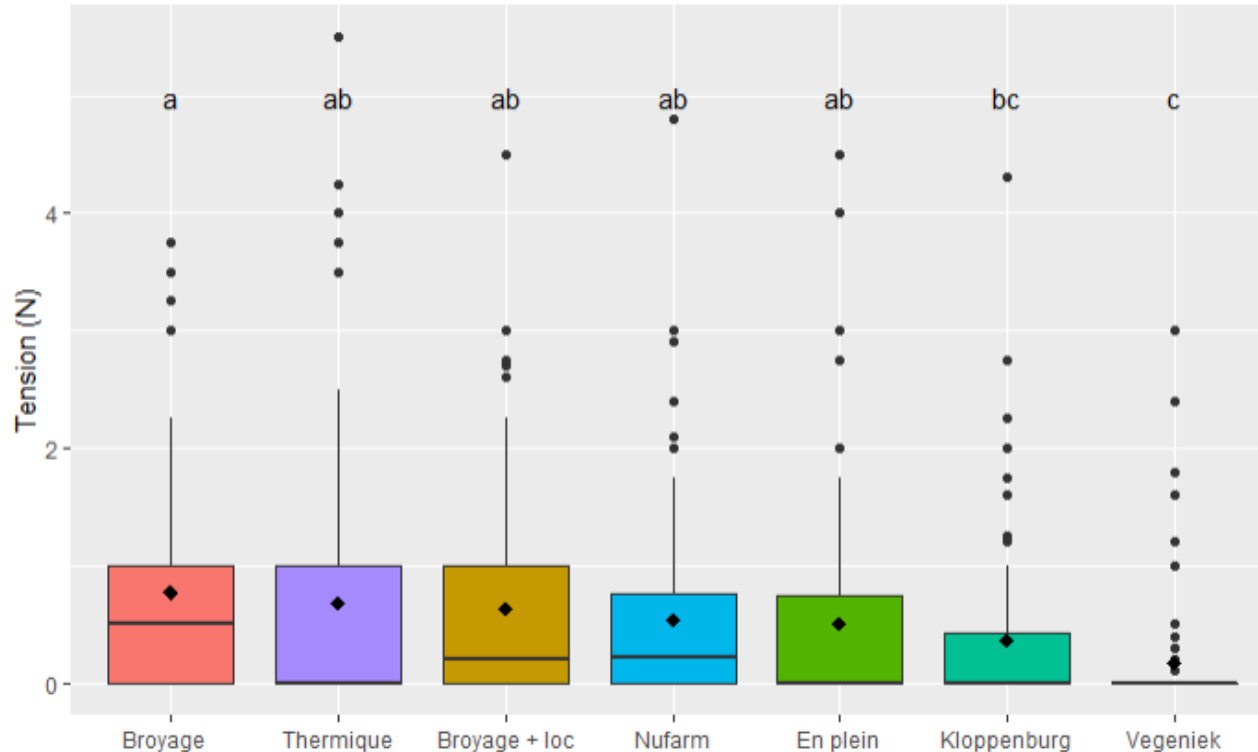


6. Chemical (0,8 L/ha Gozai + 0,5 L/ha Ranman) (15/09)

7. Crushing + localized spreading on the top of the ridge (14 and 15/09)

DYNAMOMETER TEST

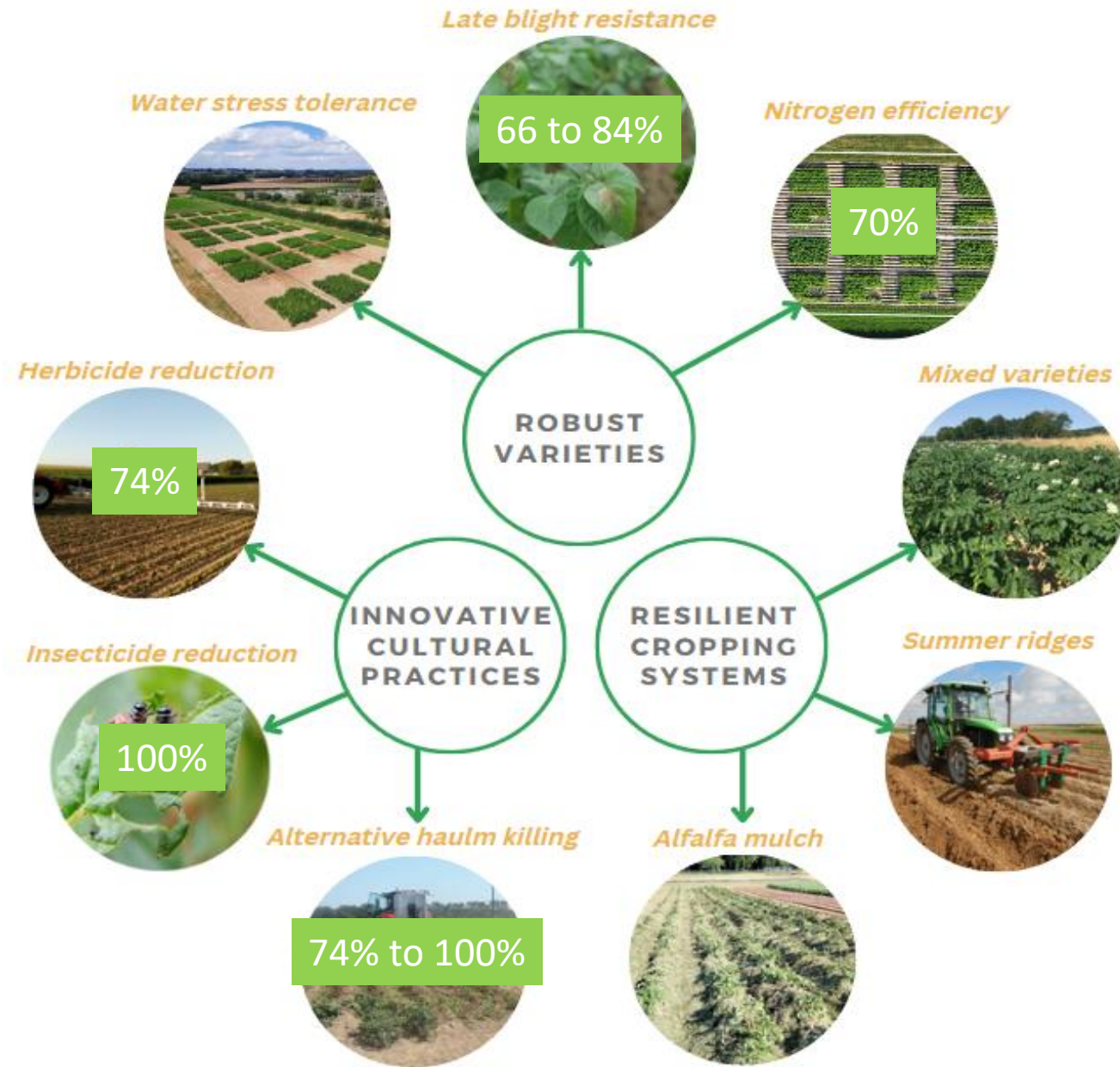
The effectiveness of the different methods was assessed by studying the tension required to separate the tops from the tubers.



Modalities with identical letters have statistically equivalent means at the 5% threshold according to the SNK test.

- Very low tension in 2023.
- Lowest tension for haulm puller that can be explained by the fact the haulm puller operates by already pulling the haulm from the tubers, which explains the almost zero tension in the dynamometer test.
- The higher tension in the crushing mode can be explained by the fact that the crusher does not fully destroy the stems; a few centimeters remain visible, without any destruction of the cells.

HAVE WE REDUCED INPUTS?



2024 – Large scale trial

3 varieties : Fontane, Montis, Alanis

	Levers	Conventional itinerary	Intermediate low input itinerary	Extreme low input itinerary
Robust varieties	Fertilization	100% N for Fontane	70% N of Fontane's dose	50% N of Fontane's dose
	Late blight protection	Following DST	Treatment postponed until the Nth generation (to be defined according to the season's mildew pressure).	Treatment postponed until the Nth generation (to be defined according to the season's mildew pressure).
Innovative cultural practices	Reduction of herbicides	Full chemical spreading	Mechanical + chemical weeding	Mechanical + chemical weeding
	Reduction of insecticides	Full chemical spreading	Mechanical monitoring	Mechanical monitoring
	Alternative haulm killing	Full chemical spreading	Crushing + chemical spreading	Crushing + Haulm puller

Thank you for your attention!

