



- **WP 4 - Task 4.2.1 : Wind resistance probability model on maritime pine**

**CAILLY Priscilla,
DE BOISSESON Jean Mathieu,
FRAYSSE Jean-Yves**





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Objective of the study

To evaluate the impact of different silvicultural practices for maritime pine on wind tolerance





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Material

- **Data available at the FCBA :**

Data of wind damages collected on 34381 trees: straightness assessment after 2009 and 1999 storms



Straightness score value after storm

1	Straight tree
2	Leaning tree <20°
3	Leaning tree >20°
4	Uprooted tree
5	Broken tree

- **Variable to be explained**

→ into binary variable, **cut after wind damages** :

- yes (Straightness score 3, 4, 5)
- no (Straightness score 1, 2)

Material

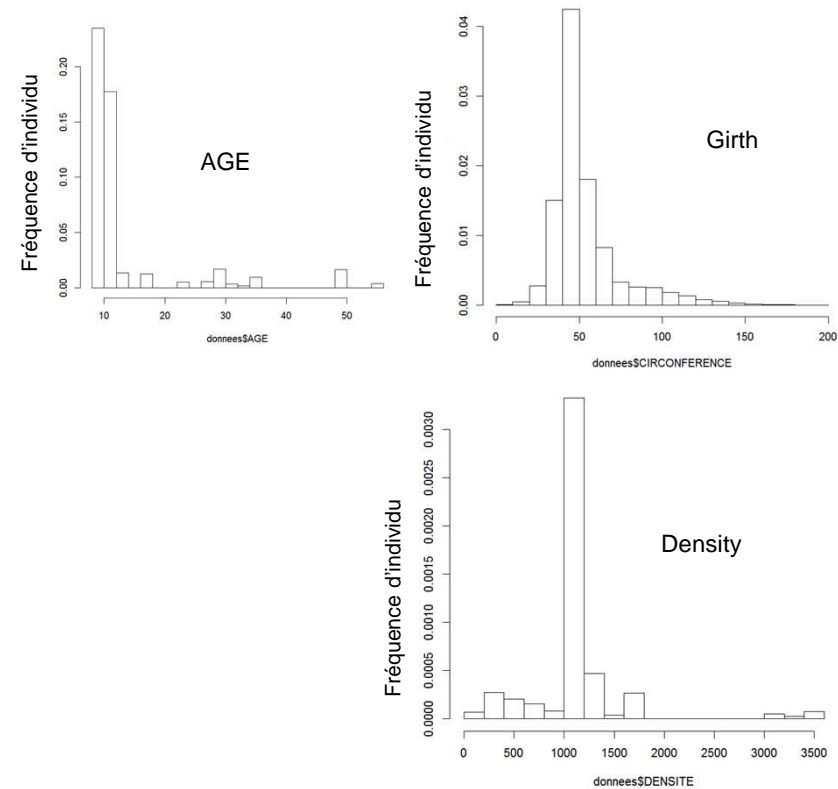
- **Explanatory variables to test**

- Quantitative variables :

- Age of plot

- Girth

- Density stem



- Qualitative variables :

- Trial -> local effect ? (24)(34381 trees)

- Type of regeneration (seeding, regeneration , plantation,...)

- Soil type (wet, dry)

- Storm year



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Method

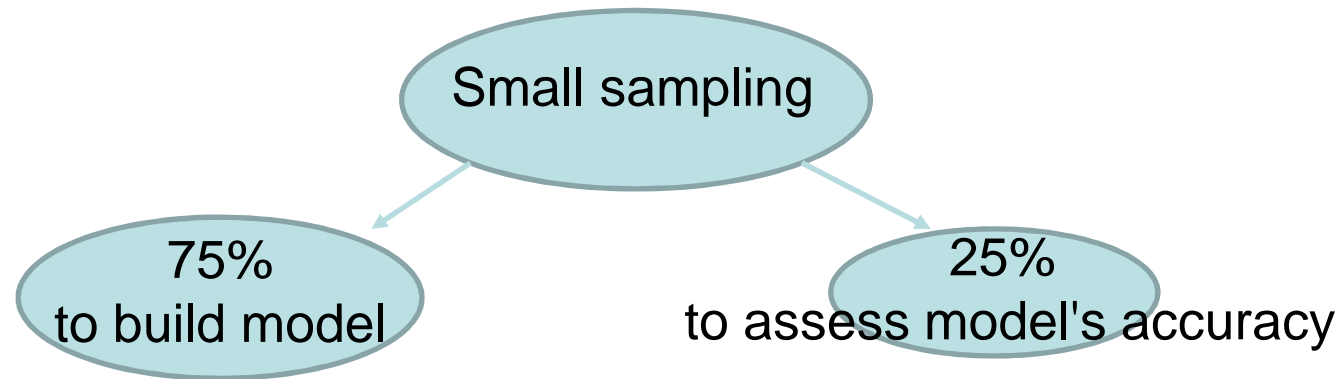
- Logistic regression (statistical model) used for predicting the outcome of a categorical dependent variable based on one or more predictor variables (quantitative or qualitative).
 - Assesses the risk of occurrence
- the dependent variable is binary (cut or not)

Tested models :

Age
Girth
Density
Trial
Soil type
Storm year
Trial
Age+Girth
Age+Girth+Density
Age+Girth+Density+Type regeneration
Age+Girth+Density+Type_regeneration+Soil_type
Age+Girth+Density+Type_regeneration+Soil_type+Year
Age+Girth+Density+Type_regeneration+Soil_type+Year+Trial

Method

- **Multicross - validation** (sampling method)
 - to check the reproducibility of results
 - to assess the stability and accuracy of the models



x1000

- to assess the stability of the models
- identify the most plausible model
- determine its parameters

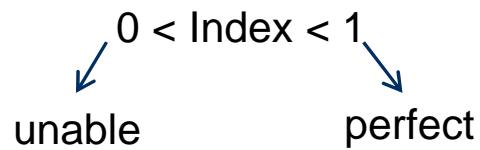


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Results

- The models do not explain the data

Model ability to translate reality



Model	13
Youden	0,1923
IC_min	0,1855
IC_max	0,2115
Kappa	0,3075
Kappa_ICmin	0,2791
Kappa_ICmax	0,3295

index are very bad

Age + Girth + Density + Type_regeneration + Soil_type + Year + Trial

Coefficient is no not significant

Discussion/Conclusion

- We did not find any explanatory factor among those tested
 - Careful ! the data used were not collected for this study
 - they do not represent all the possibilities for variables considered

Ex : for Age

Min,	1st Qu.	Median	Mean	3rd Qu.	Max.
9.00	9.00	11.00	13.69	12.00	55.00

- The next step, it would look if straightness score can be explained by the variables tested with **Multinomial logistic regression** (statistical model)

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Thank you for your attention

