



Sveriges lantbruksuniversitet
Swedish University of Agricultural Sciences

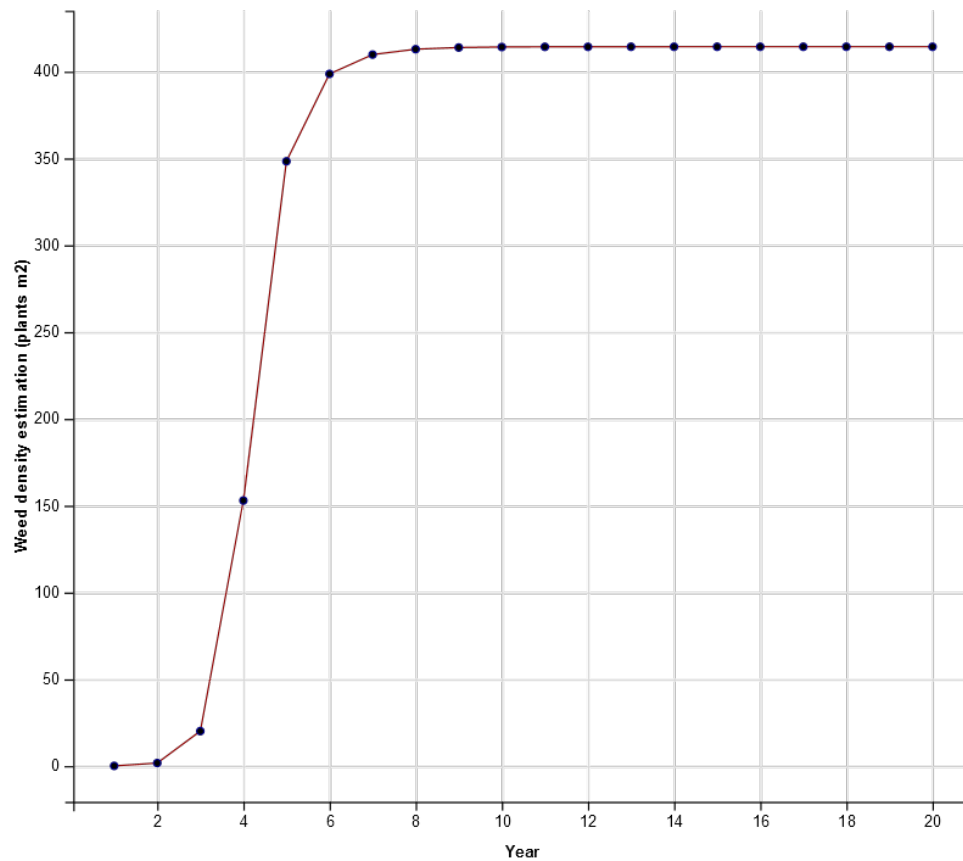
Department of Crop Production Ecology

Modellering av renkavle - ett verktyg för rådgivningen och jordbrukaren

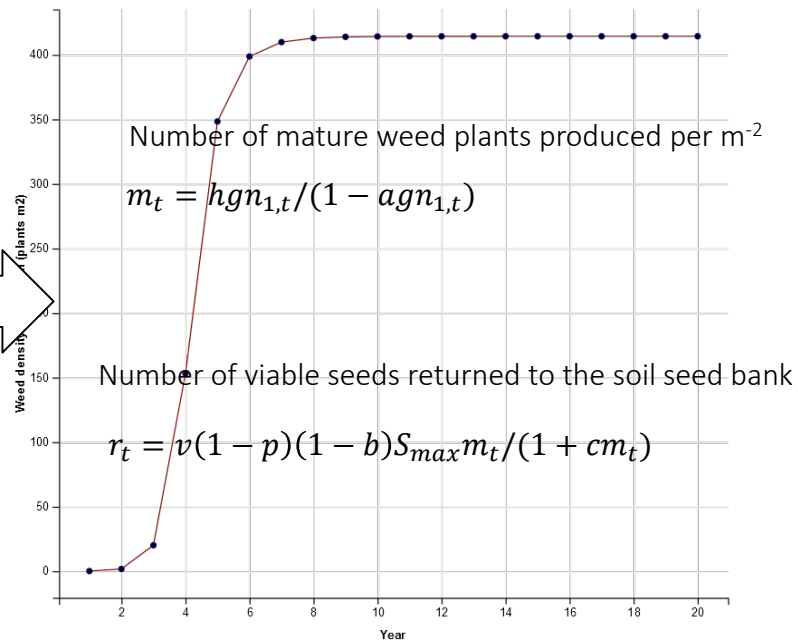
Alexander Menegat



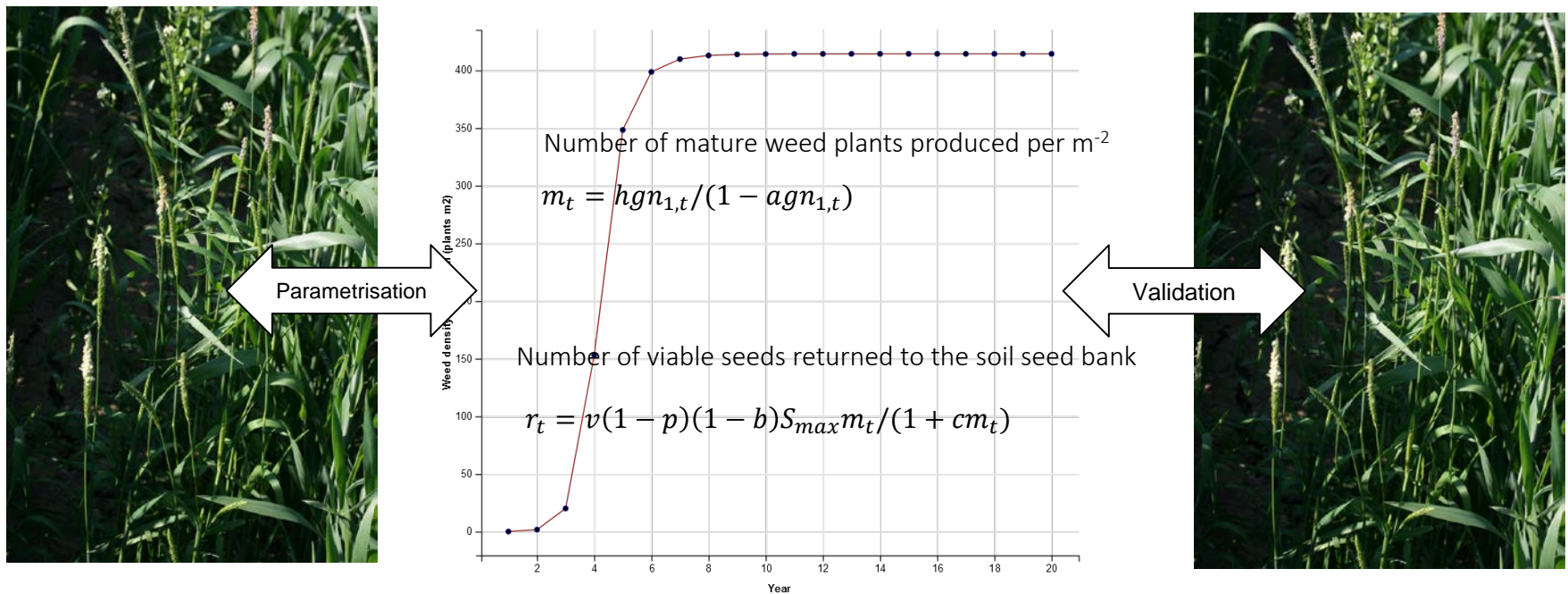
In our case a model is a mathematical approximation of reality:



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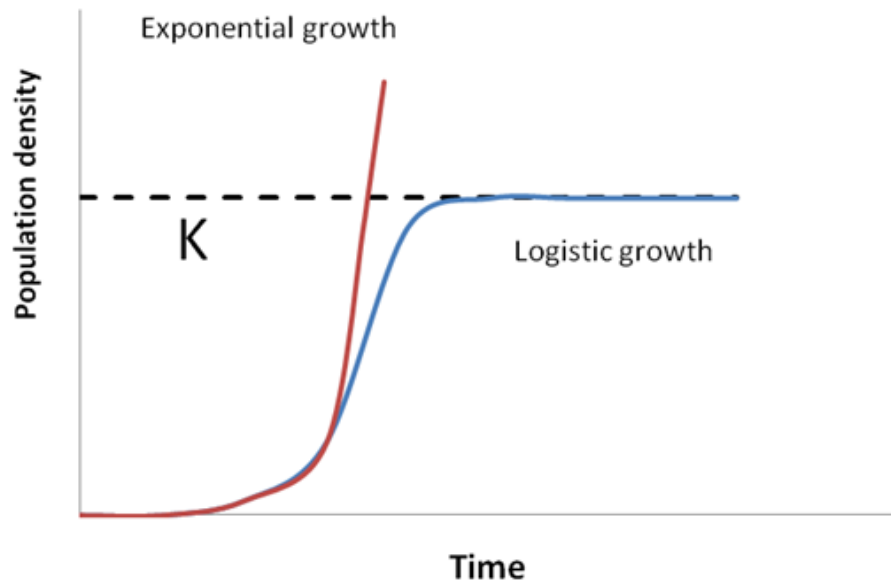


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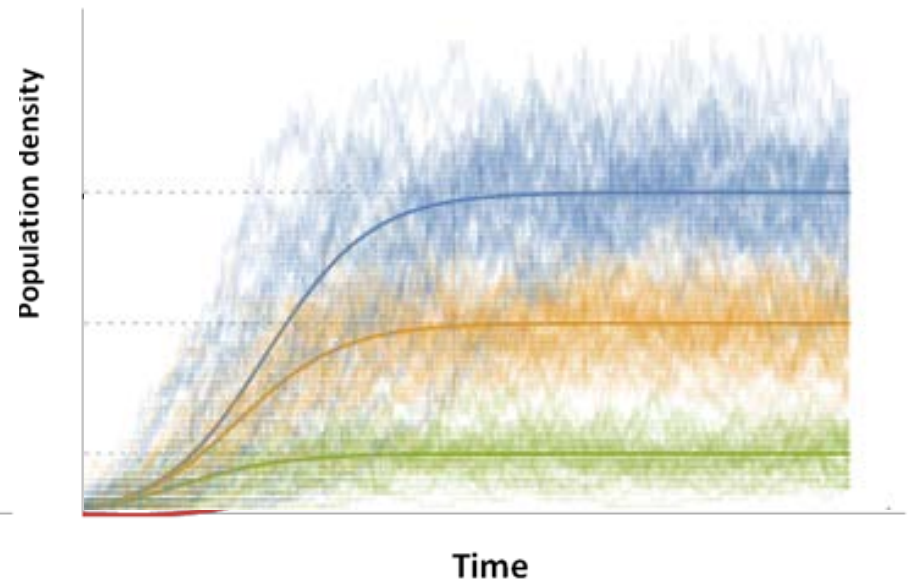
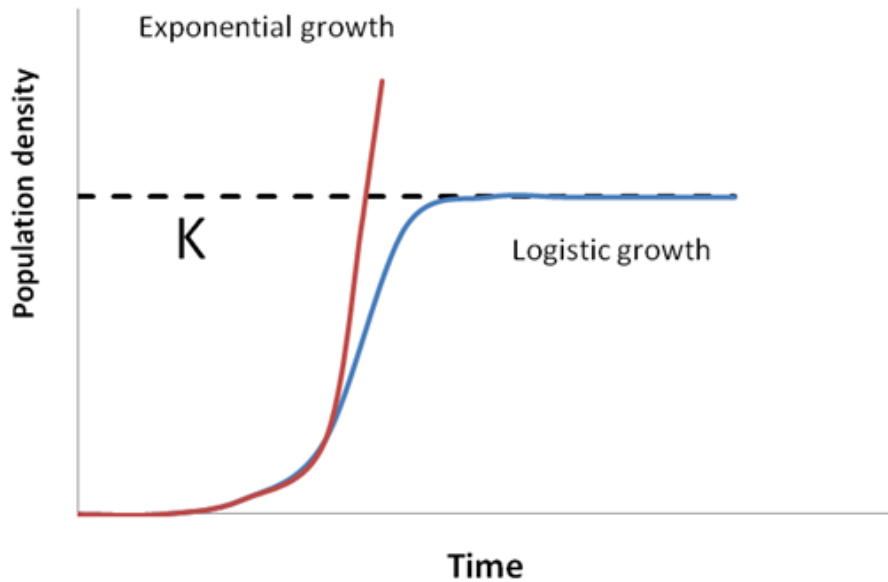
What a model is not?

A model is not a 1:1 picture of reality. It is rather a conceptualization of a system.



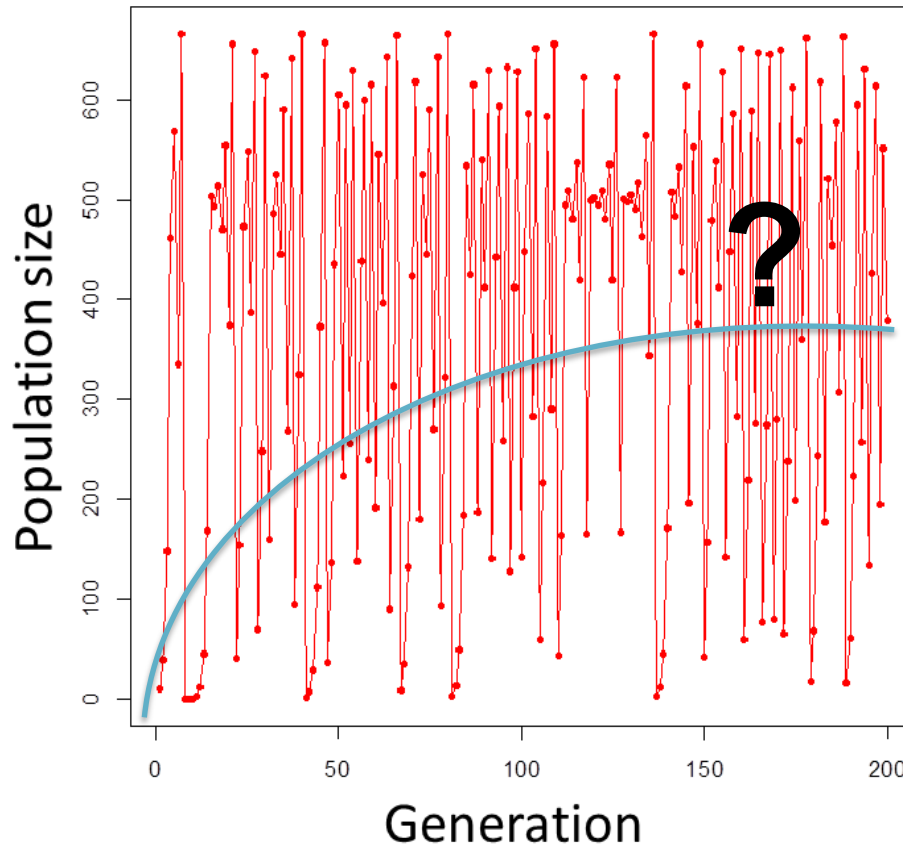
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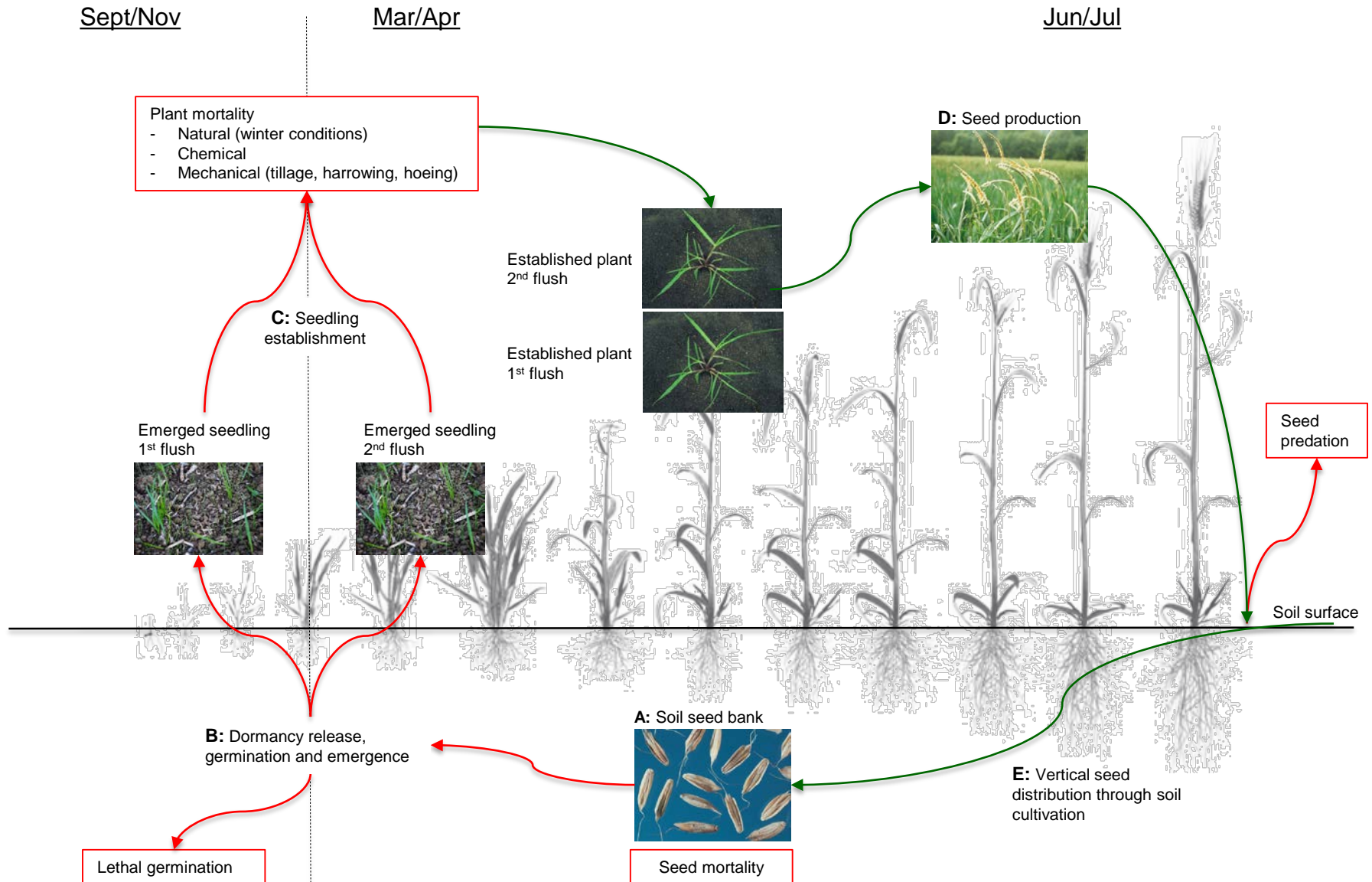
What a model is not?

Models are always incomplete and often even false.



...but even a false model can lead to useful insights about a system.

1st step: definition of the life cycle (observation step)



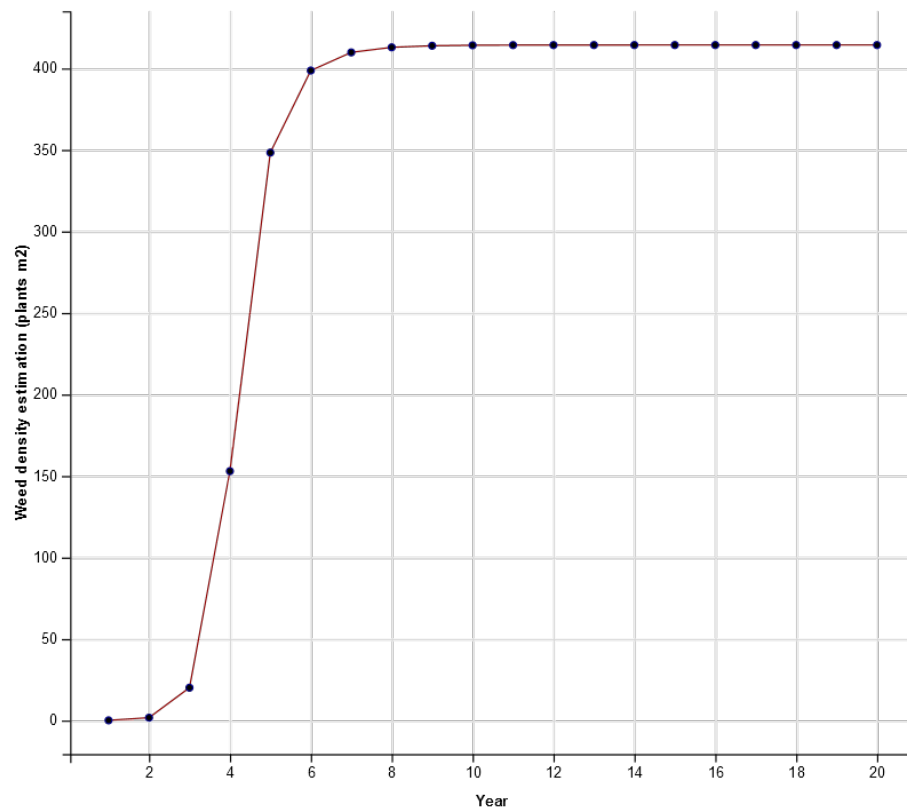
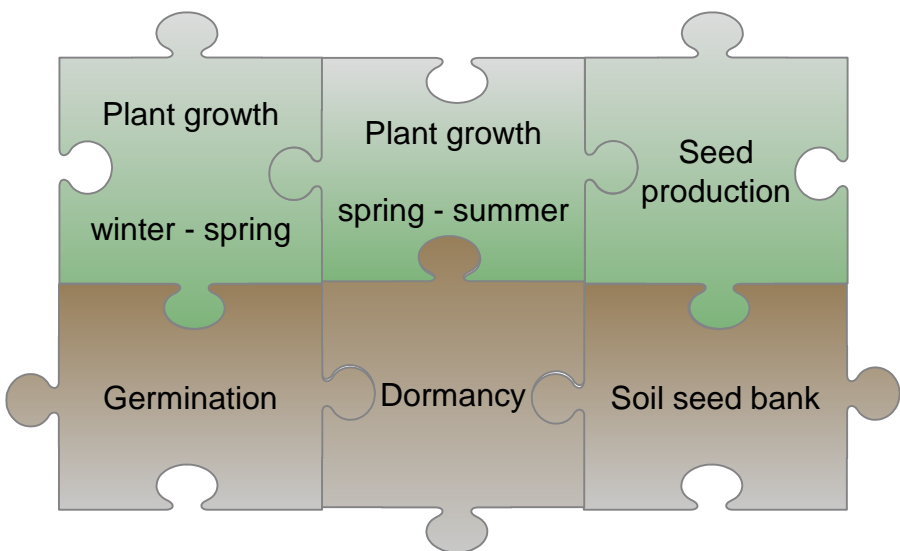


Aims/questions for the blackgrass model

- What are the most sensitive parts in the life cycle?
- How weed control measures affect weed population dynamics (long-term).
- Understanding of the complex interaction of various weed control measures (strategy evaluation).
- Building of hypotheses for target oriented field experiments.

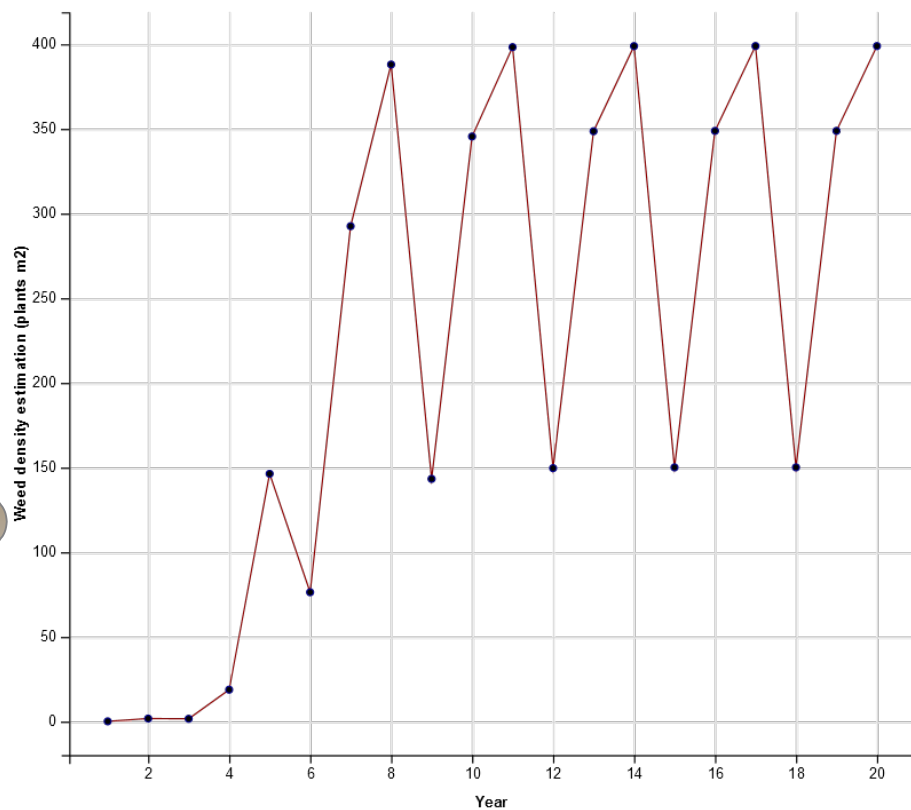
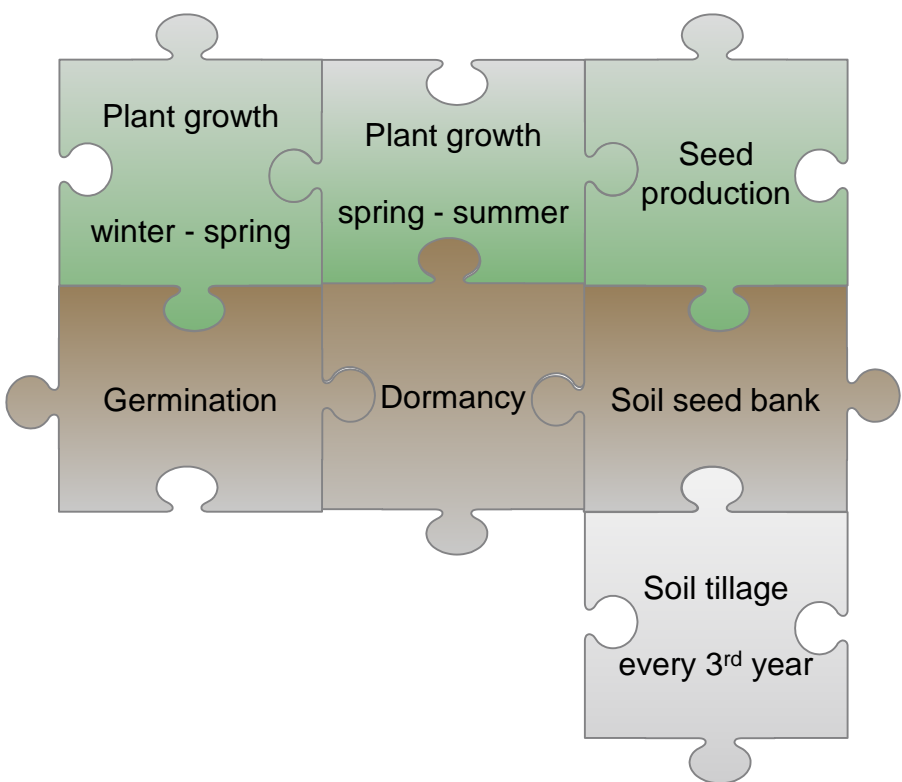


Model structure for blackgrass

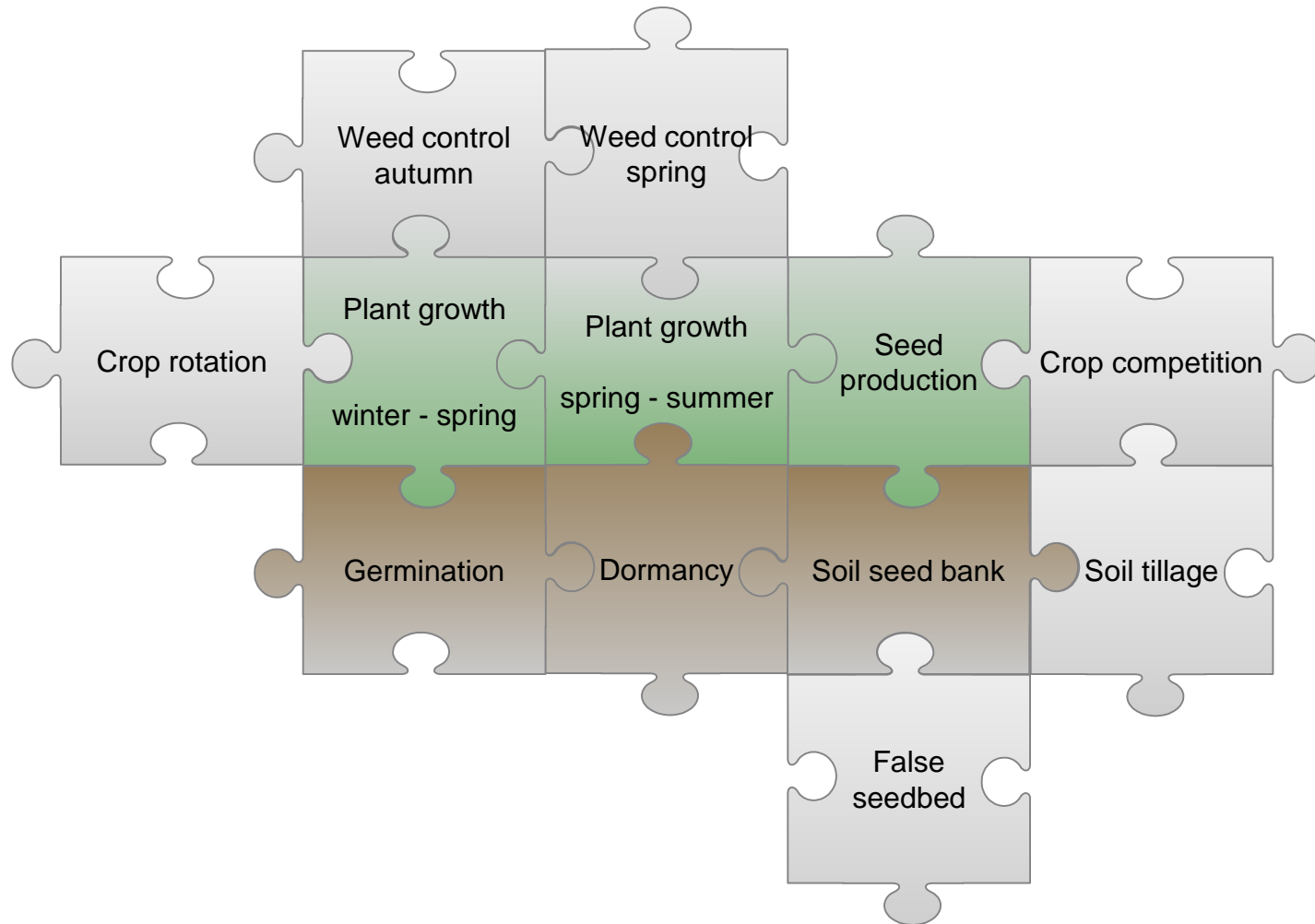




Model structure for blackgrass

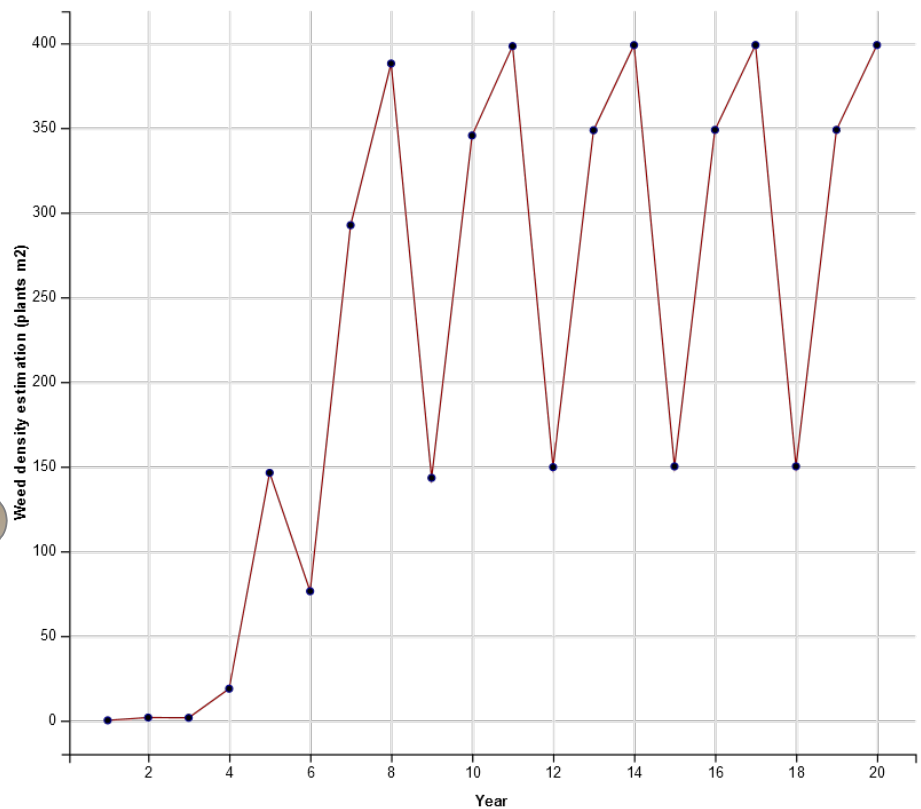
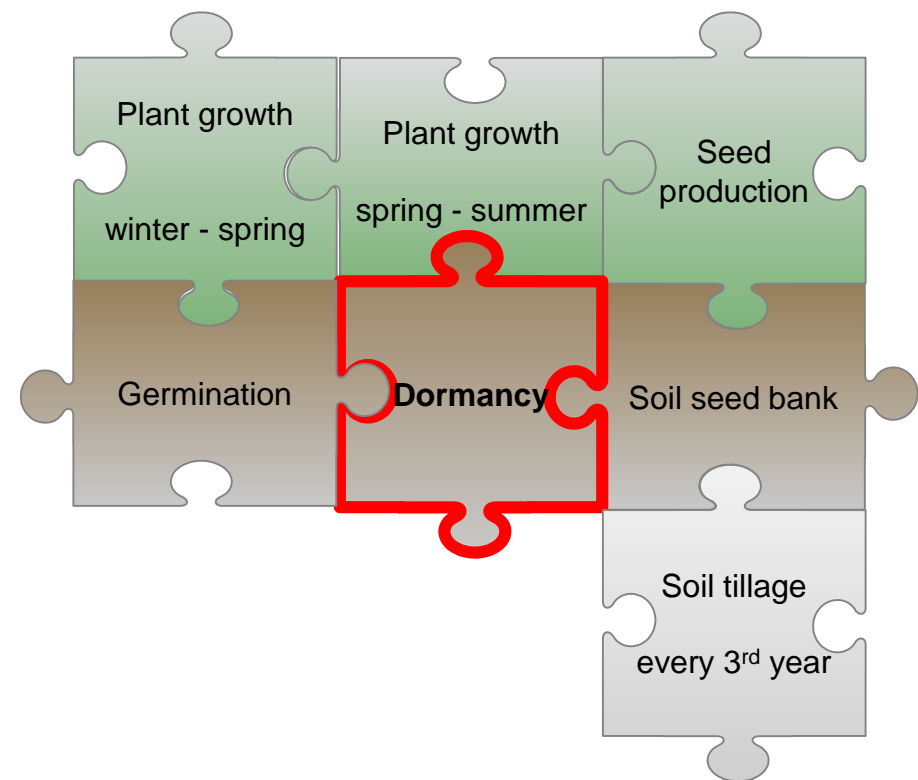


Model structure for blackgrass





Model structure for blackgrass





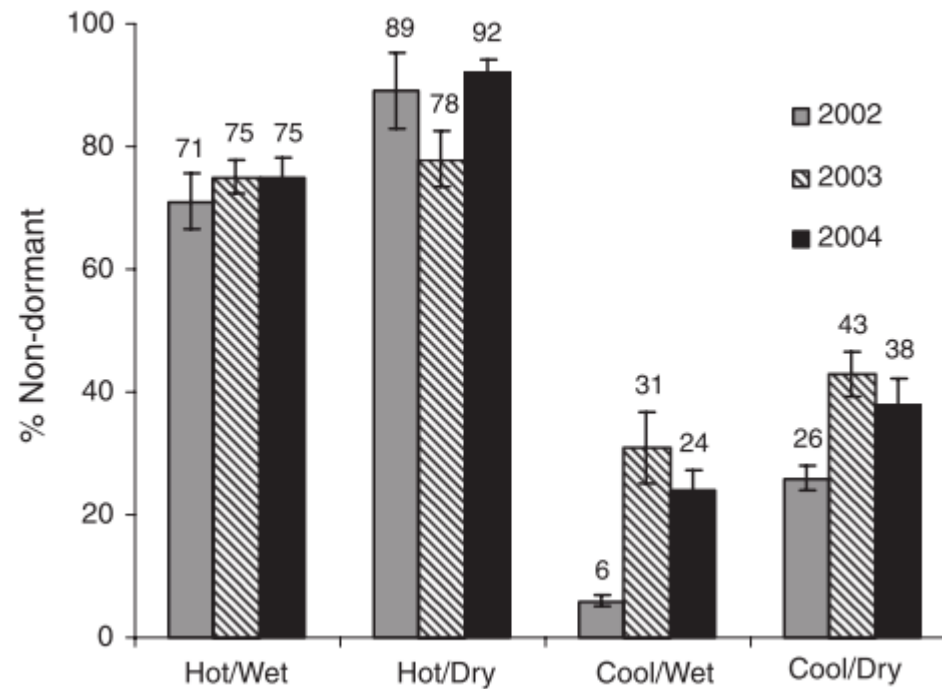
Quantifying the dormancy of *Alopecurus myosuroides* seeds produced by plants exposed to different soil moisture and temperature regimes

A J SWAIN*, Z S HUGHES*, S K COOK† & S R MOSS*

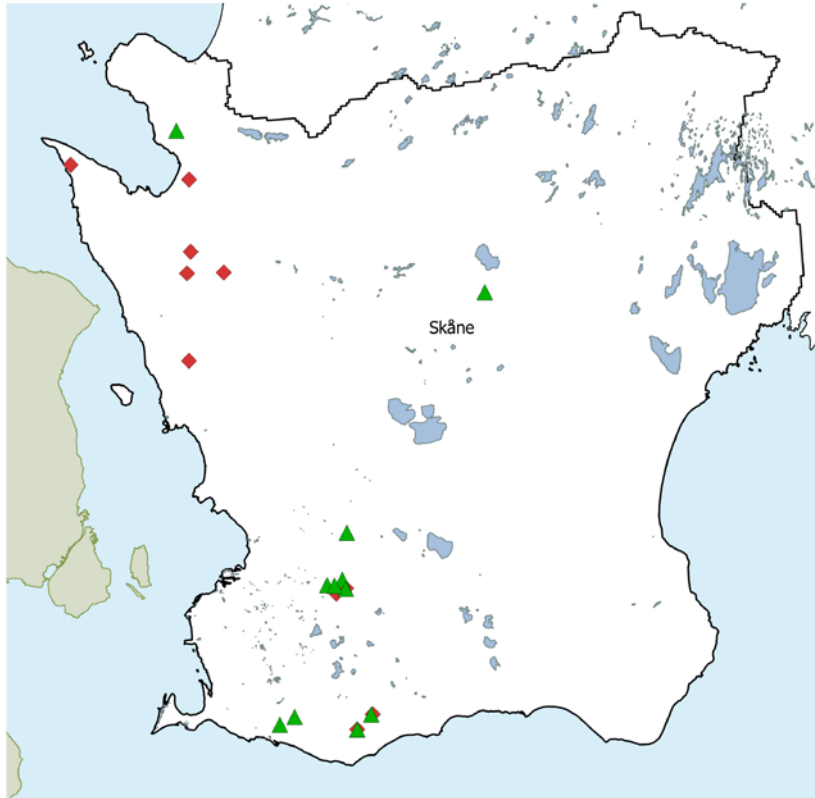
*Plant and Invertebrate Ecology Division, Rothamsted Research, Harpenden, Hertfordshire, UK, and †ADAS Boxworth, Boxworth, Cambridgeshire, UK

Received 13 December 2005

Revised version accepted 12 July 2006



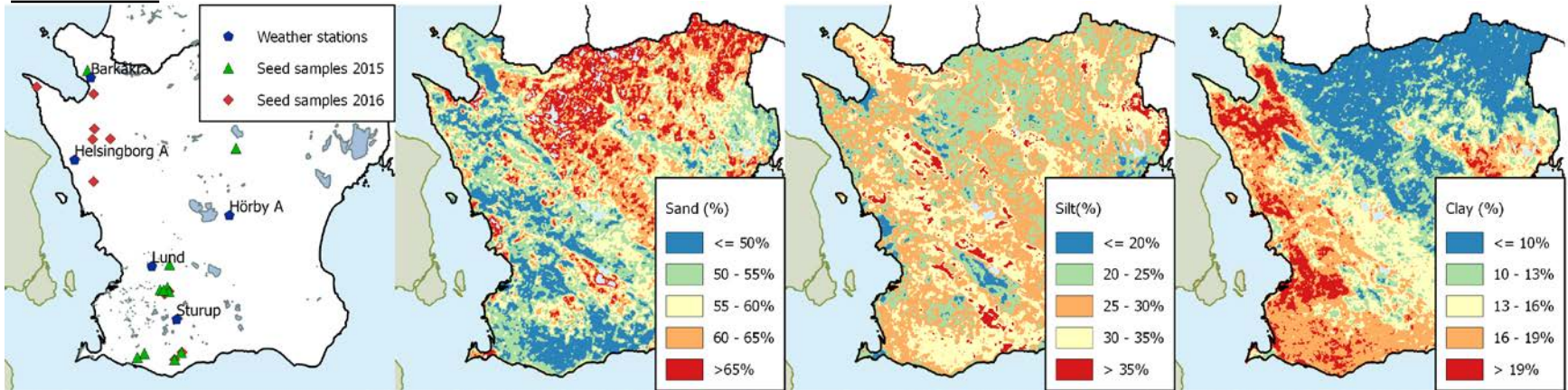
Dormancy forecast: modelling approach



Sampling site	Year	Associated SMHI weather station	
Alberta	2015	Lund	53430
Brönnestad	2015	Hörby A	53530
Gylle	2015	Sturup	53300
Jordberga	2015	Sturup	53300
Klagstorp	2015	Sturup	53300
Lönhult	2015	Gladhammar A	76420
Mossheddinge	2015	Lund	53430
Rosengren	2015	Lund	53430
Svedberga	2015	Lund	53430
Trelleborg	2015	Sturup	53300
Vejbygården	2015	Barkåkra	62180
Örup	2015	Lund	53430
Esarp	2016	Sturup	53300
Gunnarstorp	2016	Helsingborg	62040
Heagård	2016	Halmstad	62400
Jordberga	2016	Sturup	53300
Klagstorp	2016	Sturup	53300
Kongsmarken	2016	Sturup	53300
Krapperup	2016	Barkåkra	62180
Lydinge	2016	Helsingborg	62040
Ormastorp	2016	Helsingborg	62040
Ullriksfält	2016	Barkåkra	62180
Viarp	2016	Helsingborg	62040

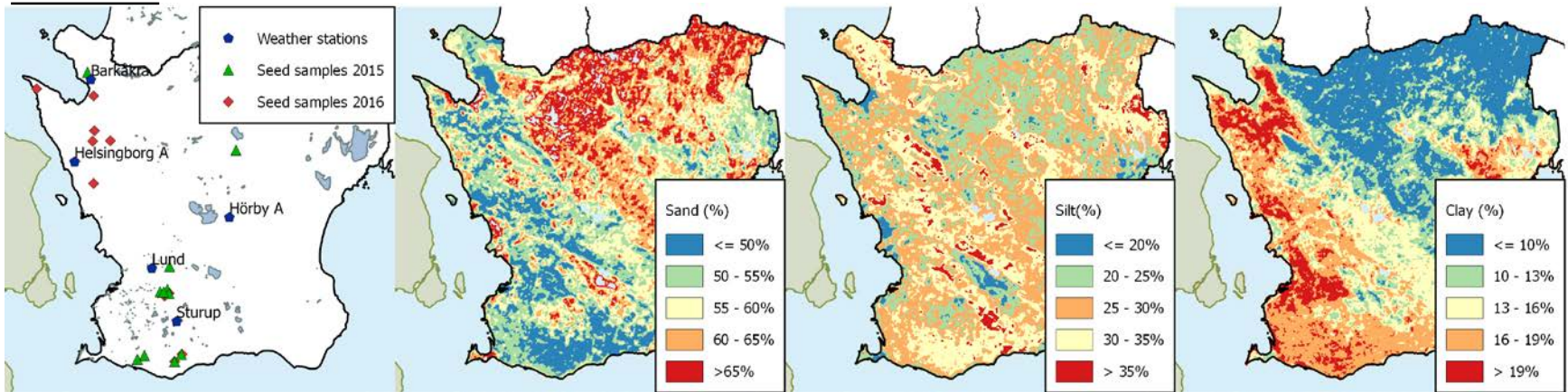
Dormancy forecast: modelling approach

Soil data



Dormancy forecast: modelling approach

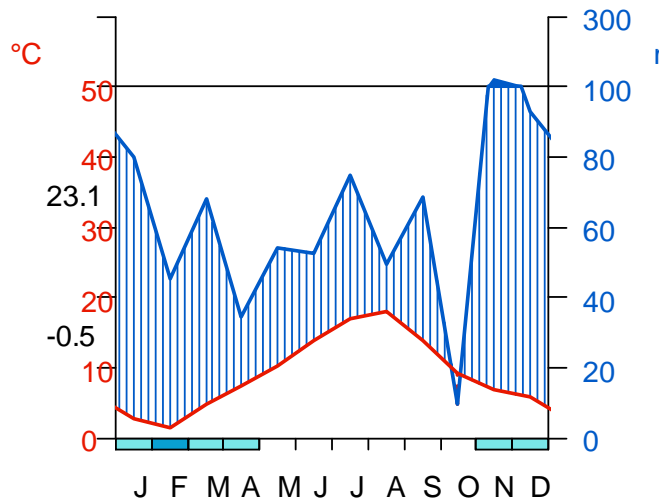
Soil data



Weather data

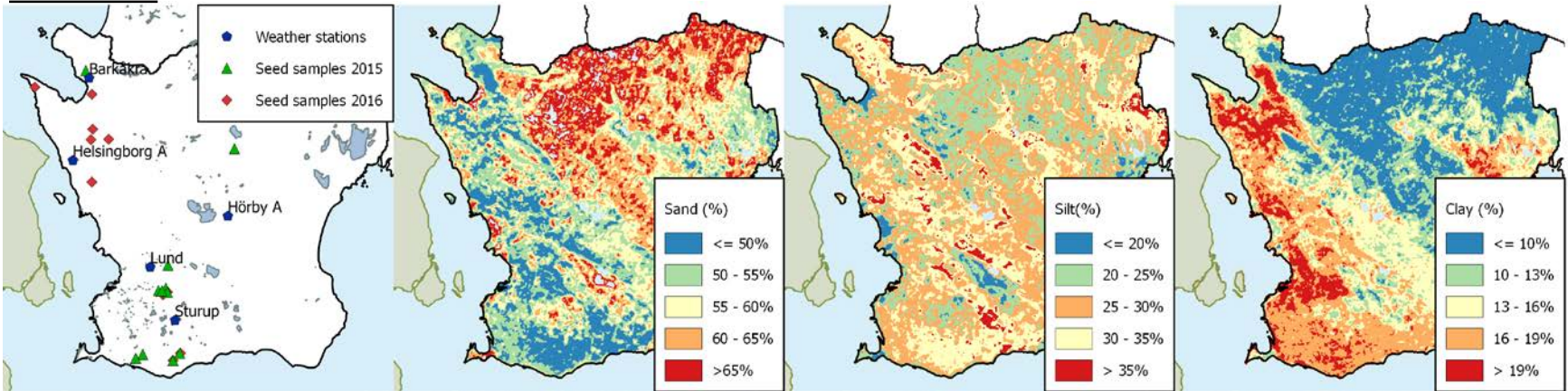


Helsingborg (43 m) 56.0304 12.765
2015 9.3°C

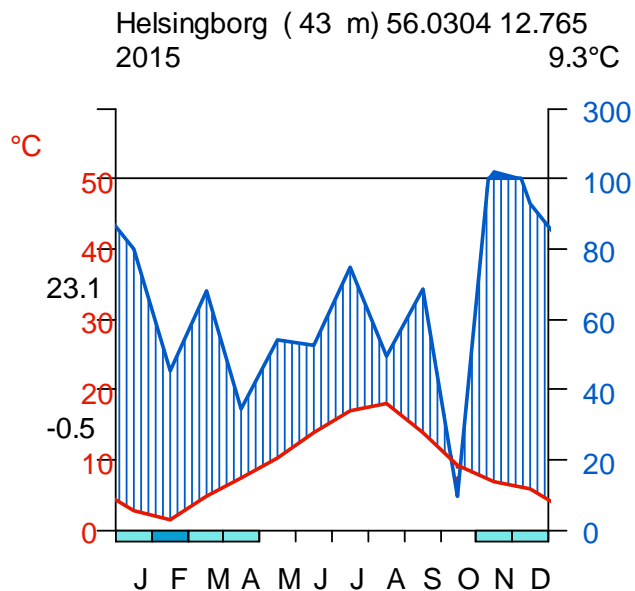


Dormancy forecast: modelling approach

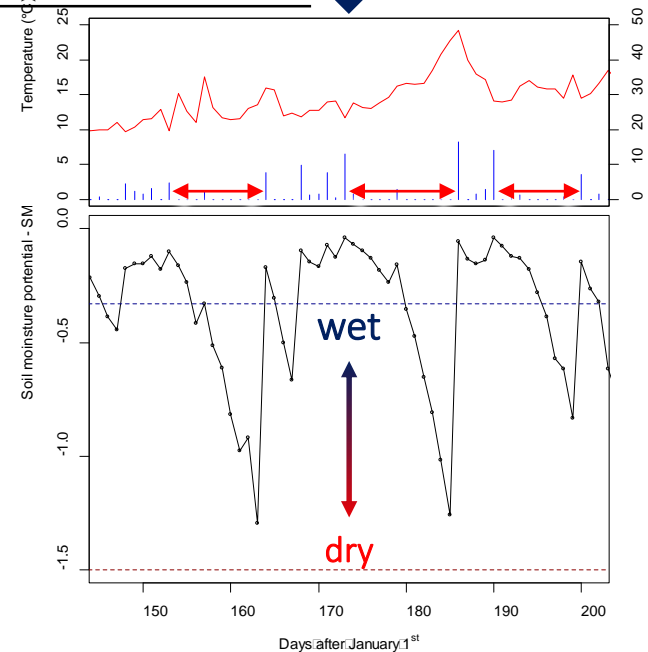
Soil data



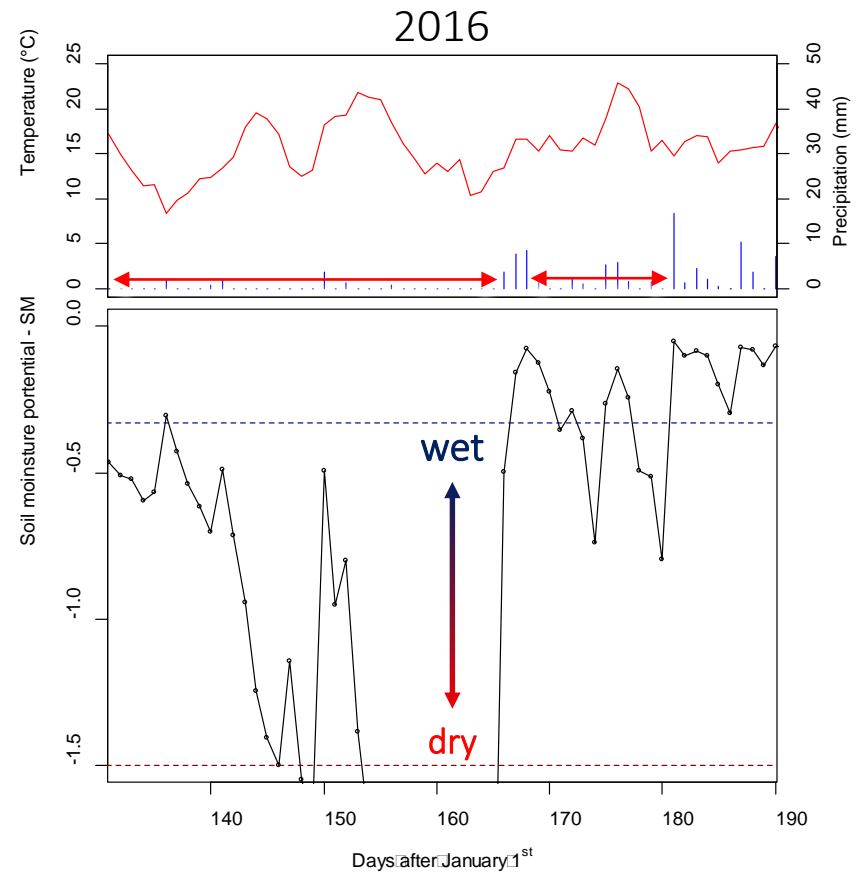
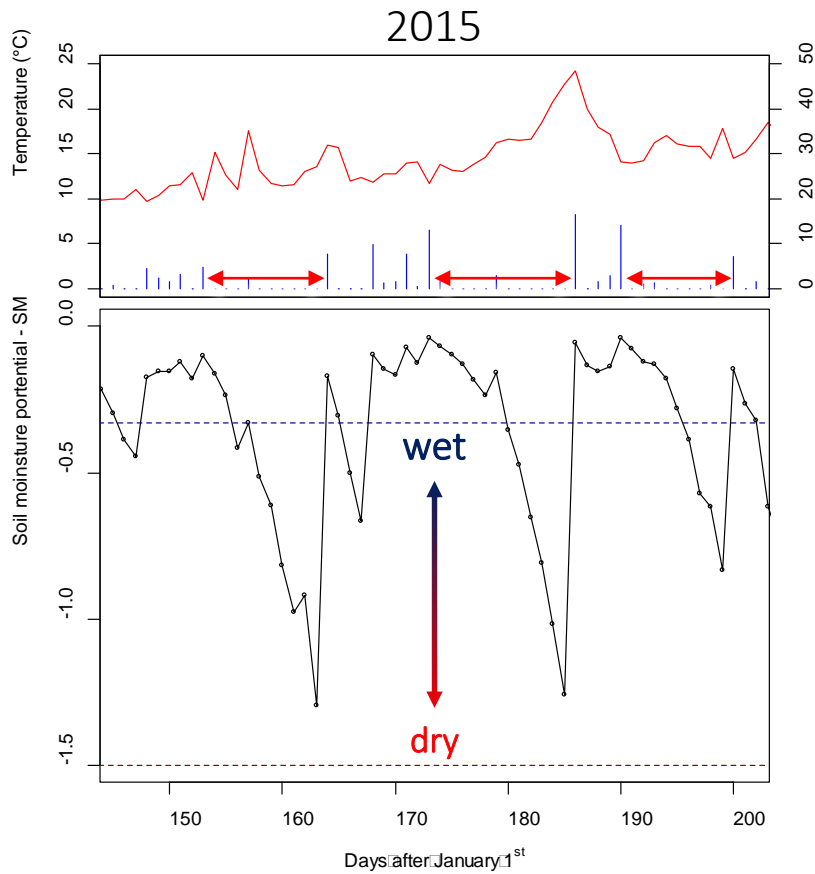
Weather data



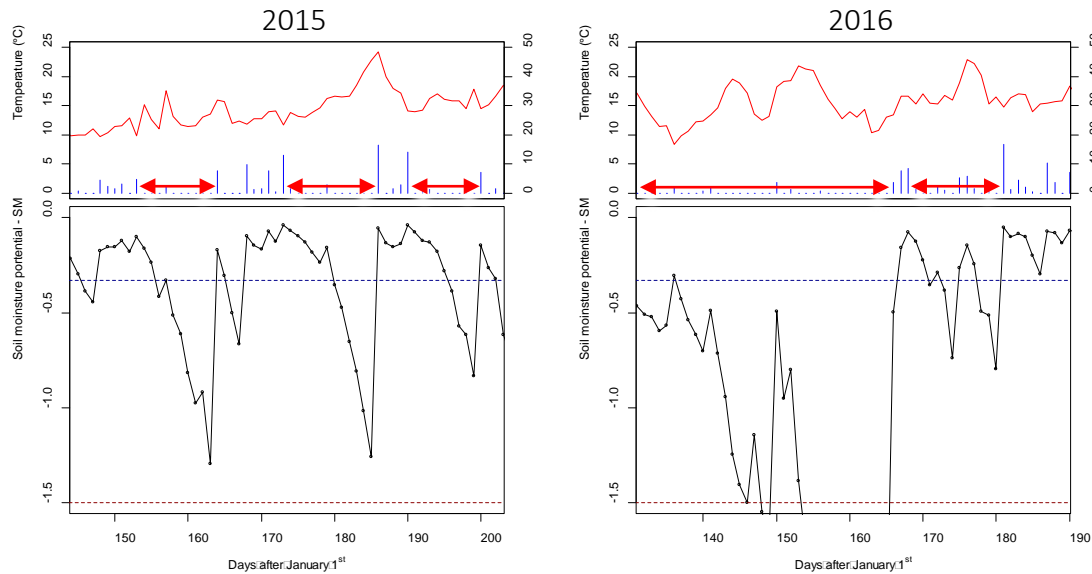
Soil moisture model



Water availability: comparison 2015/2016 (*Klagstorp*)



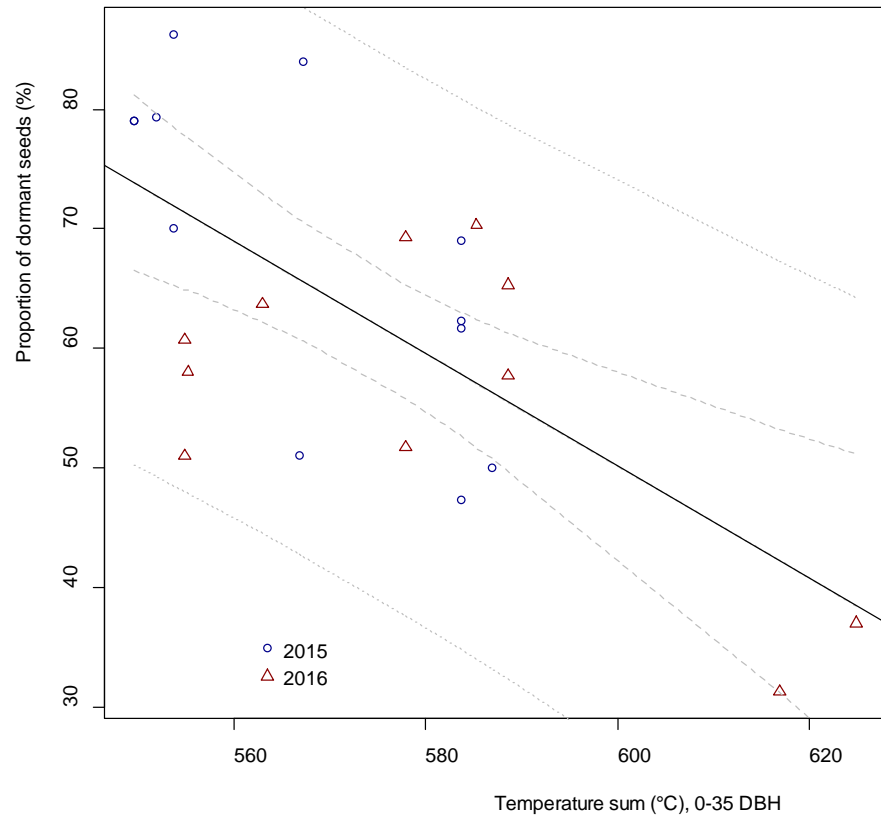
Water availability: comparison 2015/2016 (*Klagstorp*)



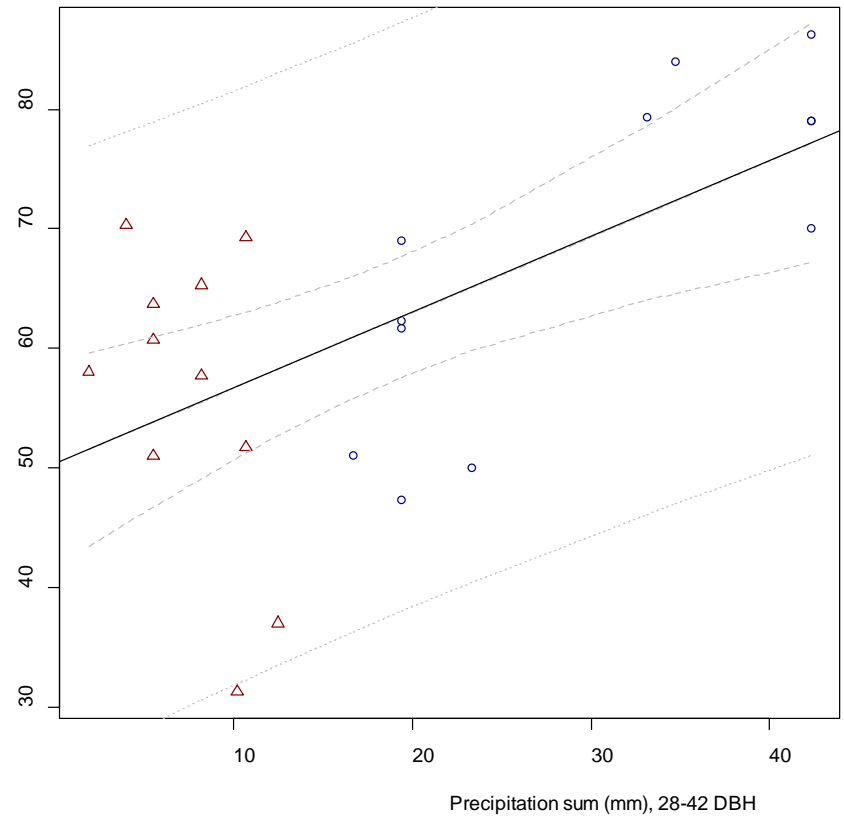
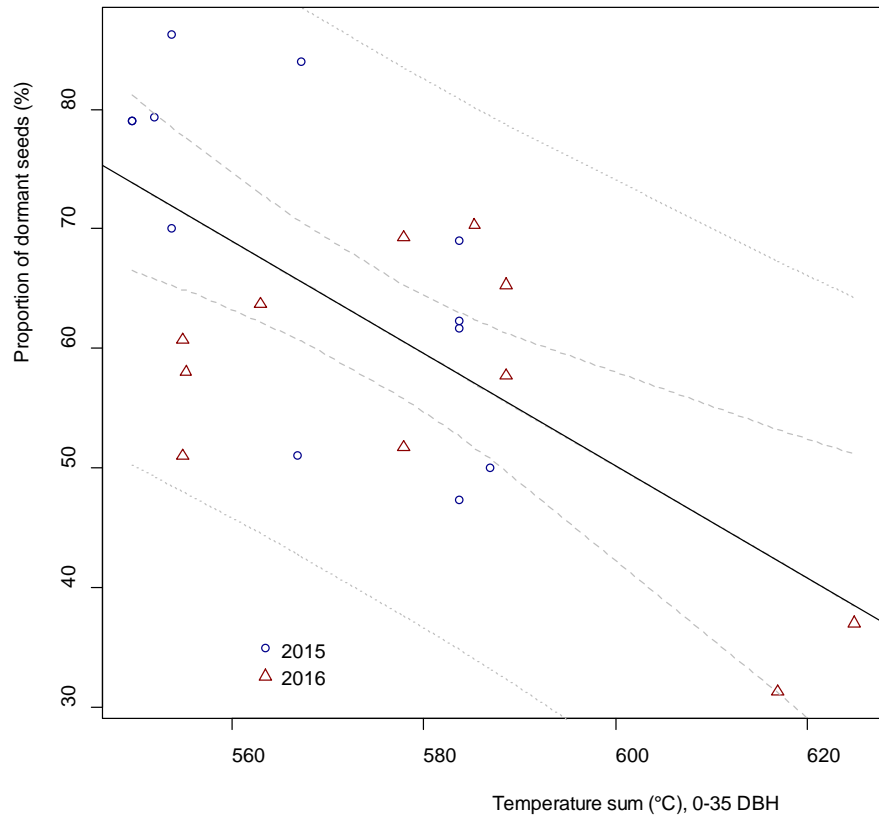
Year	Proportion of dormant seeds (%)	10-30% seed shed reached (day)	Precipitation sum (mm)	Mean temperature (°C)	Temperature sum (°C)	Number of days with mean SMP < PWP (0-30 cm soil depth)
2015	68	199	100	15	833	1
2016	55 (-13%)	189 (-10 days)	111 (+11mm)	16	911 (+78°C)	15 (+14 days)

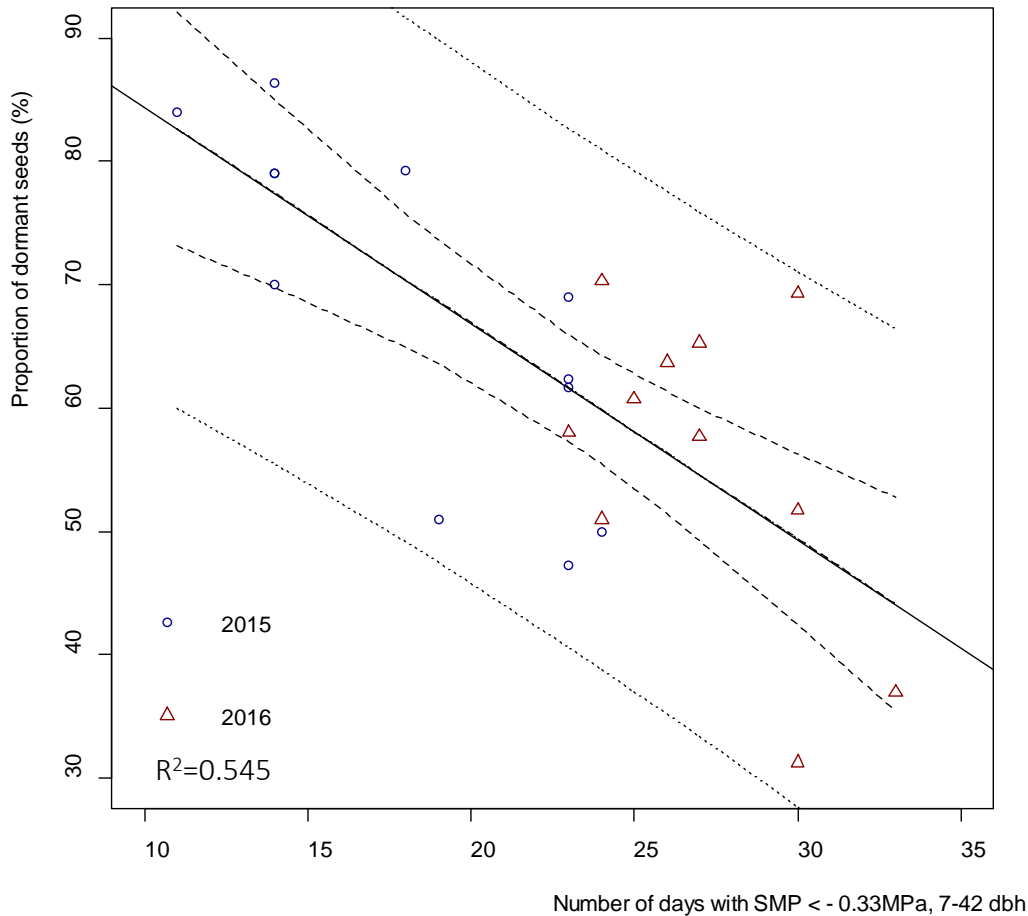
2015: 12 sampling sites
2016: 11 sampling sites

Best regression temperature- and precipitation sum



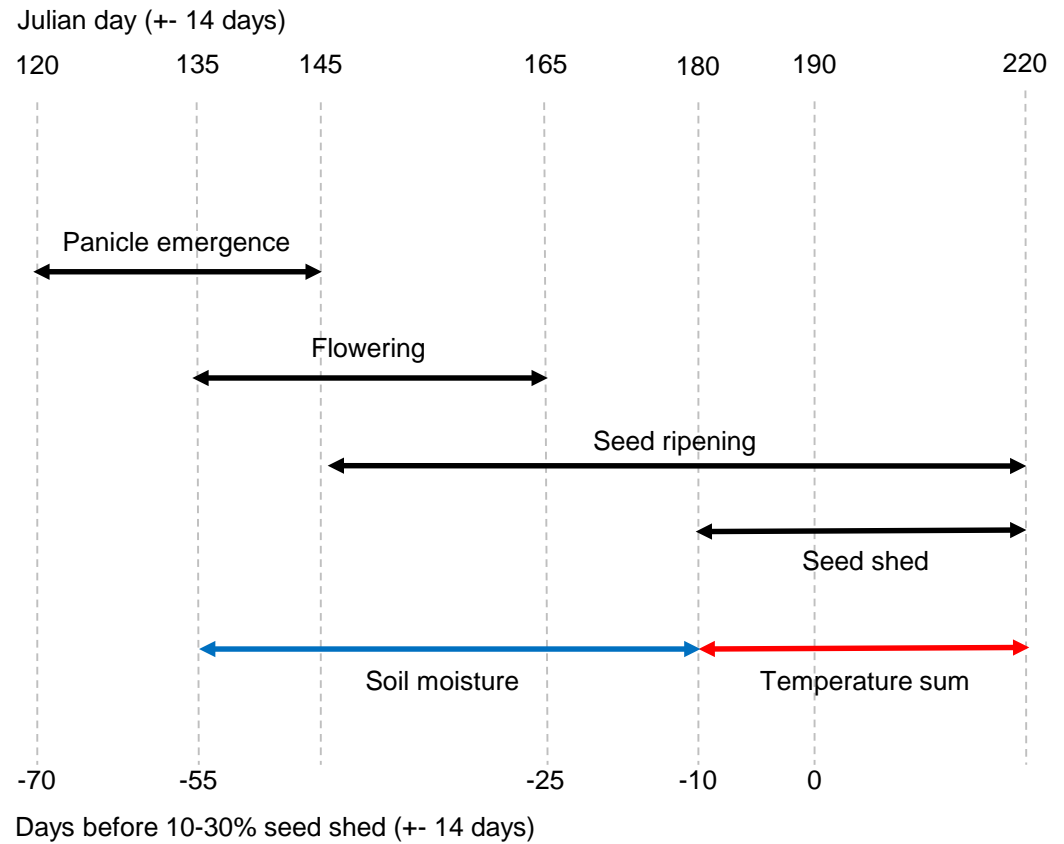
Best regression temperature- and precipitation sum



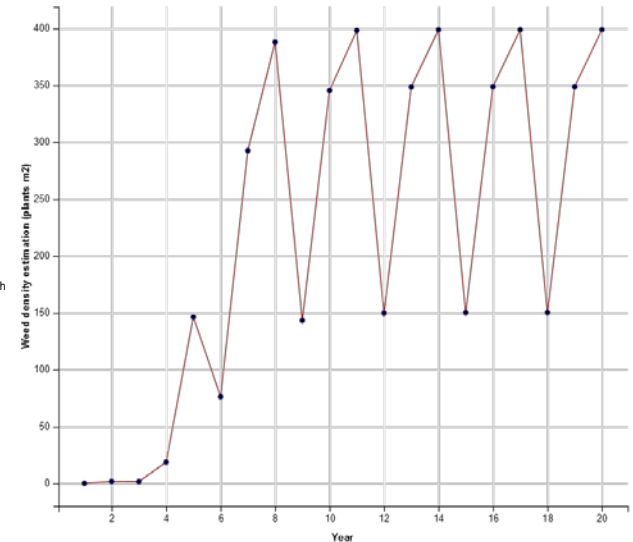
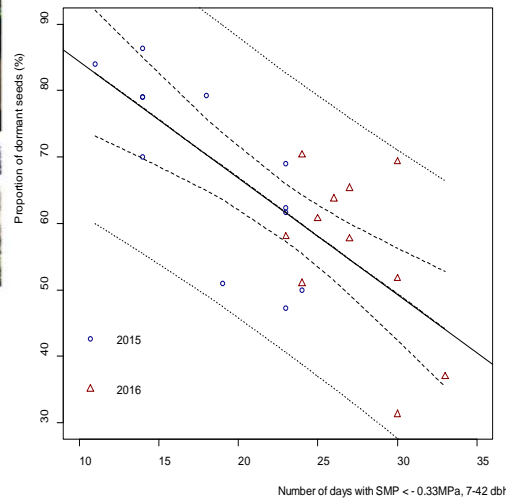


Summary:

- Only the upper soil layer (2-10 cm) is relevant in terms of soil moisture.
- A combination of soil moisture and temperature sum seems to be favourable for prediction accuracy ($R^2=0.678$).



Long term effect of soil tillage measures on population development under different initial dormancy levels.





What kind of models will be realised?

Independent sub-models

1. Dormancy forecast
2. Vertical movement of seeds due to tillage operations
3. Seedling emergence
4. Seed production

...and a interaction model where all sub-models are combined.

