



From smallholder to Intensive Farming: Testing the CARAH Model for onset of Potato Late Blight epidemic in Galicia

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Introduction

- Two contrasting production systems coexist in Galicia:
 - **Smallholder farming:** fragmented and heterogeneous (<1 ha)
 - **Intensive farming:** larger and more homogeneous (4-9 ha)
- Potato late blight is present every crop season in both systems.
- However, smallholder farming systems are less interesting to new technology management
 - The **late blight climatic models** (and DSS) are widely used in intensive farming, but

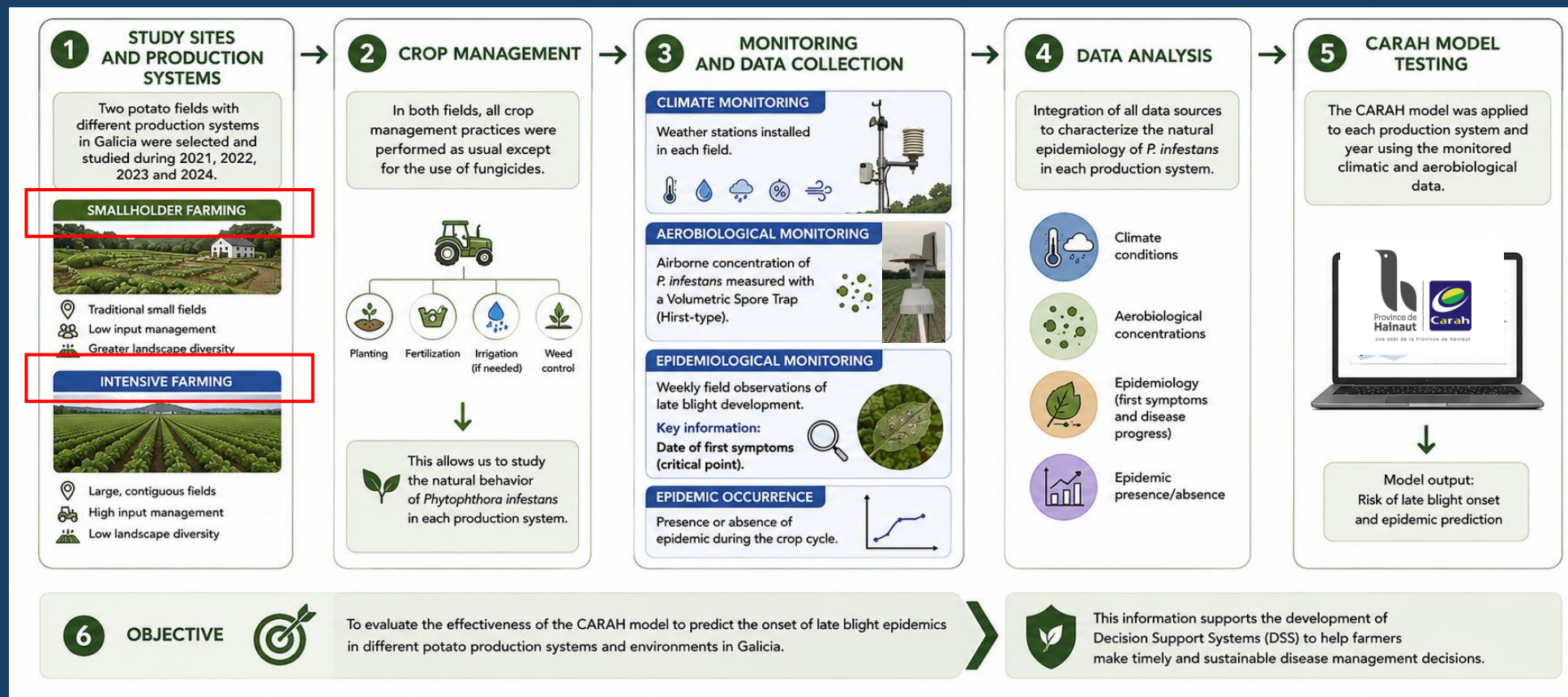
How is the performance in smallholder systems?

Goal: estudy epidemiology of late blight in both farming systems in Galicia and see how CARAH model can predict outbreaks of this disease





Methodology





Methodology

Intensive farming



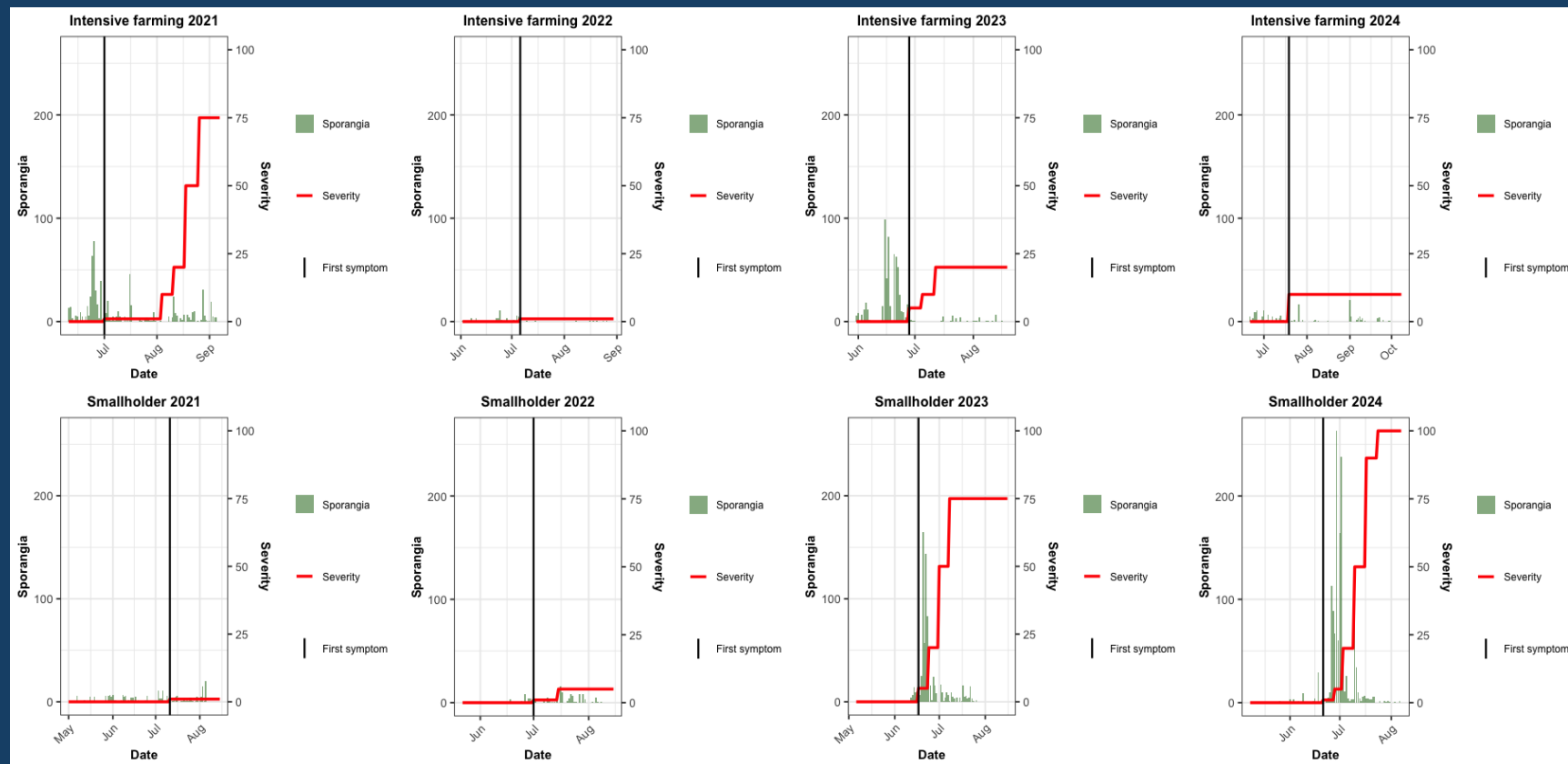
Smallholder farming





Results: late blight epidemiological characterization per crop season

Intensive farming



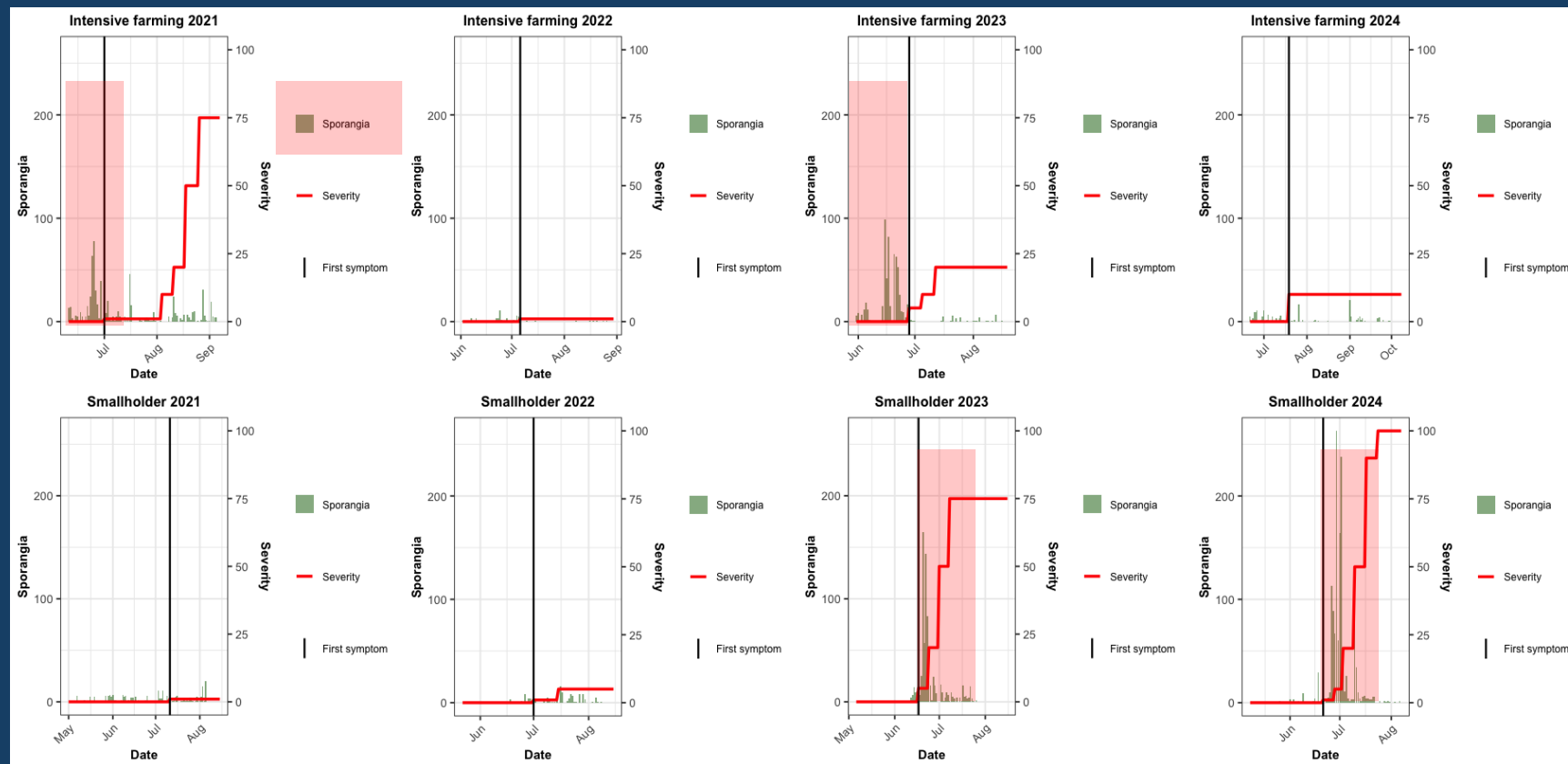
smallholder



Results: late blight epidemiological characterization per crop season

Intensive farming

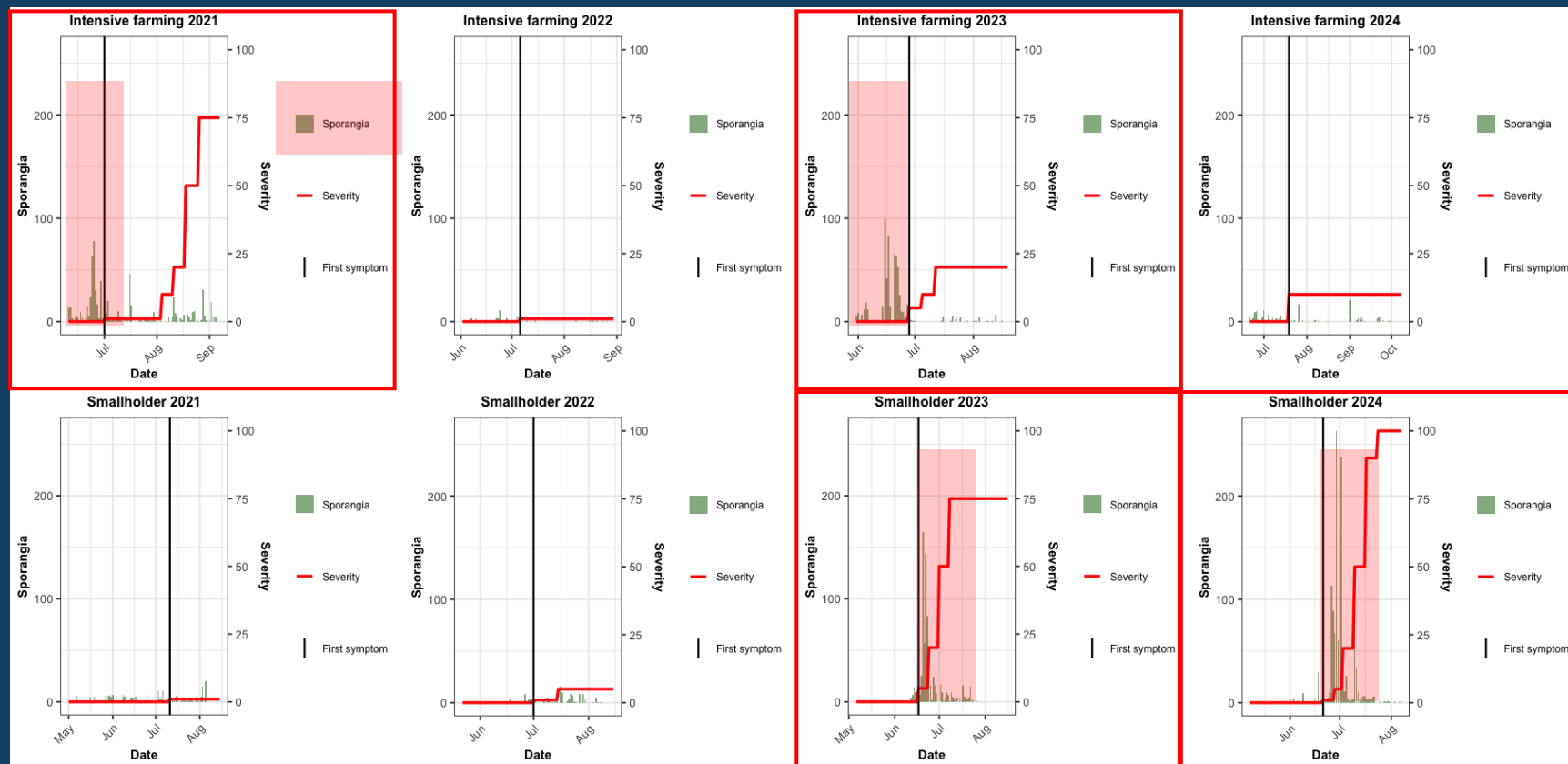
smallholder





Results: late blight epidemiological characterization per crop season

Intensive farming



smallholder

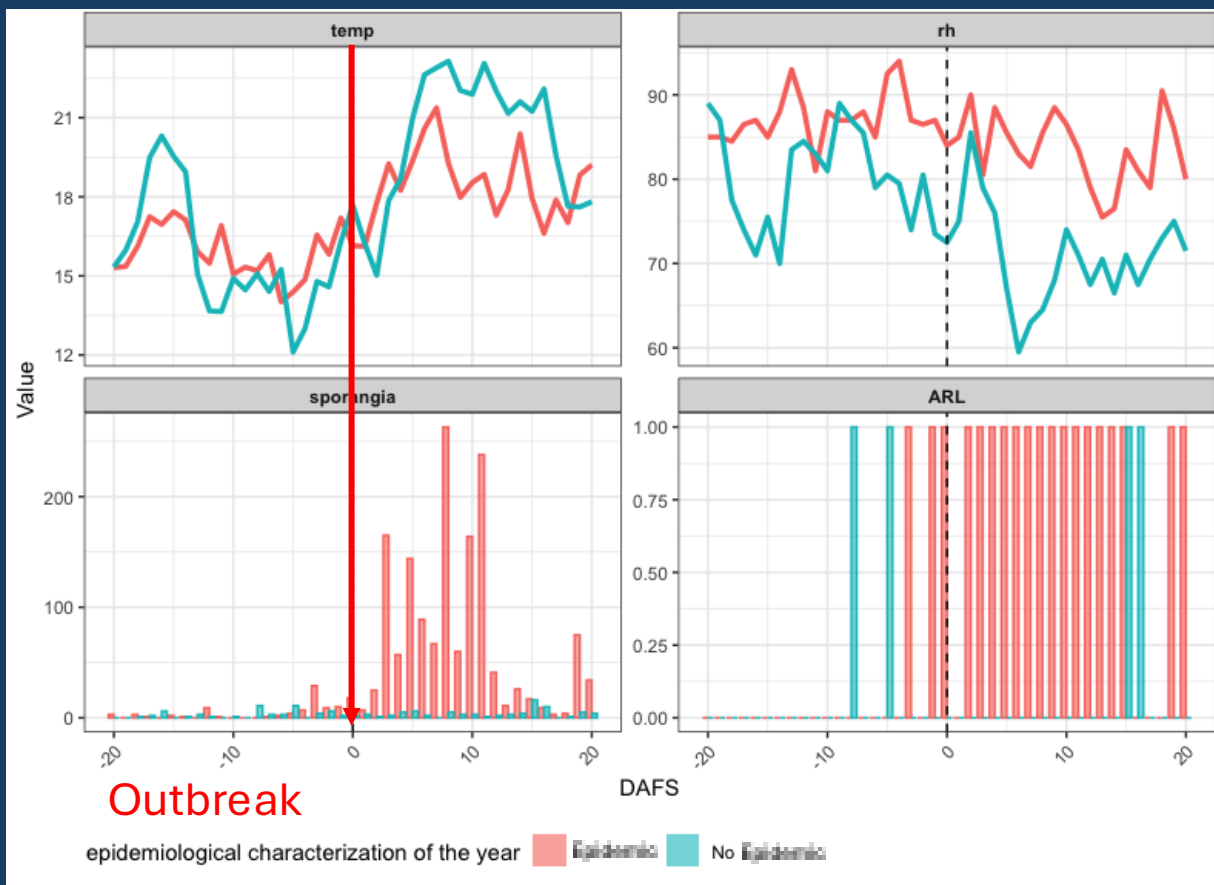
Epidemic (>20% severity)



Results: late blight epidemiological characterization per crop season

Smallholder

Intensive farming





Results: late blight epidemiological characterization per crop season

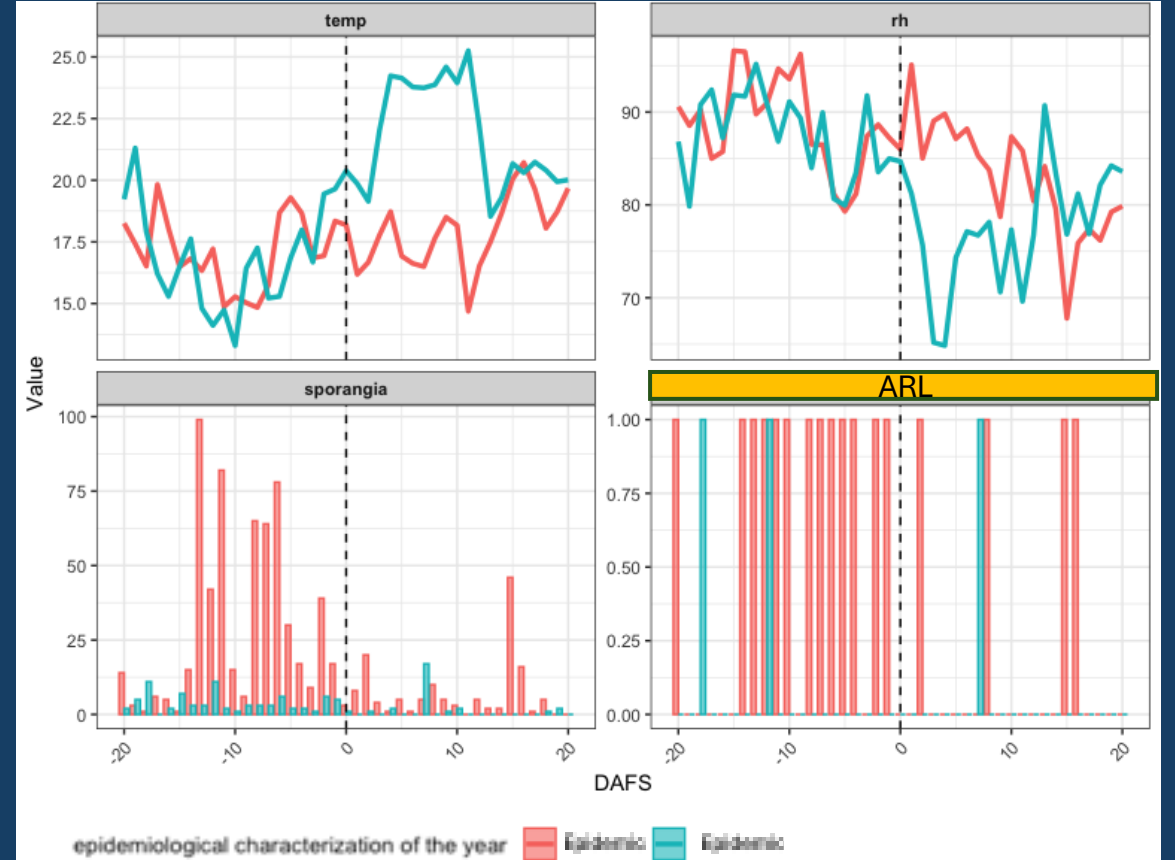
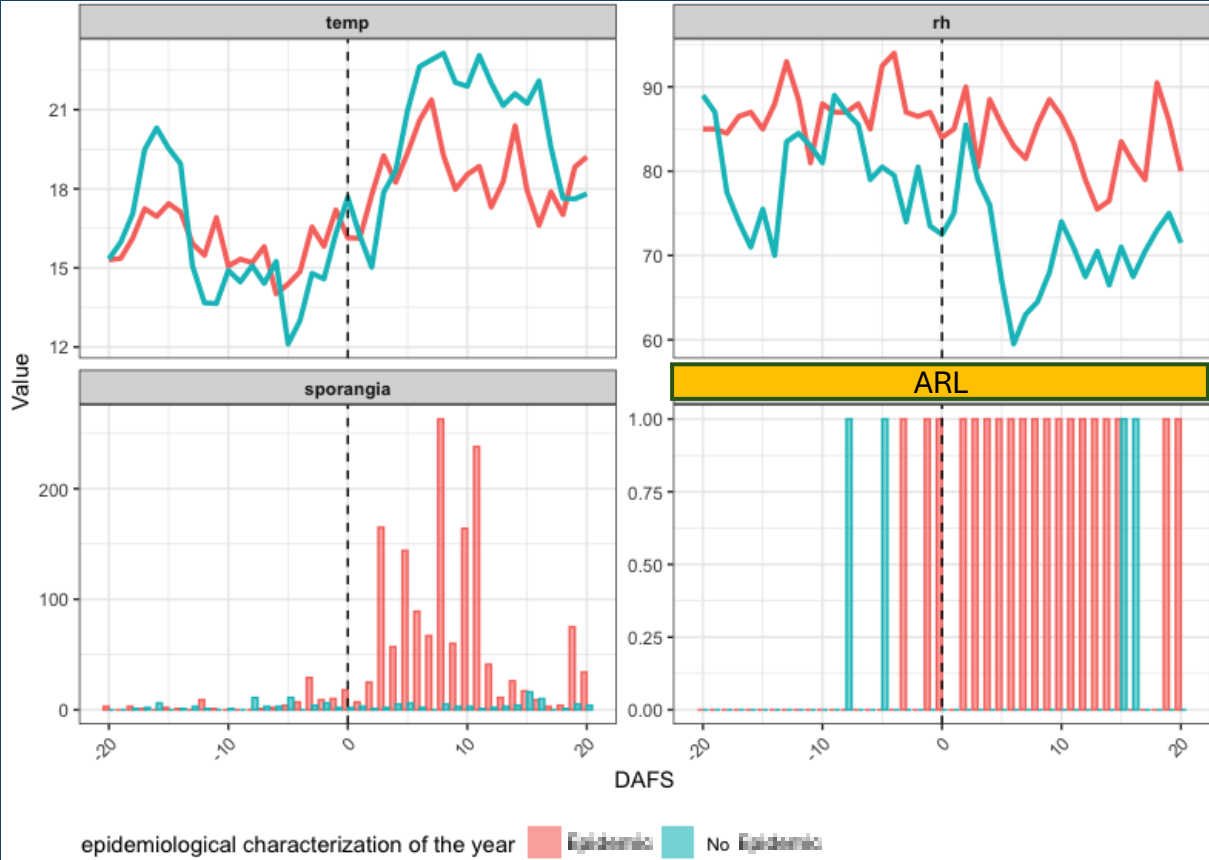




Results: late blight epidemiological characterization per crop season

Smallholder

Intensive farming



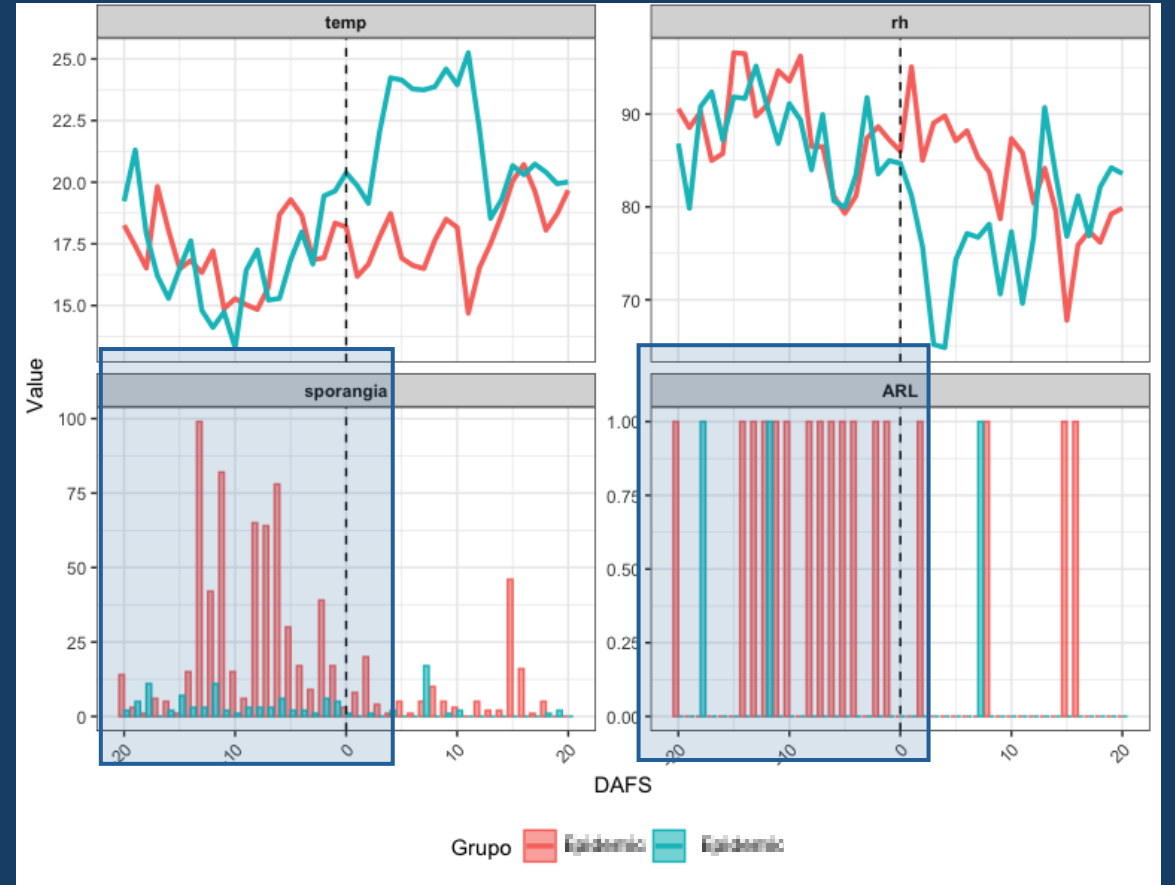
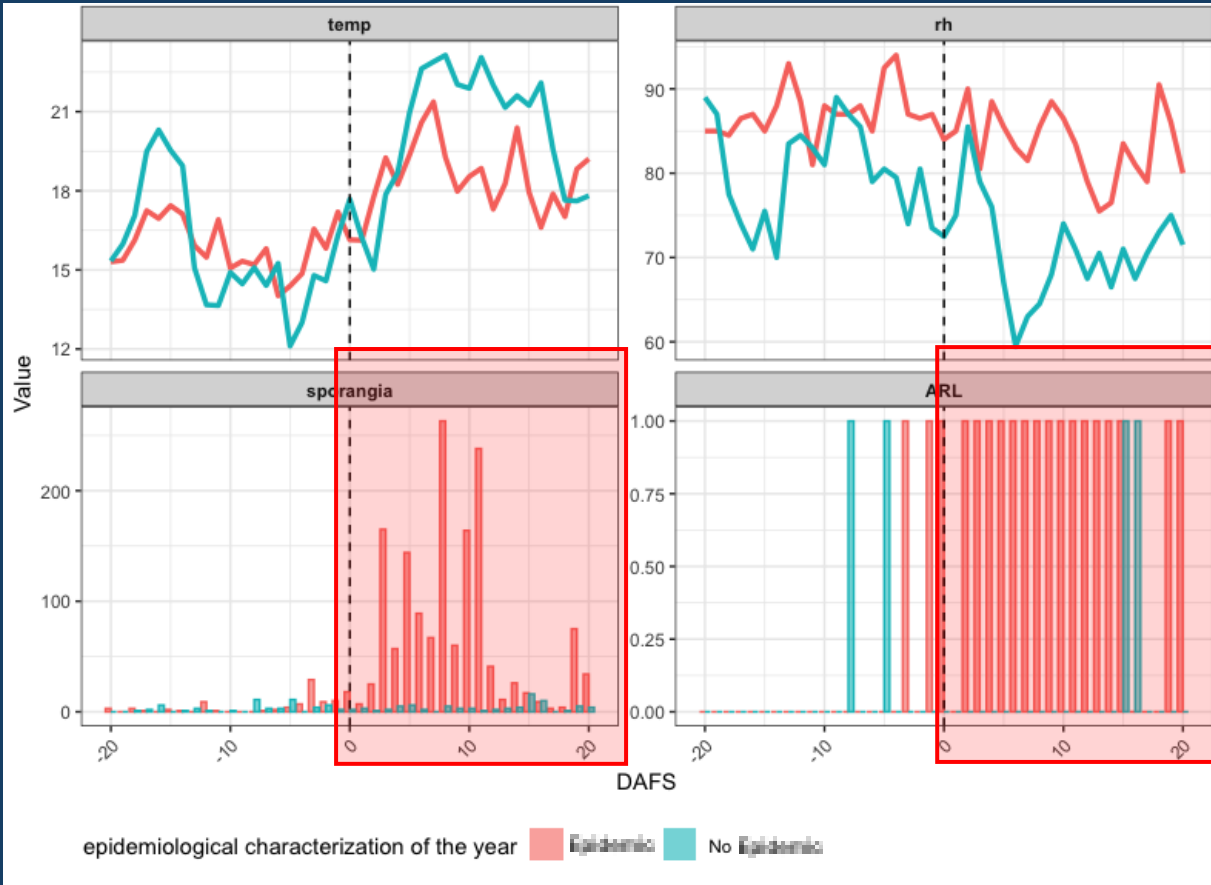
ARL= aerobiological risk level (>10 sporangia/day)



Results: late blight epidemiological characterization per crop season

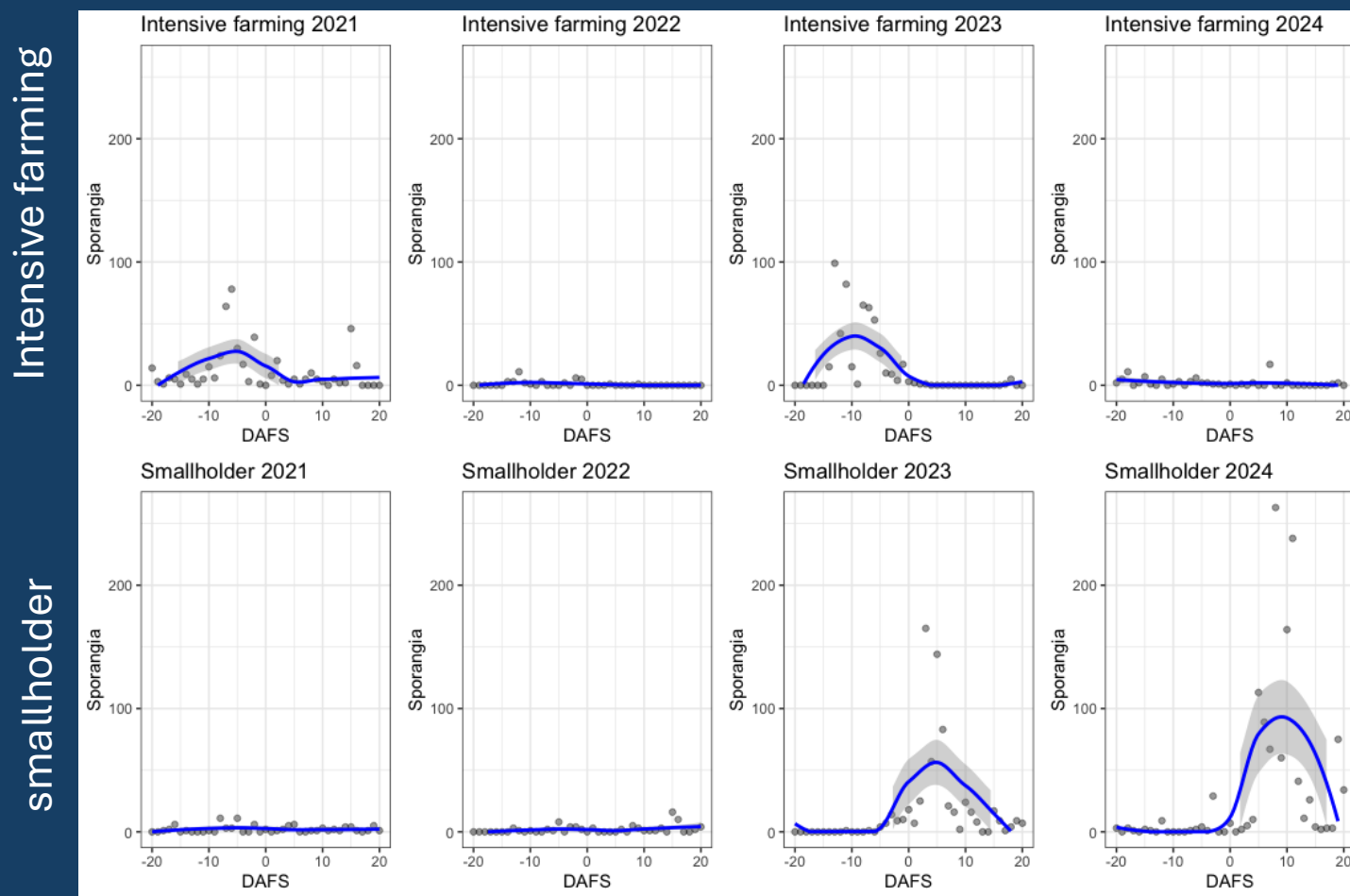
Smallholder

Intensive farming





Results: late blight epidemiological characterization per crop season



DAFS: day after first symptoms

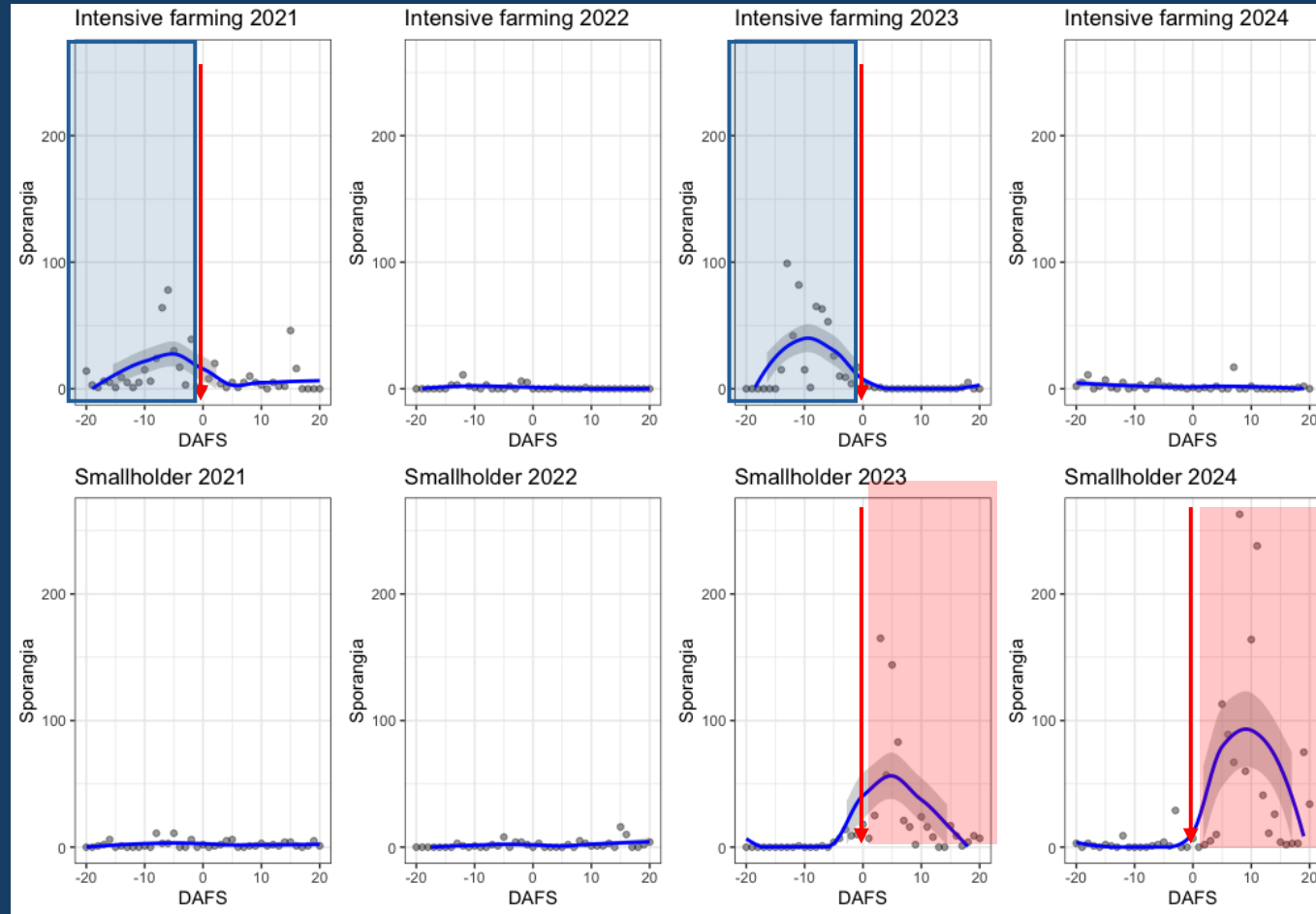


Results: late blight epidemiological characterization per crop season

0= outbreak of late blight epidemic

Intensive farming

smallholder



DAFS: day after first symptoms



Different behaviour of late blight in each cropping system....



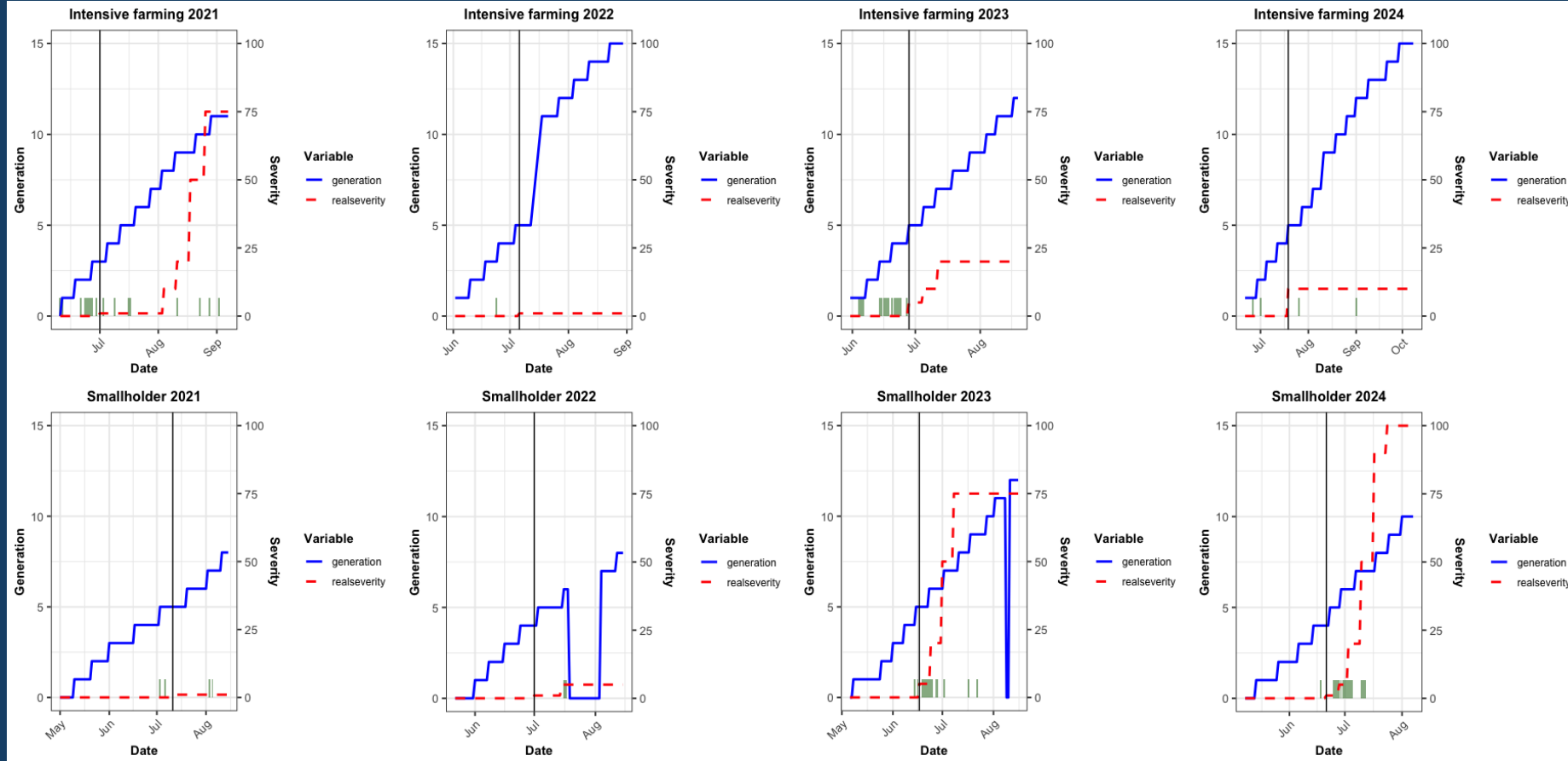
What happened with **late blight climatic models** (and DSS) ?



The case of study of CARAH model from Belgium



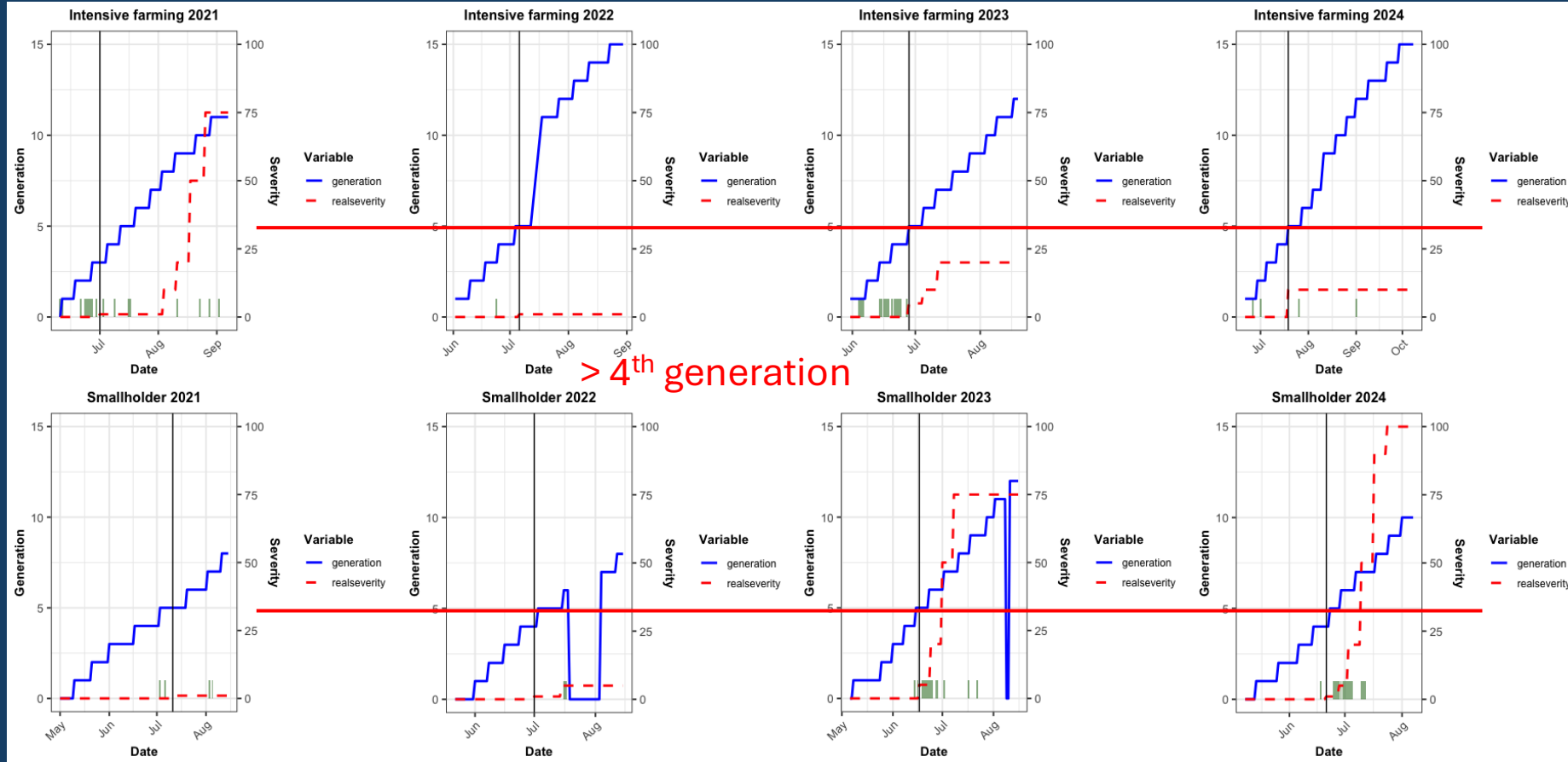
Results: Carah model per crop season



— Generation of CARAH model
 --- Real severity
 — outbreak (1st symptoms)



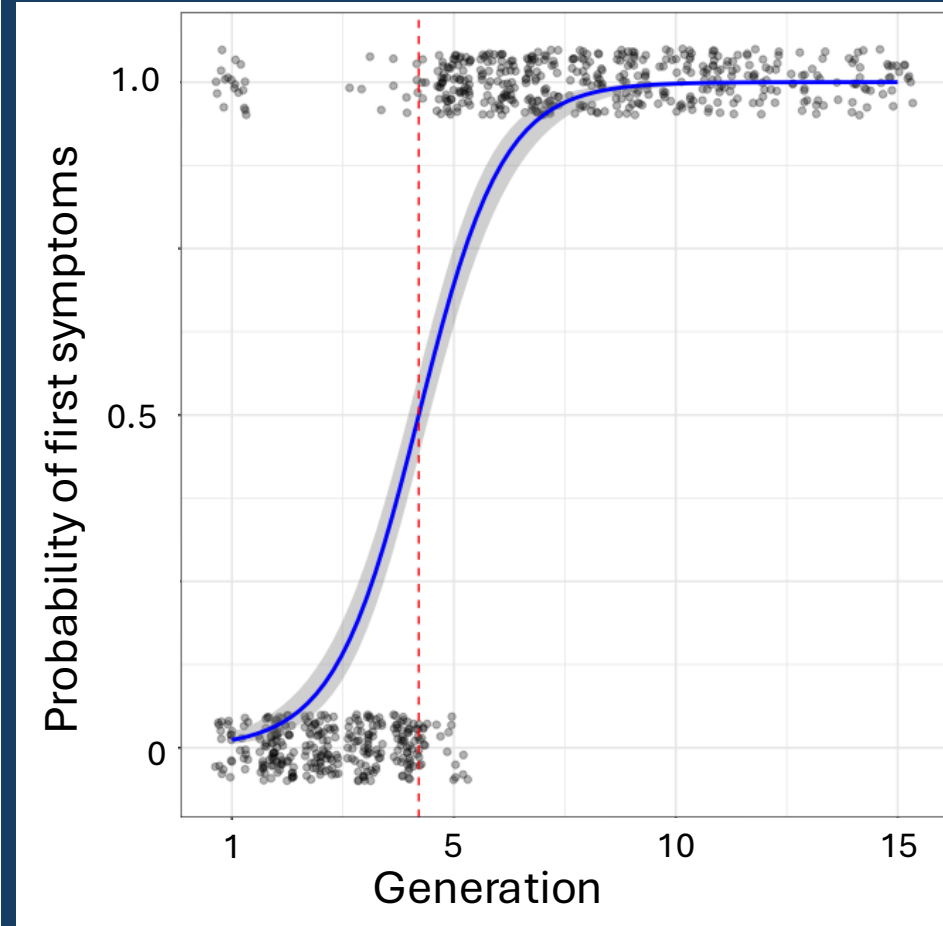
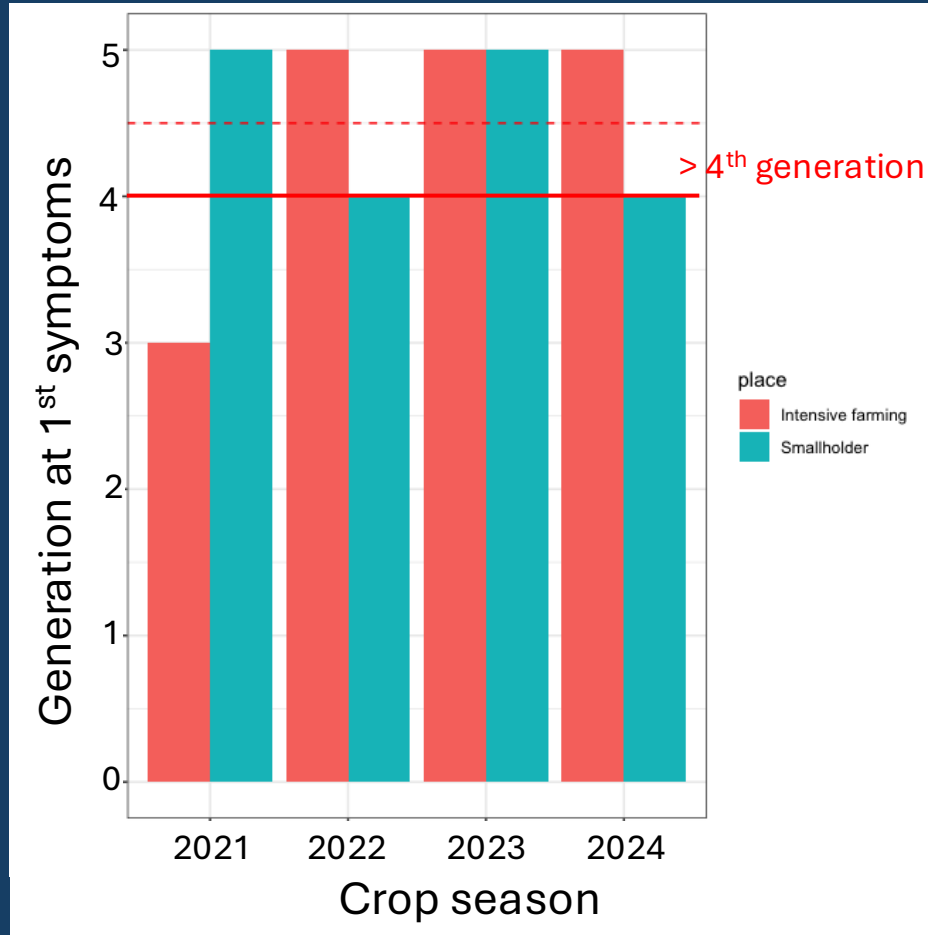
Results: Carah model per crop season



— Generation of CARAH model
--- Real severity
— outbreak (1st symptoms)



Results: Carah model per crop season





Conclusions

1 No differences in climate between Smallholder farm and Intensive farm

SMALLHOLDER

INTENSIVE

Temperature

Rainfall

Relative Humidity

Wind

Similar climatic conditions

2 Differences in epidemiology among crop seasons in Smallholder farm and also Intensive farm

SMALLHOLDER

INTENSIVE

Disease severity

Time (days)

— Season 1 — Season 2 — Season 3

Epidemiology (first symptoms and disease development) varied among seasons in both farm types

3 Differences in aerobiological concentrations between Smallholder farm and Intensive farm

SMALLHOLDER

INTENSIVE

Higher spore concentrations in the air in intensive farms

Before first symptoms: higher spore concentrations in intensive farms.
After first symptoms: spore concentrations increase in smallholder farms.

4 The influence of density of potato fields on spore concentrations in the air

LOW DENSITY

➔

HIGH DENSITY

Spore concentration in the air

↑ High

↓ Low

Higher density of potato fields → higher spore concentrations in the air

5 Late blight epidemiology (first symptoms) could be predicted by aerobiological information

INTENSIVE FARMS

Aerobiological data (spore concentrations) → Predicts first symptoms

SMALLHOLDER FARMS

Only spores from the field feed the sampler → First symptoms must appear first

In smallholder farms, external inoculum is very limited; therefore, prediction of first symptoms is not possible.

6 Usefulness of the CARAH model to predict first symptoms in both types of farms

CARAH model

Intensive farms

→

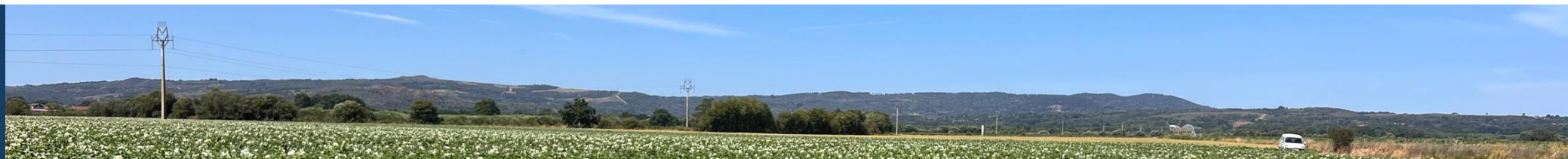
Accurate prediction

Smallholder farms

→

Accurate prediction

The CARAH model proved useful to predict first symptoms of late blight in both intensive and smallholder farming systems.



**Moitas grazas
Many Thanks**

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