Prediction of genotype performance in **untested environments** using **environmental covariates**

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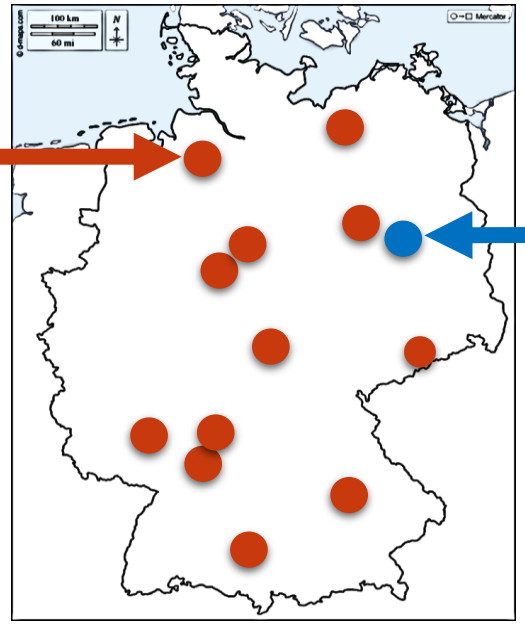
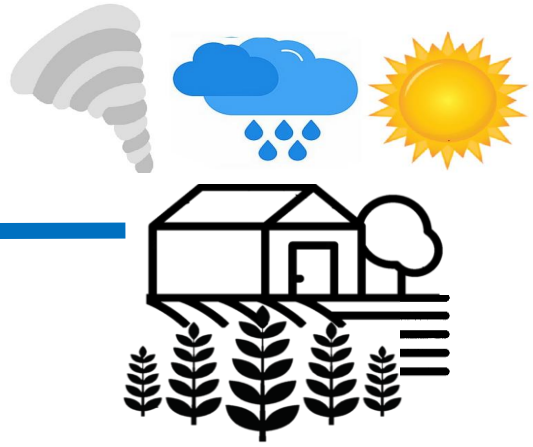
Aim

Federal plant variety office:

Variety trials





Farmer:

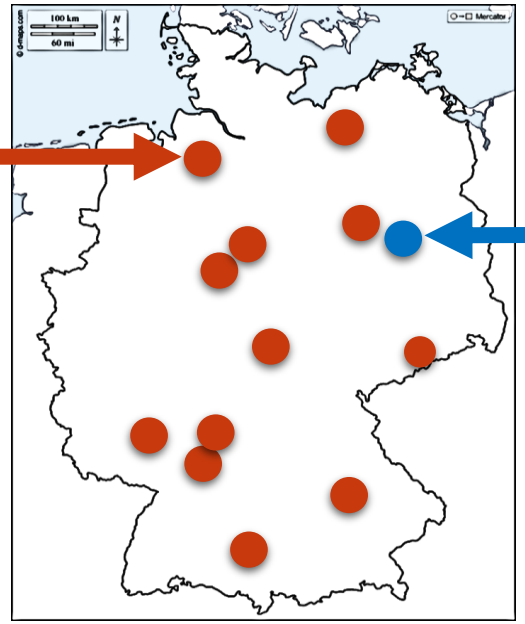
No yield trial

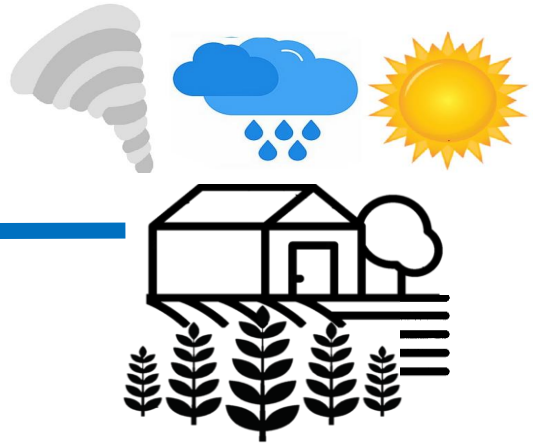
Which winter wheat variety to plant next year?

Aim

Federal plant variety office:

Variety trials





Farmer:

No yield trial

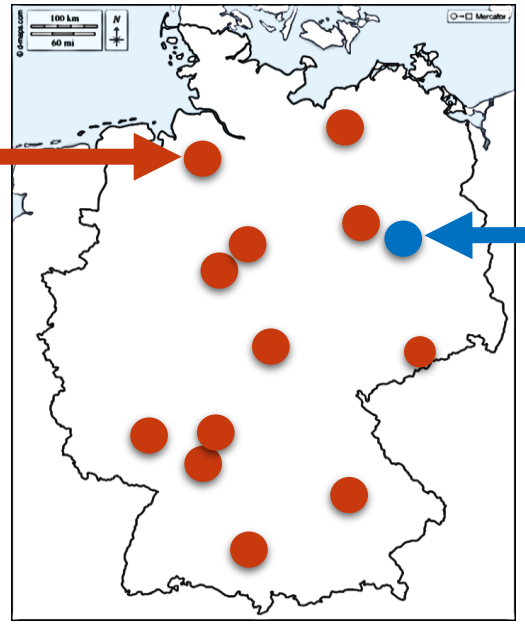
Which variety to plant next year?

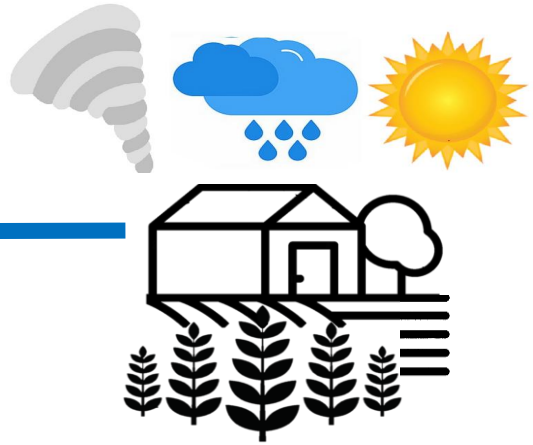
Aim: Find that out

Aim

Federal plant variety office:

Variety release trials





Farmer:

No yield trial

Which variety to plant next year?

Aim: Find that out **how** to achieve this

How

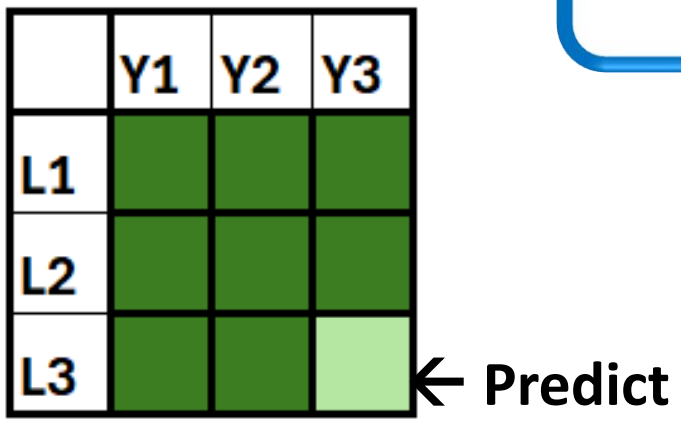
"Stellschrauben":

↳ Models

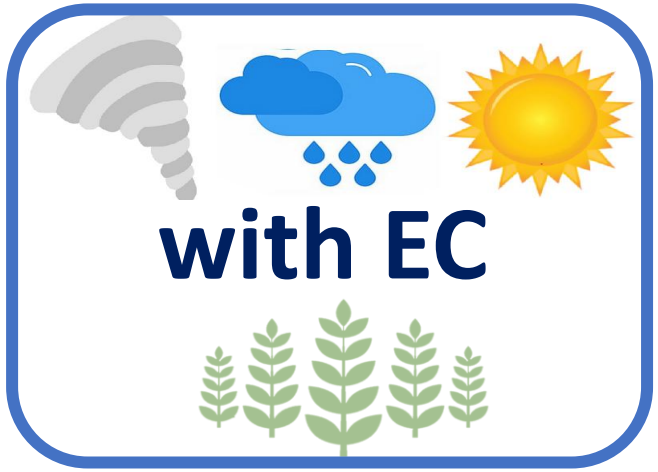
$$\text{Yield} = G + \text{Design} + \beta_{g1} x_{ly1} + \beta_{g2} x_{ly2} + \ldots + \beta_{gP} x_{lyP} + \varepsilon$$

↳ Environmental covariates

↳ Cross validation



1) Models

	Model	EC
a.	**Baseline model**	**without EC**
b.	**Kinship model**	
c.	**Extended Finley Wilkinson**	
d.	**Reduced rank regession**	
e.	**Factorial regression**	

EC = Environmental covariates

2) EC = Environmental Covariates

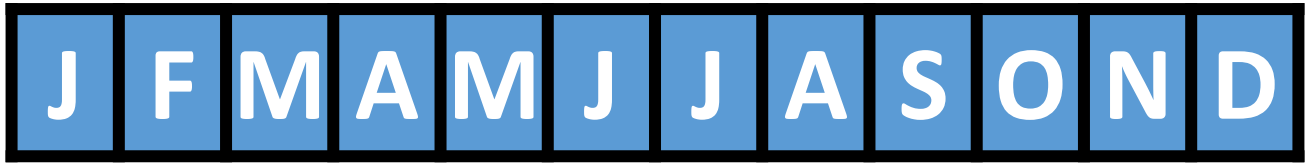
Wind	Rain	Temperature
mean or sum		
stress condition		

2) EC Aggregation

Daily values

↓ average over

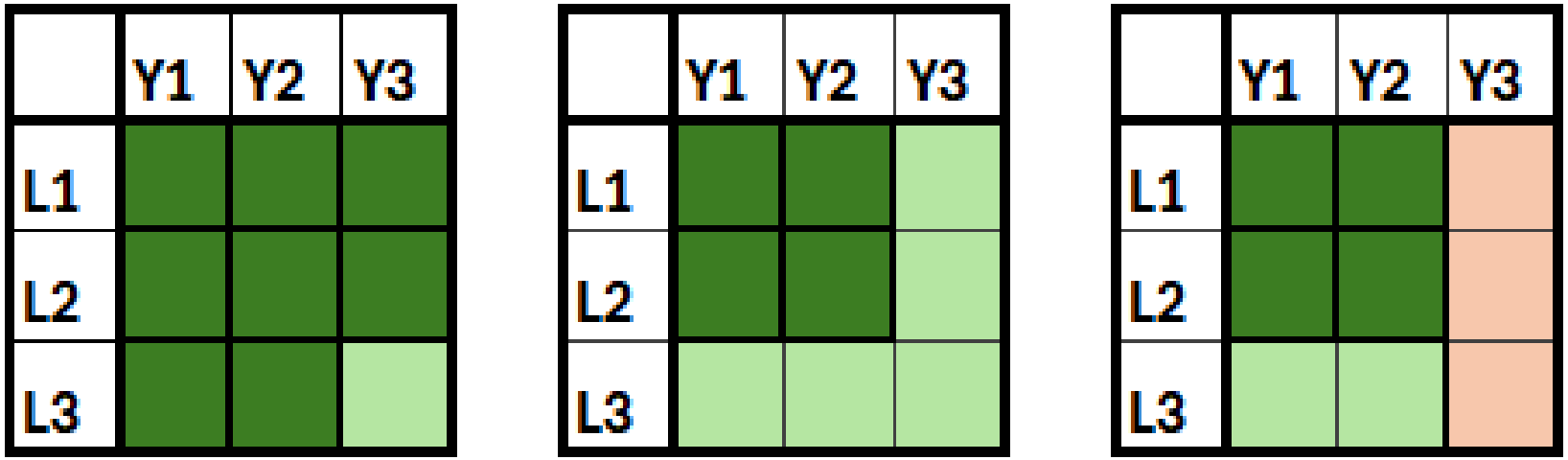
a) Month



b) Phenological season

c) Growing season

3) Cross validation



Model evaluation

Indicator variables

- ***MSPE***

  prediction accuracy

- ***MSEPD***

  genotype differentiation

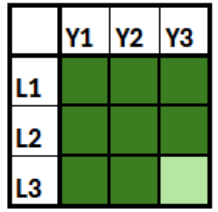
Results: 1) Model

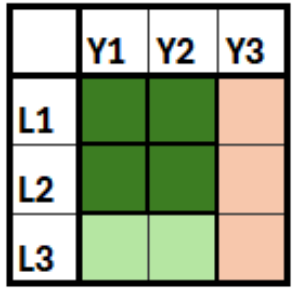
Model	MSEPD rank	MSEPD
Kinship	1	47.91
Baseline	2	48.14
Reduced rank regression	3	48.67
Factorial regression	7	52.41

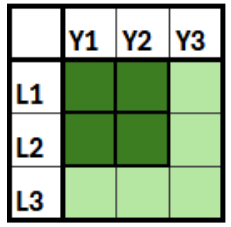
MSPE : prediction accuracy

MSEPD : genotype differentiation

Results: 2) CV







CV	MSEPD rank	MSEPD	MSPE rank	MSPE
LOEO ECin	1	43.74	1	123.20
LOLY ECout	2	49.68	2	221.57
LOLY ECin	3	52.28	3	227.71

MSPE : prediction accuracy

MSEPD : genotype differentiation

Results: 3) EC

EC aggregation	MSEPD rank	MSEPD	MSPE rank	MSPE
Season	1	49.71	1	218.84
Year	2	50.05	2	225.65
Month	3	108.51	3	271.98

MSPE : prediction accuracy

MSEPD : genotype differentiation

Time for Questions

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