



6<sup>th</sup> International Symposium for  
Farming Systems Design



# Current on-farm glyphosate uses and alternative practices in France

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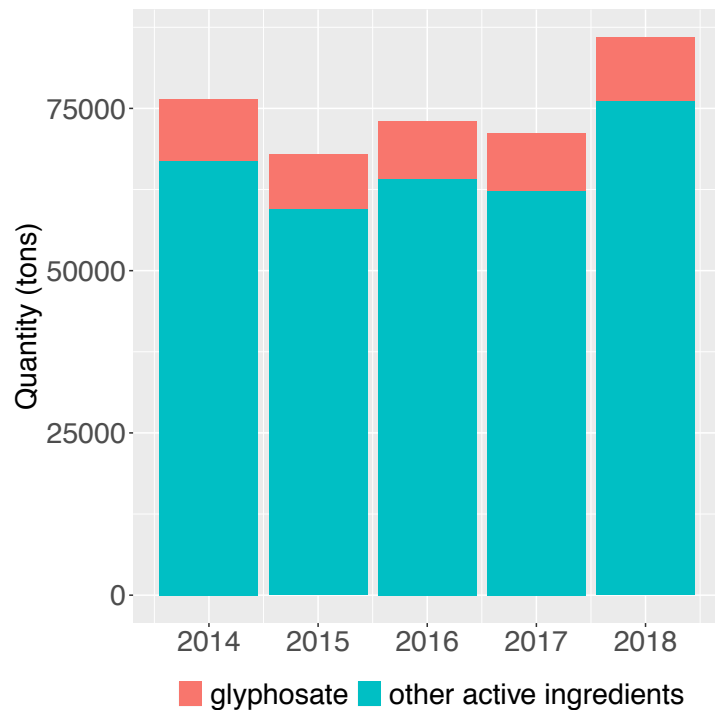


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## Introduction

# Glyphosate: a major active ingredient in cropping systems... concerned by public policies

Pesticides sales in France



First Active Ingredient in terms of quantity sold in France : 9000-10000 tons/year

In 2017...

- Glyphosate re-evaluation by the European Commission
- Demand from the French President to quit glyphosate by 2020

Aims of this study :

→ Characterizing current uses of glyphosate and identifying existing alternatives in arable crops



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Material

## Analysis of public data about cropping practices

Study based on data from the French Ministry of Agriculture

On-farm survey carried-out every 2-3 years → 2011, 2014, 2017

Arable crops → 20 000 fields

(wheat, barley, triticale, oilseed rape, sunflower, pea, corn, sugar beat, or potatoes)

For each field, description of all technical operations over the year

→ e.g. tillage, fertilization, pest management, irrigation

Additional information about 5 preceding years:

→ e.g. crop sequence, plowing

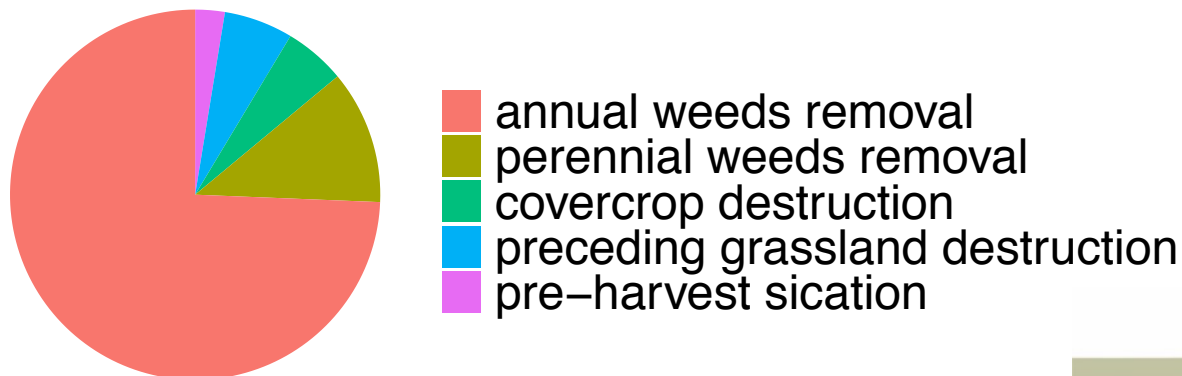


## Weed removal in fallow-period: the dominant use in arable cropping systems

Only **15%** of surfaces grown with arable crops receive glyphosate  
Arable cropping systems ⇔ **First contributor** to glyphosate consumption

(representing 65% of agricultural land use in France)

Glyphosate in arable cropping systems ⇔ mainly used to remove **weeds in fallow-period** (> 80%)

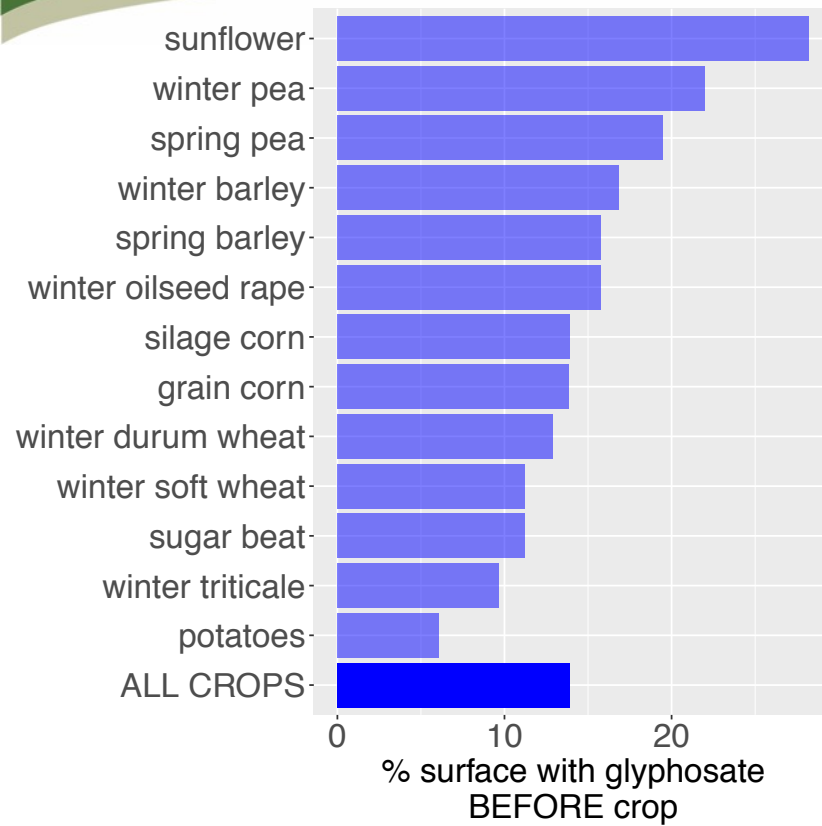


*Note to remember: GM crop cultivation is not permitted in France*

*→ No use of glyphosate for weeding during crop cycle*



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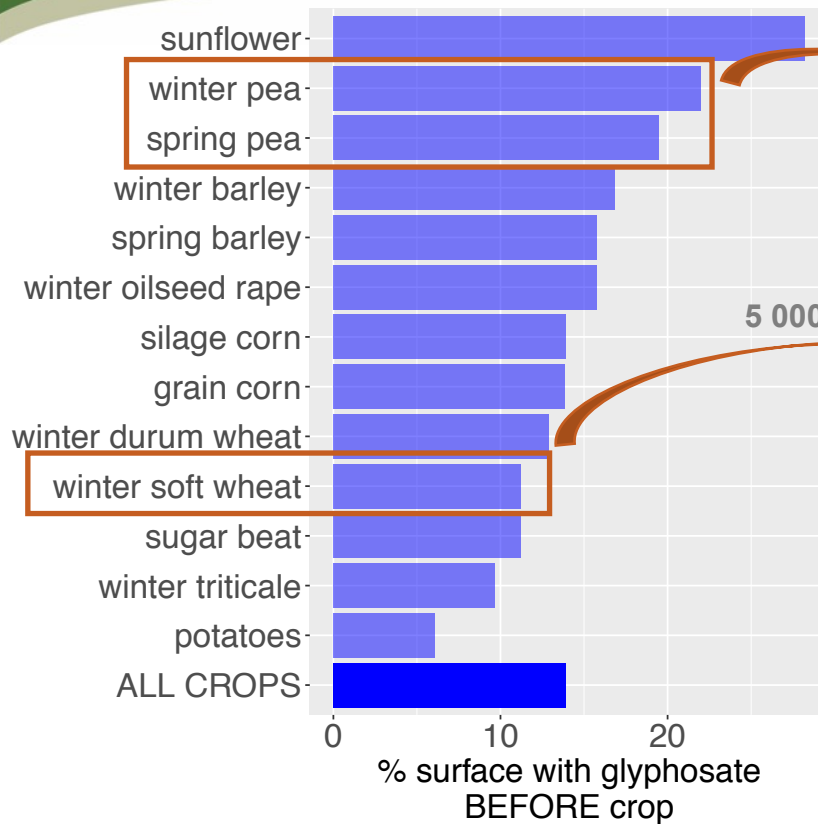


## Results

### Reliance to glyphosate varies among crops

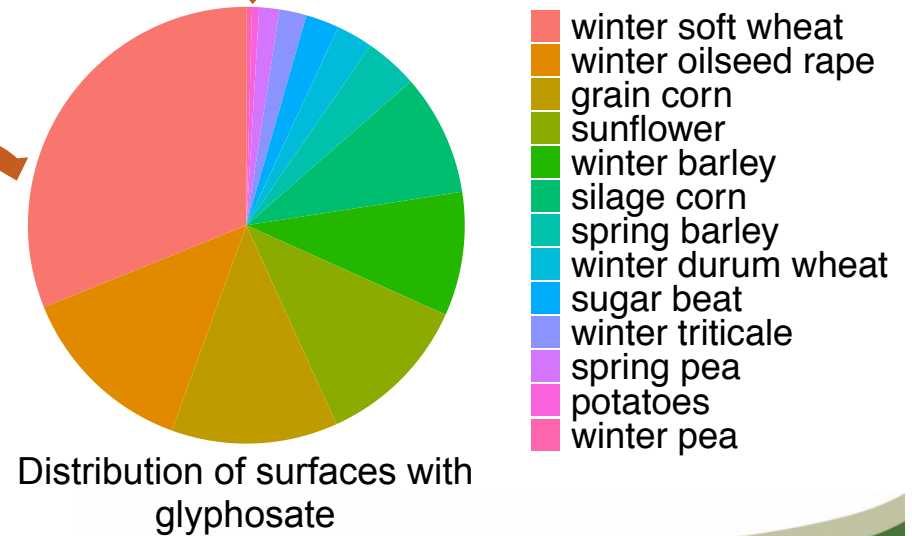


...but crops with the largest acreages are more contributive to glyphosate consumption



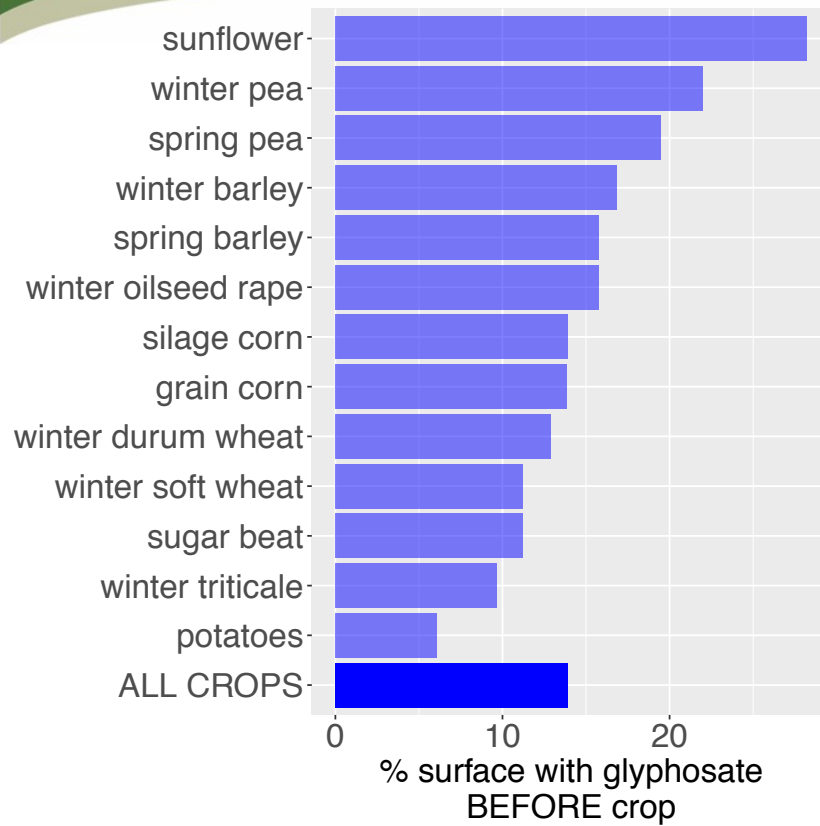
150 000 ha

5 000 000 ha



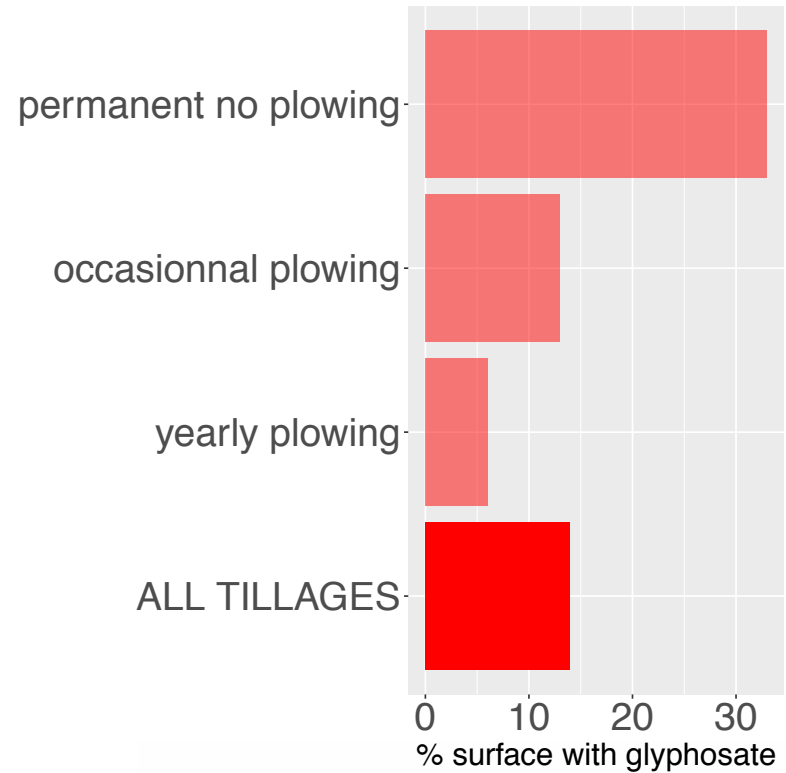


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## Results

### Reliance to glyphosate also depends on tillage





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Method

**One case-study: weeds management in  
fallow-period before winter wheat, without  
plowing**

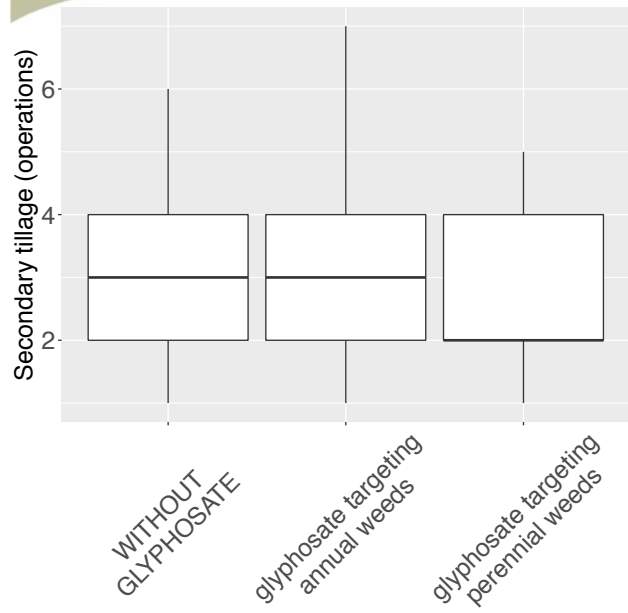
**We compared fields with / without glyphosate on several  
variables:**

- **Fallow-period Duration**
- **Time between last tillage and wheat sowing**
- **Number of secondary tillage operations**
- **Mechanical weeding**
- **Other herbicides frequency index**
- **Yield**
- **Crop rotation / pre-crop**
- **Farm size / specialization**





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## Results

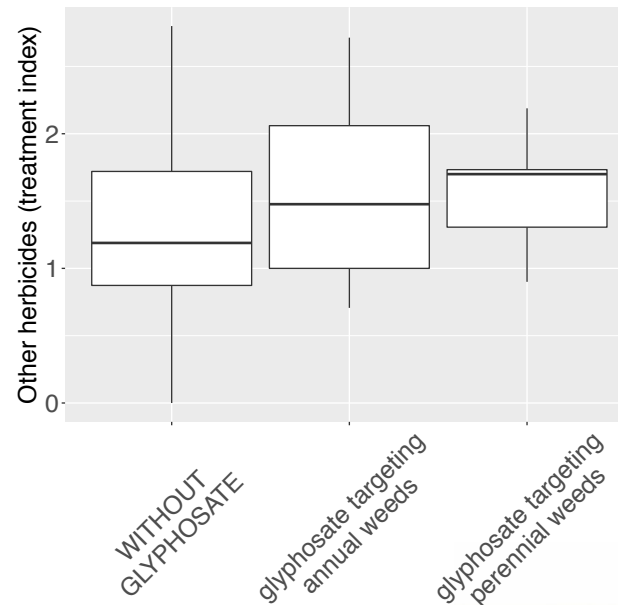
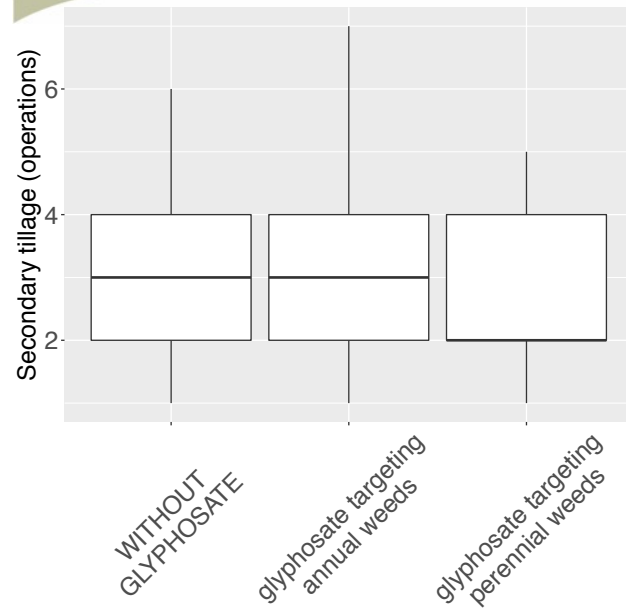
**Glyphosate-free fields do not rely more on tillage**



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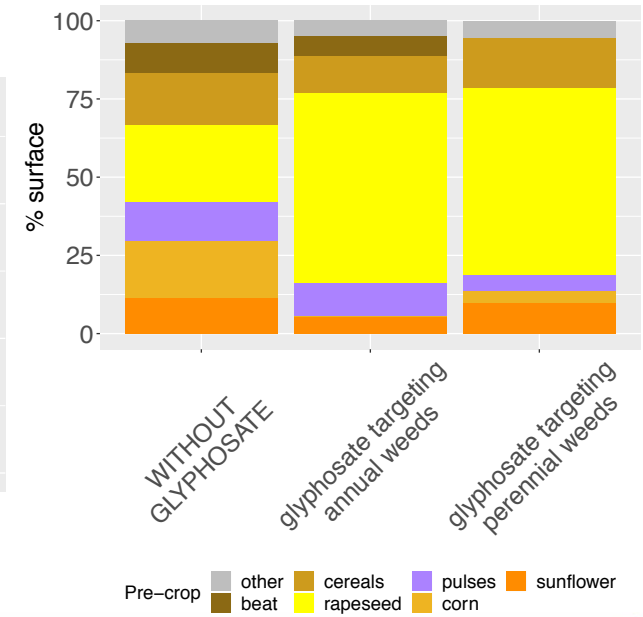
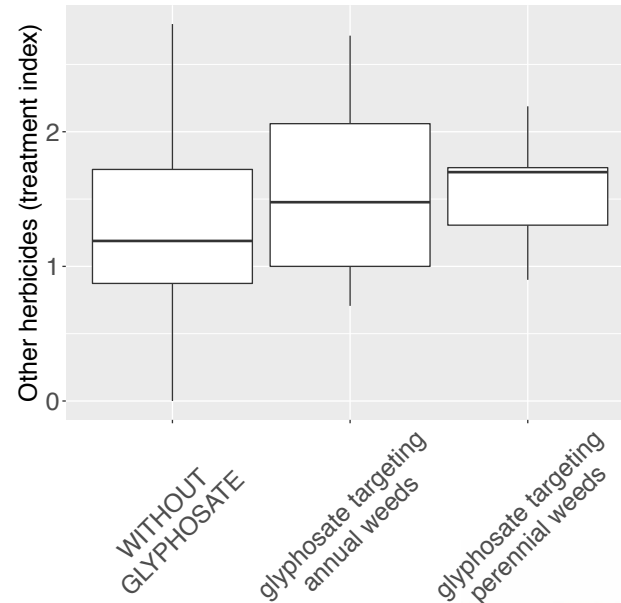
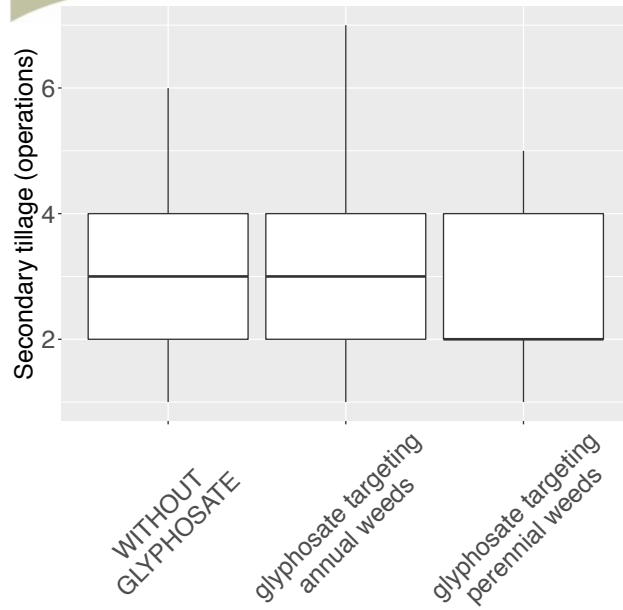
## Results

### Reliance to glyphosate is associated to overall reliance to herbicides





## Oilseed rape is the dominant wheat pre-crop on fields receiving glyphosate

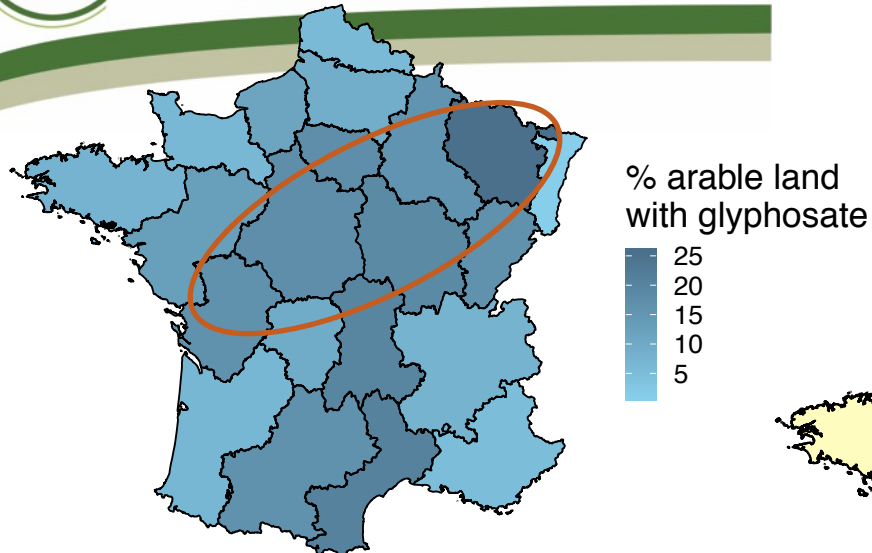




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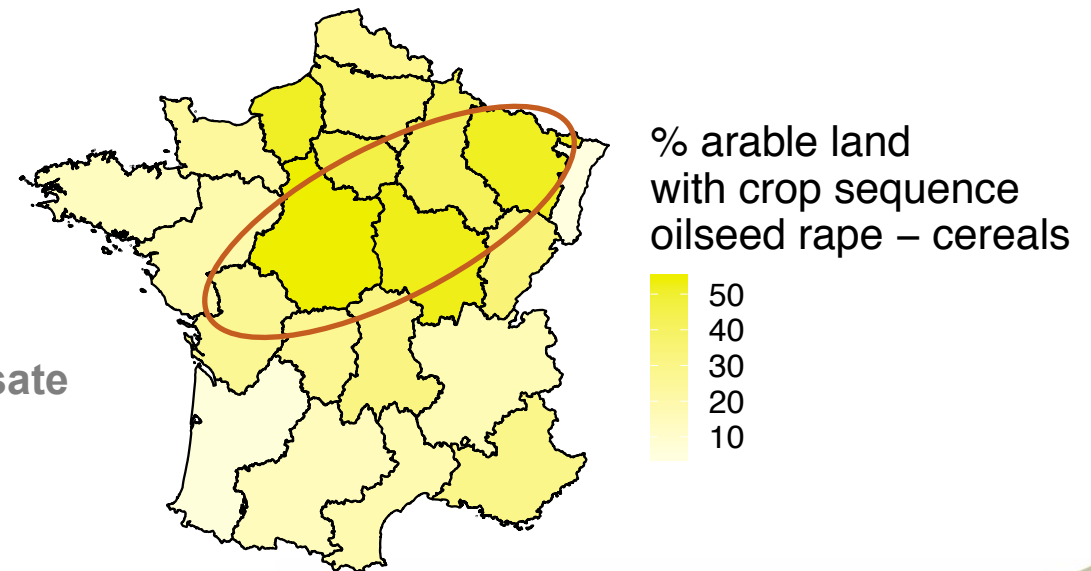
## Discussion

### Reliance to glyphosate is consistent with characteristics of cropping systems across regions



Regions with high reliance to glyphosate are characterized by:

- Poorly diversified crop rotations
- Reduced tillage
- Large farm size





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## Conclusion

- In arable cropping systems, glyphosate is mainly used to remove weeds in fallow period, especially when plowing do not contribute to weed management
- It does not allow to reduce reliance to other herbicides, and other herbicides cannot be substituted to glyphosate
- Quitting glyphosate implies redesigning cropping systems, and fostering crop diversification



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# Thank you for your attention

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## Acknowledgment:

We also would like to thank the French Ministry of agriculture for carrying out the “Pratiques culturelles” survey and authorizing access to the data.