

A JOINED-UP APPROACH TO THE IDENTIFICATION, ASSESSMENT AND MANAGEMENT OF  
EMERGING FOOD SAFETY HAZARDS AND ASSOCIATED RISKS (FOODSAFER)



# Prediction Models for Emerging Mycotoxins in Cereals

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Currently under revision at WMJ



This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No. 101060698

7/6/2026

# What are emerging mycotoxins

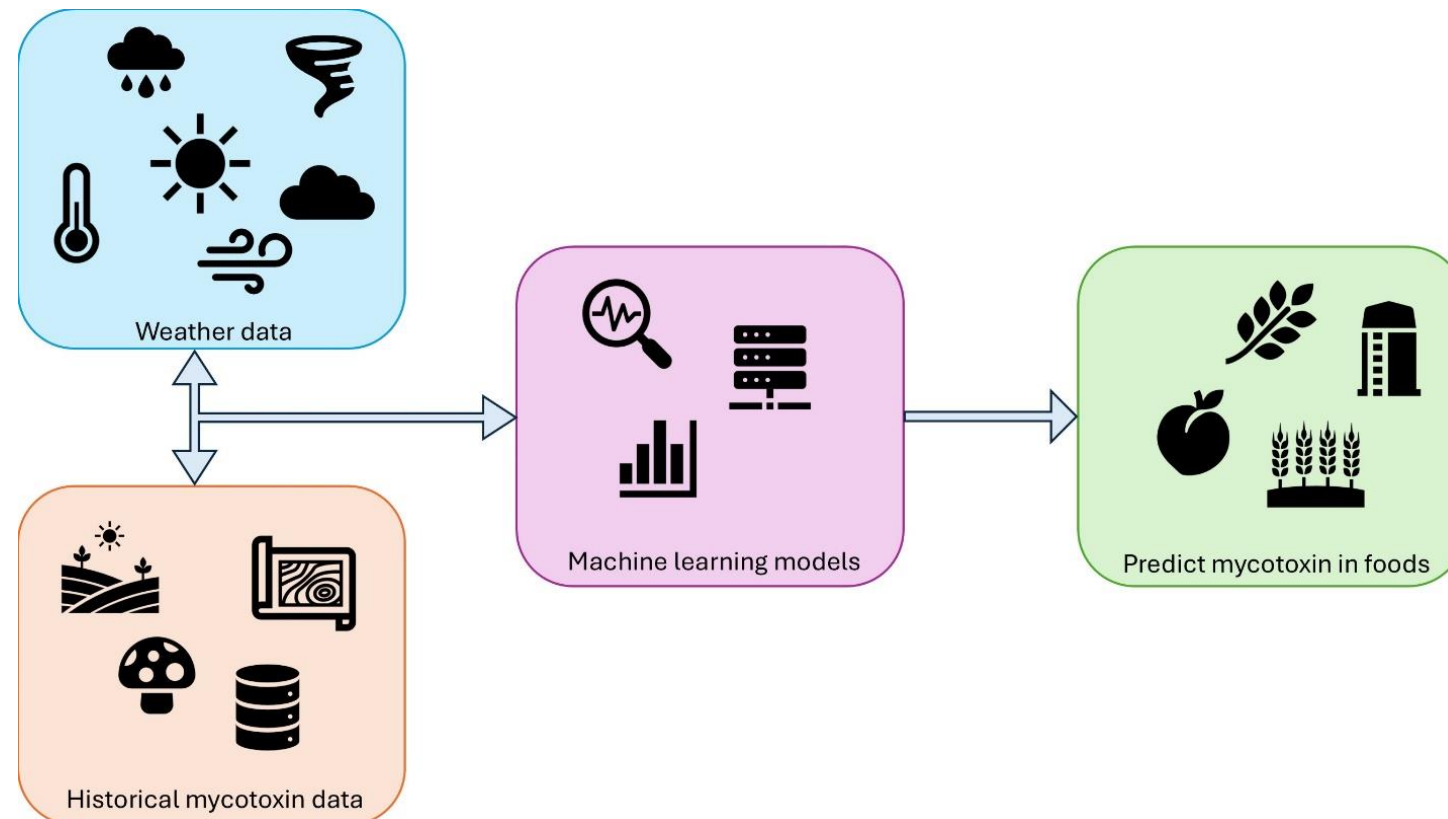


- Mycotoxins are secondary fungal metabolites, often toxic and stable under processing
- Emerging mycotoxins are less or unregulated mycotoxins
- We focus on: *Alternaria* toxins, Ergot alkaloids, enniatin and beauvericin
- Toxicity is less known and are often not tested for in samples

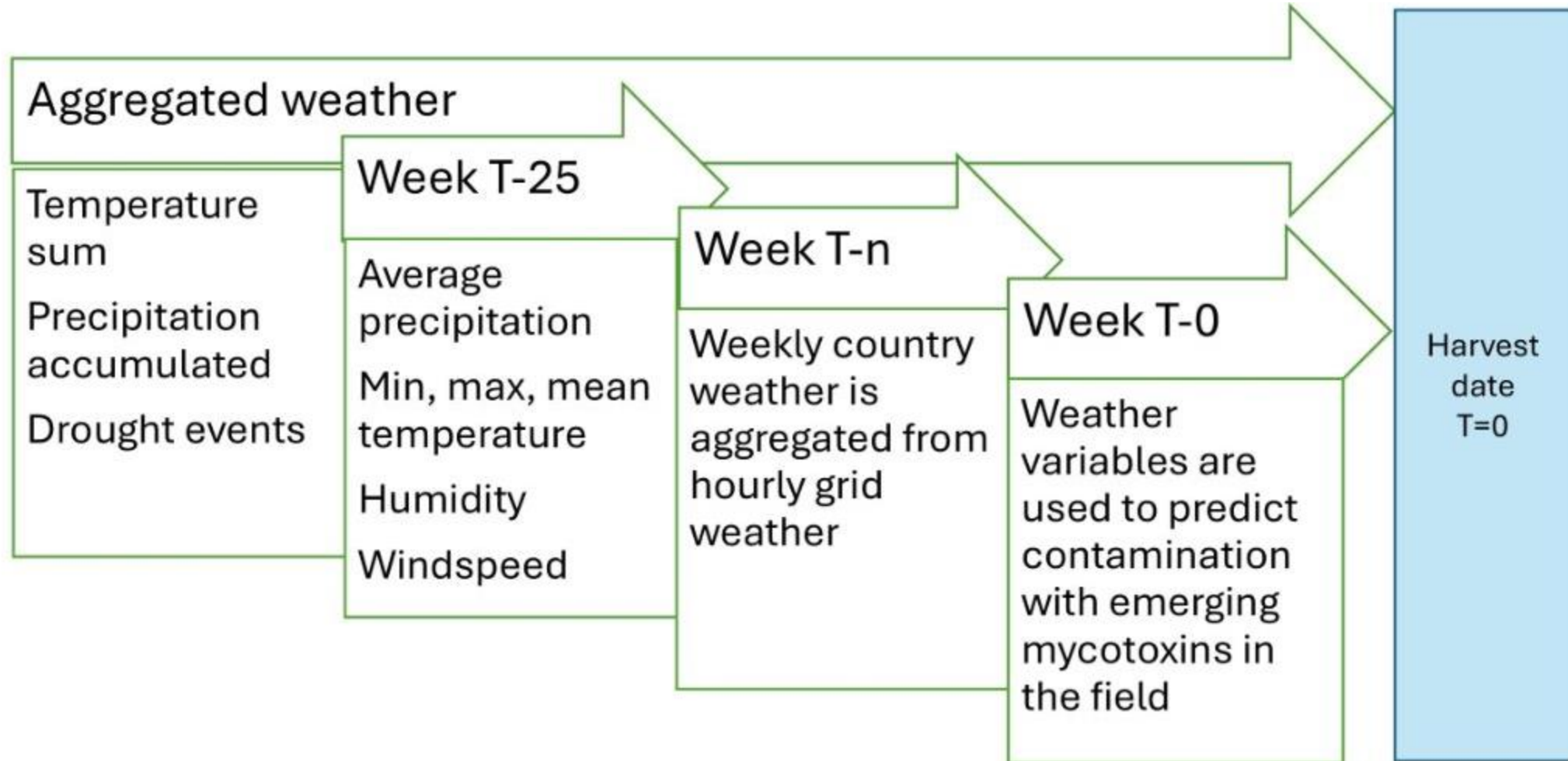
# The aim



- Develop the first emerging mycotoxin prediction models using machine learning with historical survey data and meteorological inputs.



# The meteorological data



# Data selection and target creation

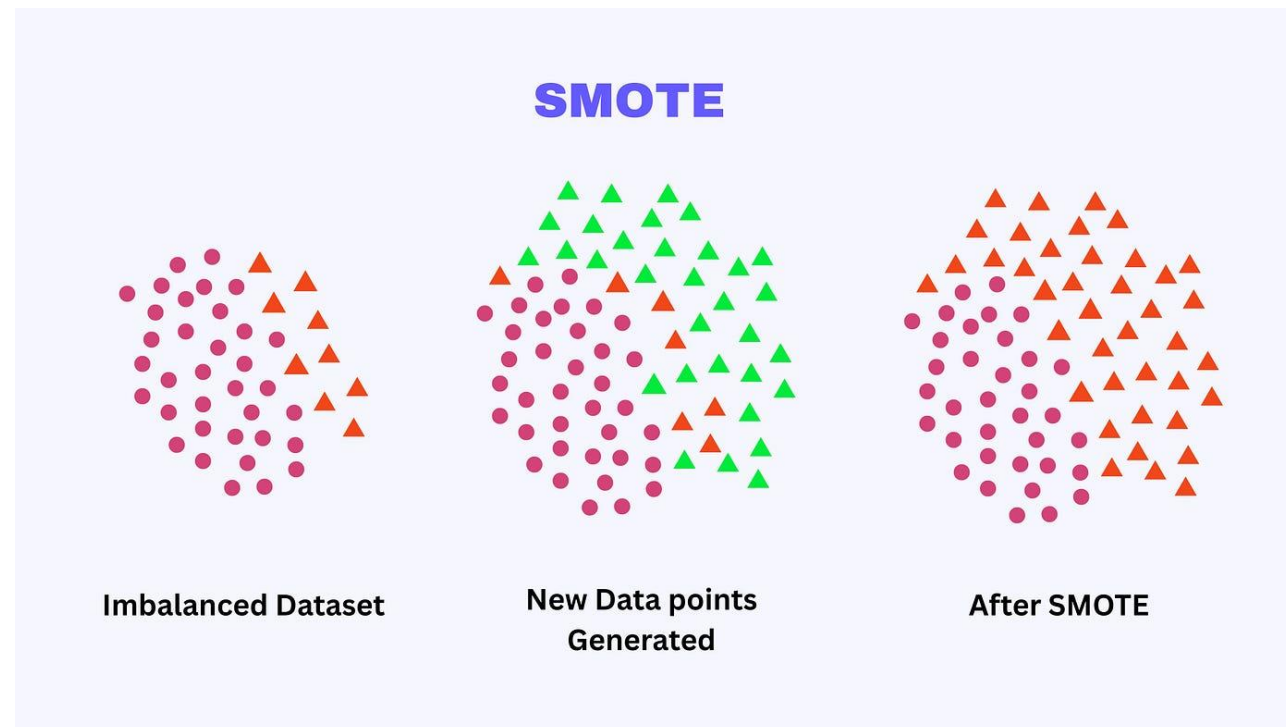


- Wheat and Maize
- European countries with many data points:
  - Austria, Denmark, France, Germany, Italy and Poland
- 2014-2023
- N= 3716
- WOFOST harvest date estimate
- Binary target: presence of any emerging mycotoxin=1

# Modelling



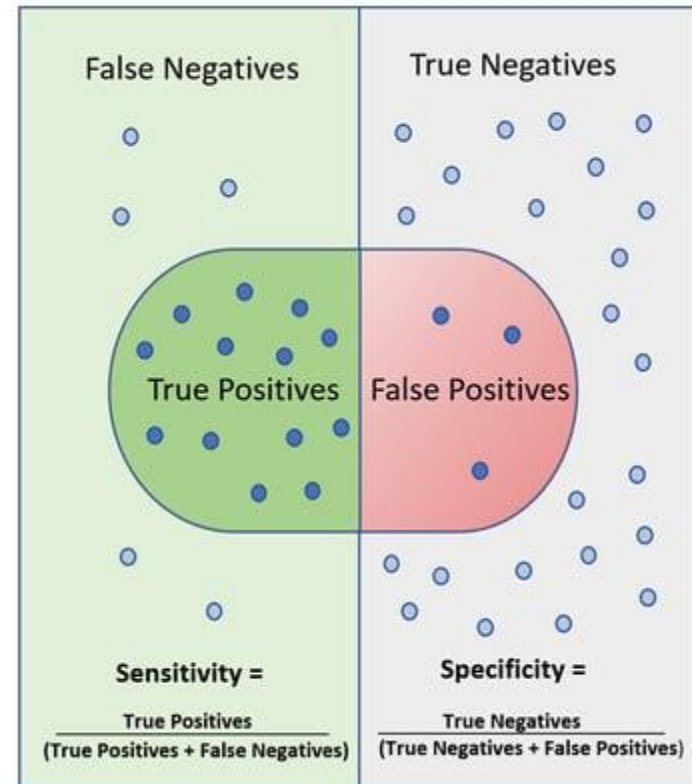
- Iterations starting from baseline regressions
- To hyper parameter optimized machine learning classifiers
- To balancing with SMOTE and ADASYN



# Discussion



- Aim: Develop the first emerging mycotoxin prediction models using machine learning with historical survey data and meteorological inputs.
- Performance is modest
- Tend to do well in either specificity or sensitivity
- Possible causes:
  - Harvest date estimation
  - Geolocation granularity



# Discussion



- Future research:
- Useful for risk flagging
  
- Recommendations:
- Recording crop phenology stages in data collection
- Linking weather data more accurately to collected samples



# Conclusion



- Aim is achieved
- Room for improvement
- Future research focus of practical output and improved data

# Thank you



- Any questions?
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