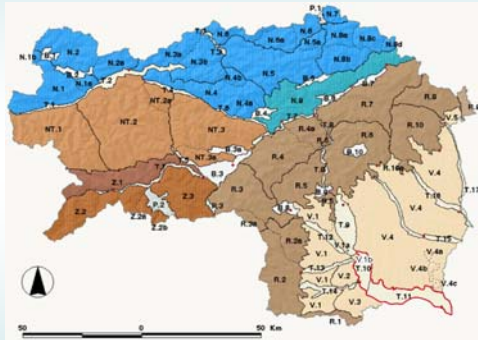


Modelling of Sustainable and Groundwater Protective Cropping Systems Using Long-term Scenario Simulations



Leibnitzer Feld

Unteres Murtal

Geographic sub-regions of Styria; the red line indicates the following two areas:
 T.10 = Leibnitzer Feld, T.11 = Unteres Murtal; V.1b = Weststeirisches Riedelland – Wildoner Berg
 according to <http://www.umwelt.steiermark.at/cms/ziel/845054/DE/>, LIEB G. K., modified

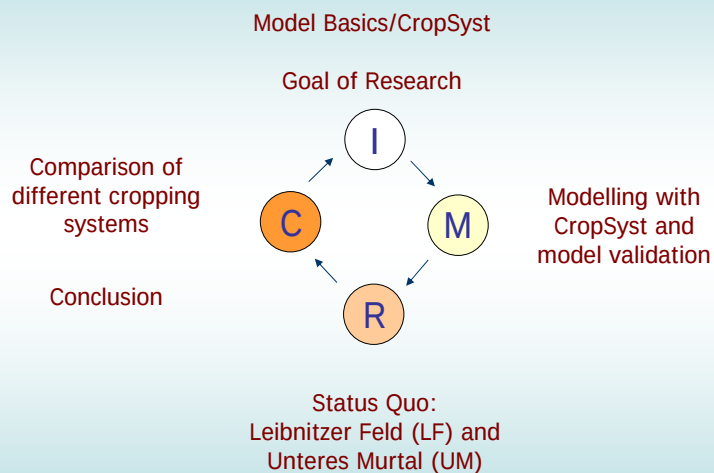
MMM Conference Graz
 January 2007

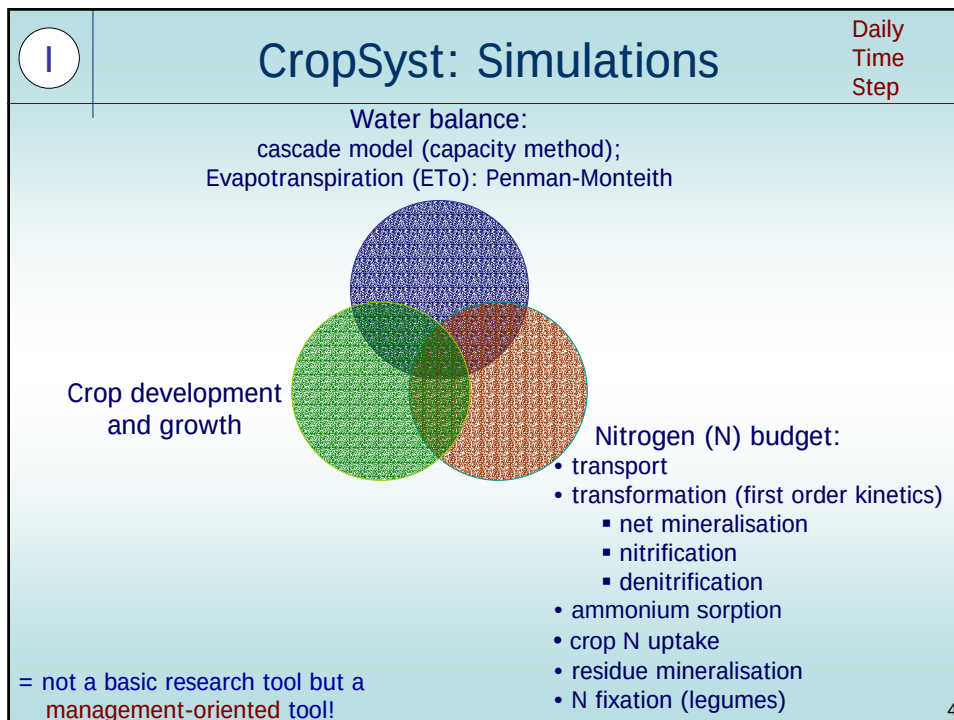
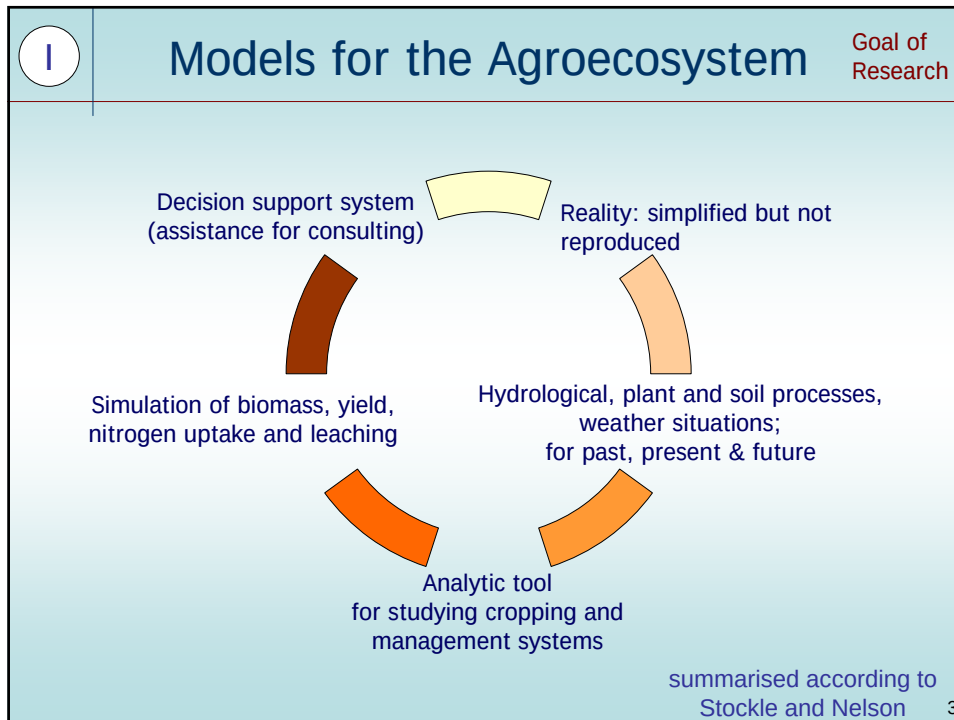


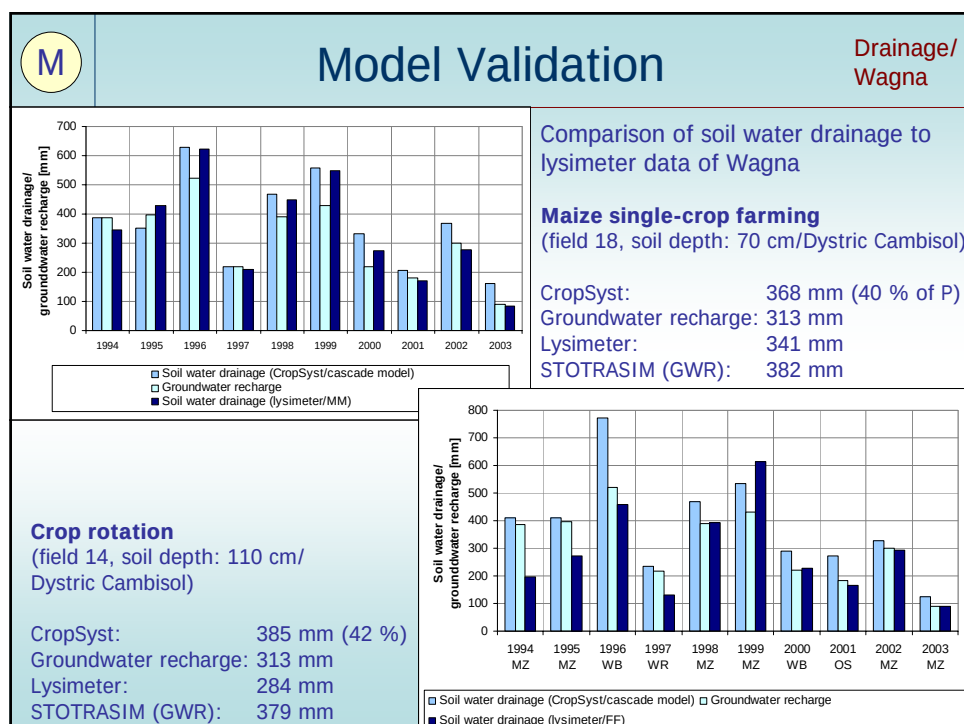
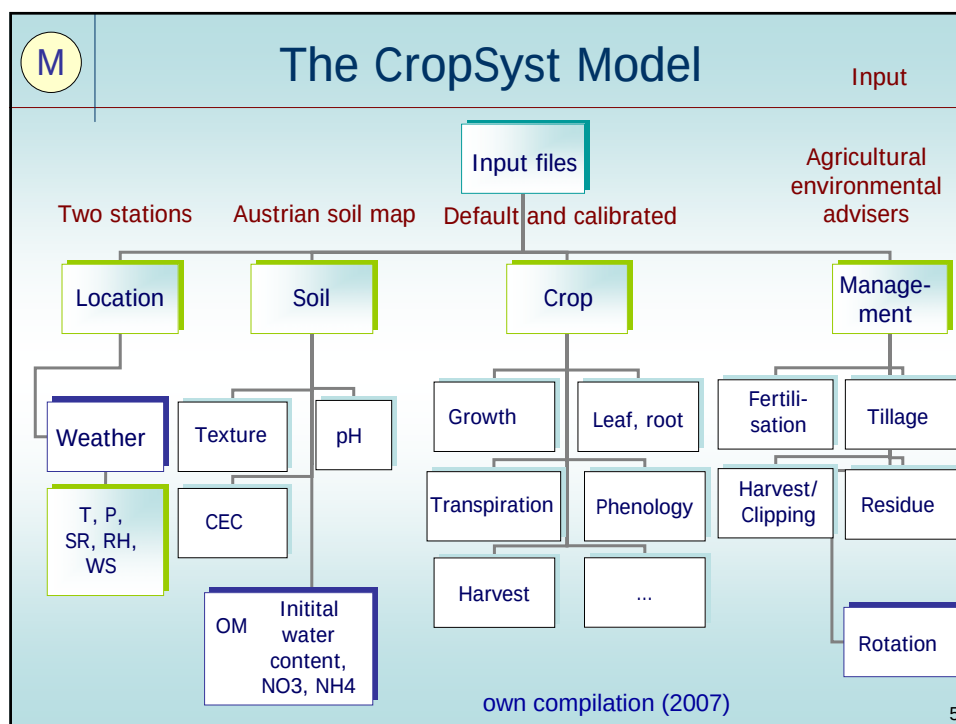
Christine Lanthaler
 e-mail: christine.lanthaler@aon.at

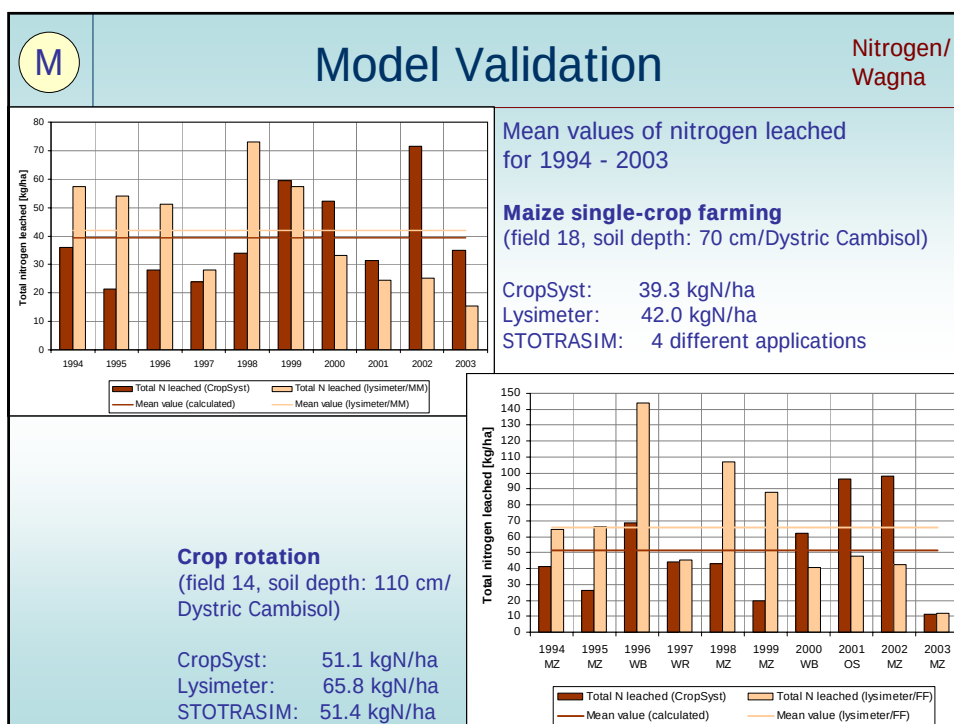


Outline

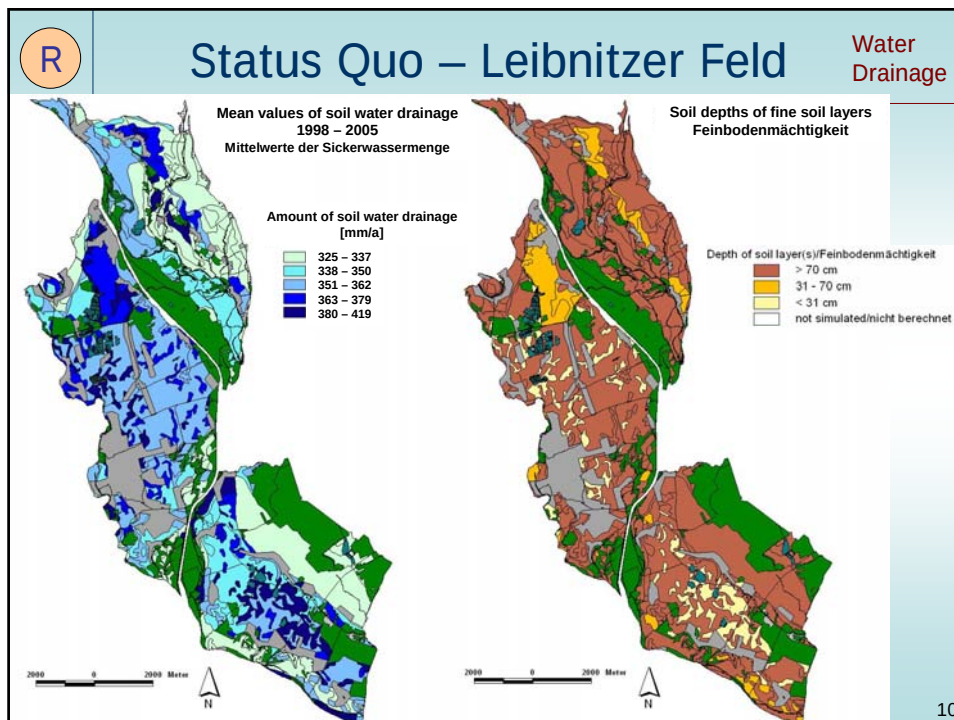
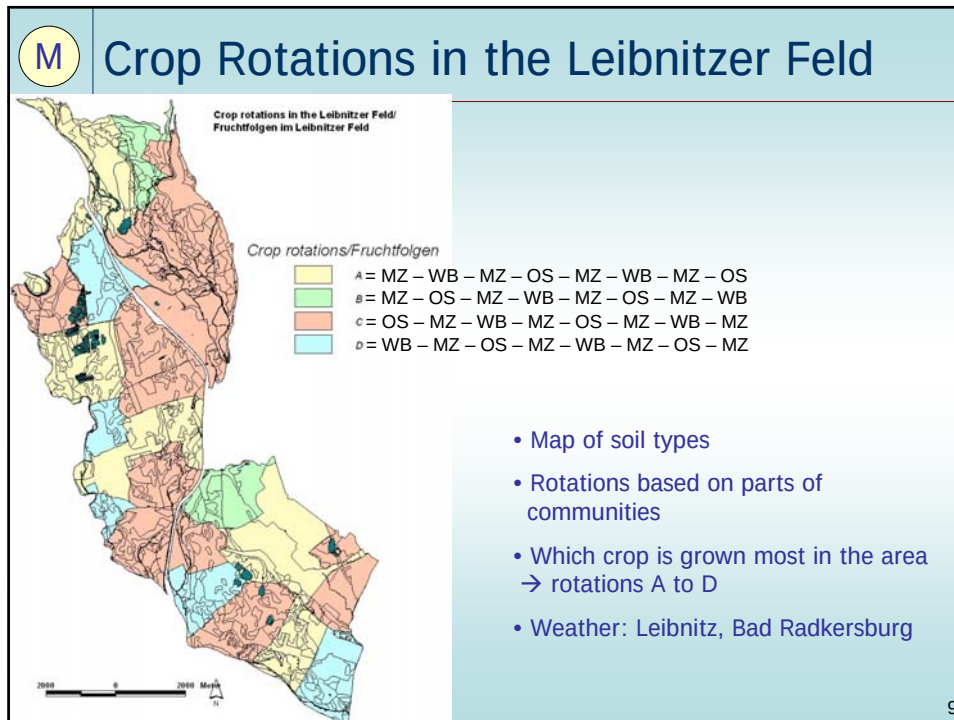


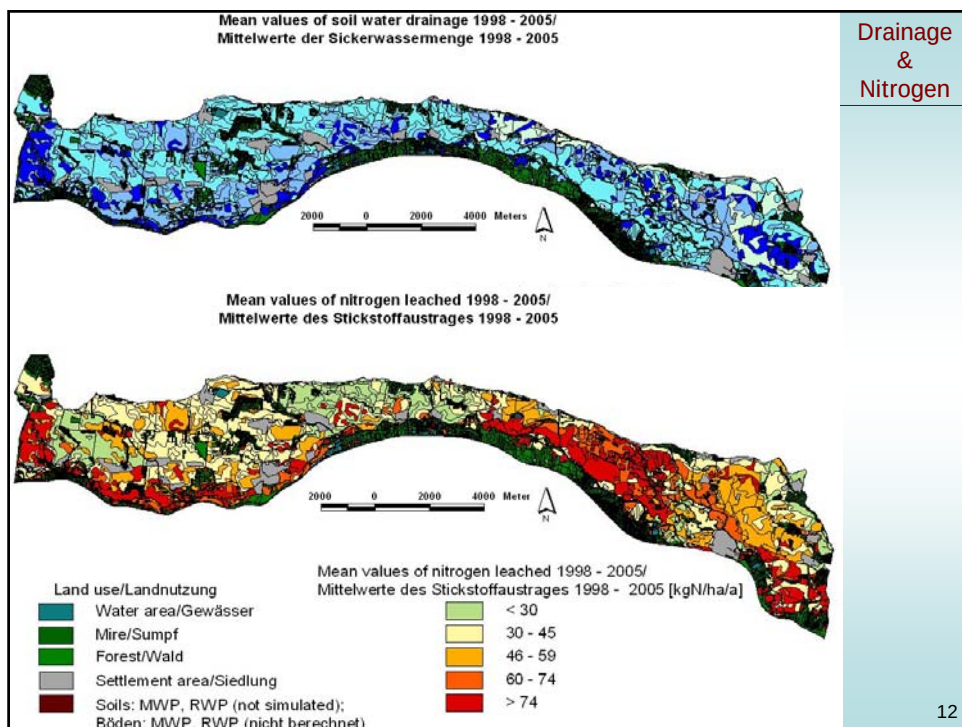
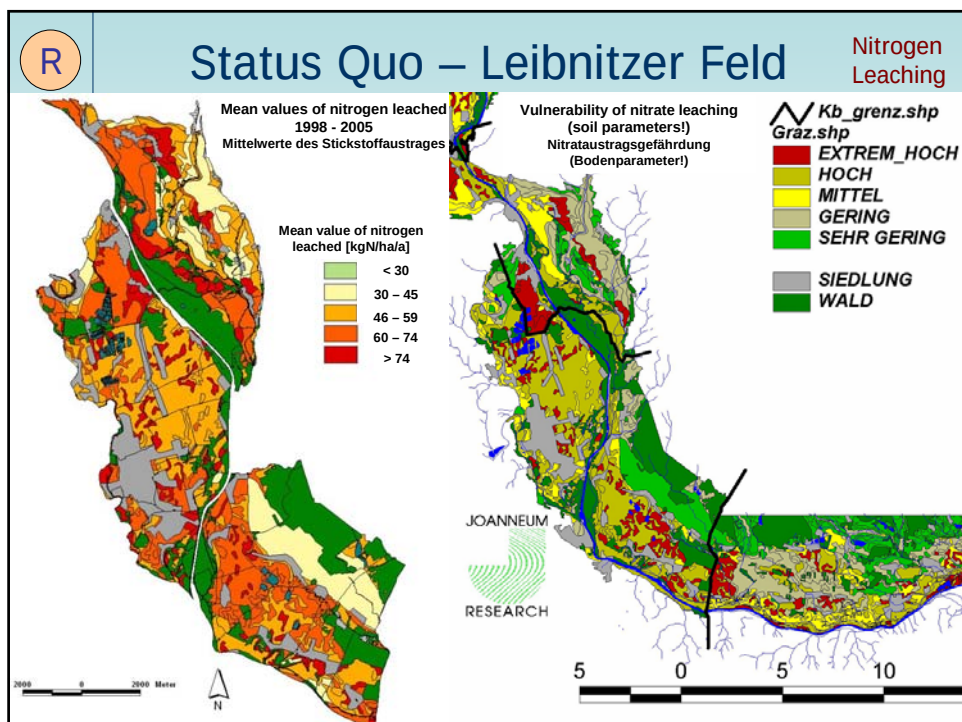


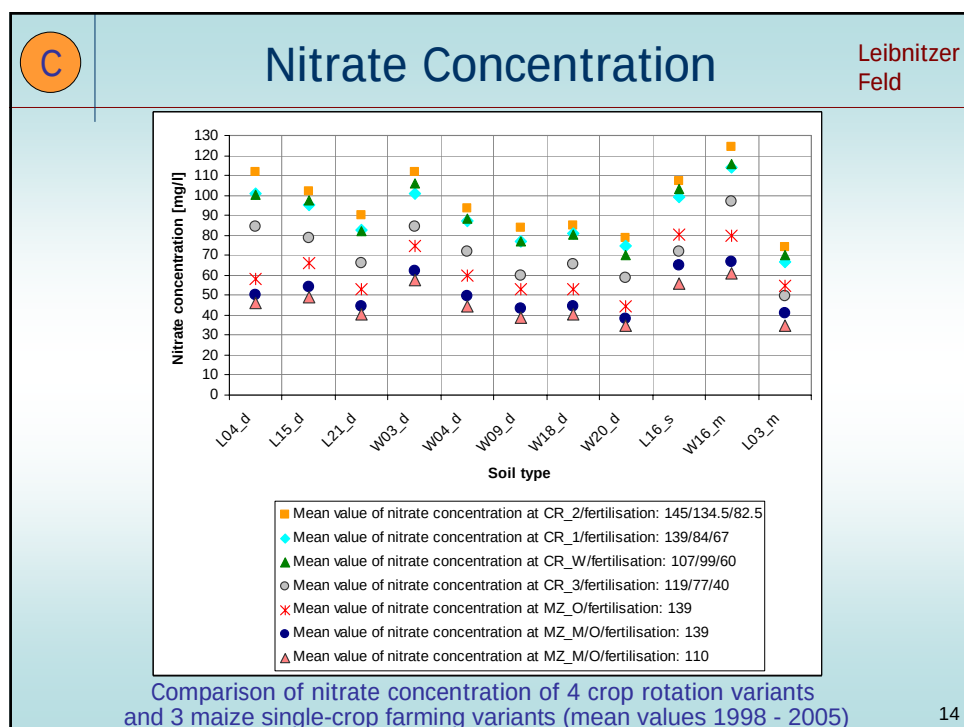
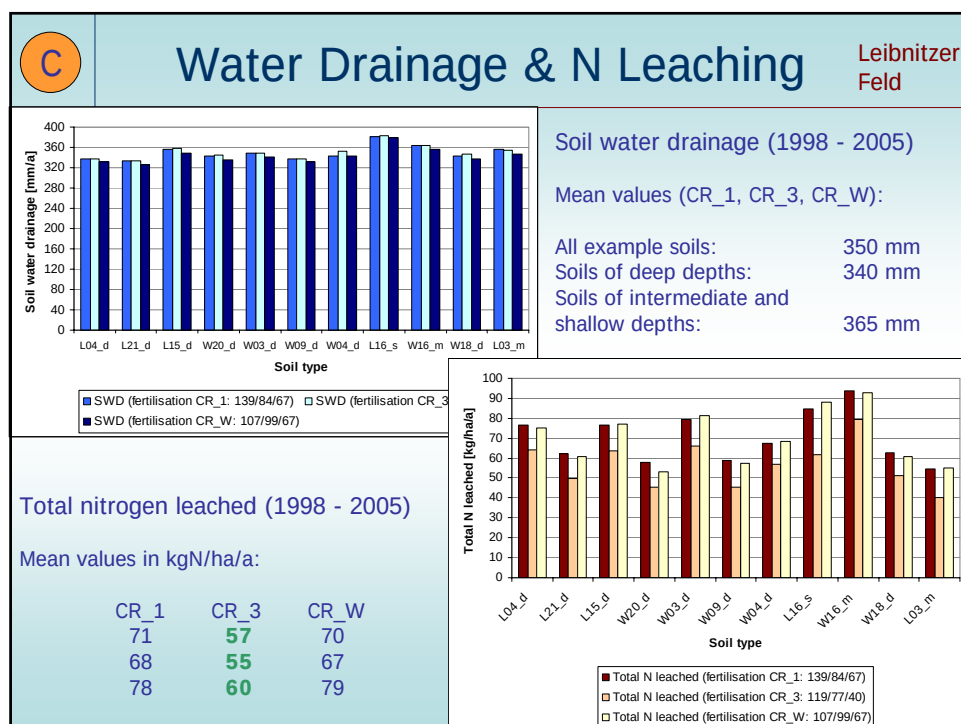


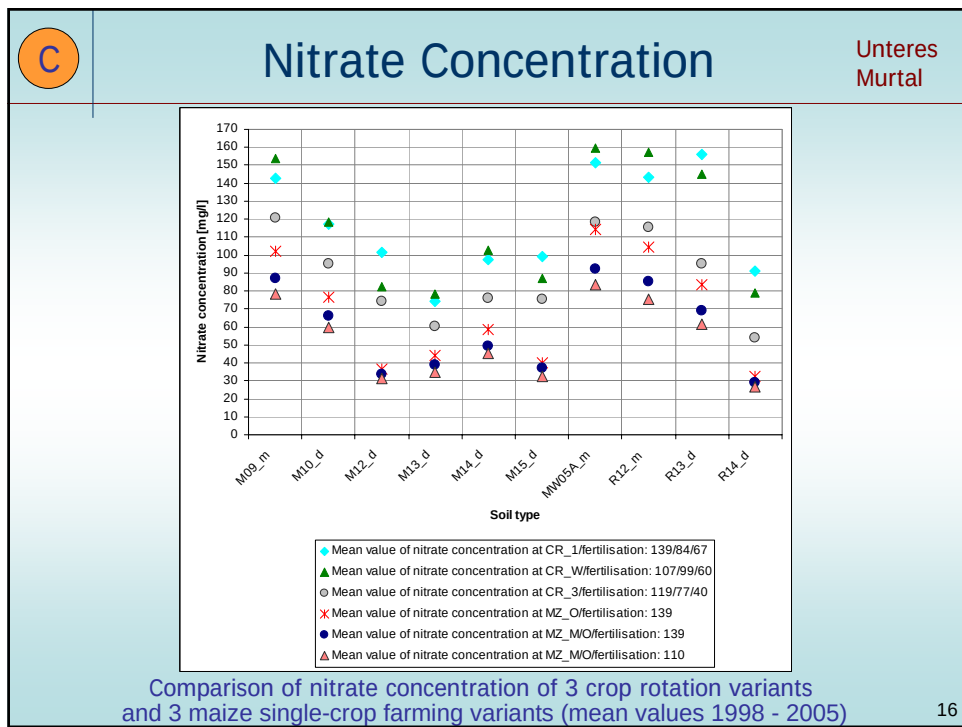
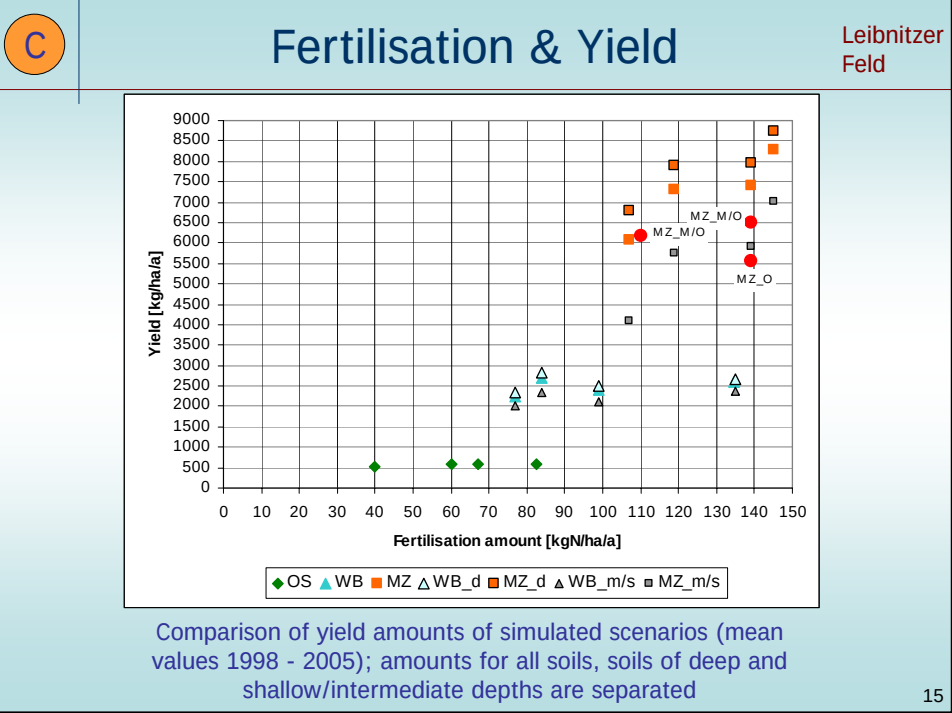


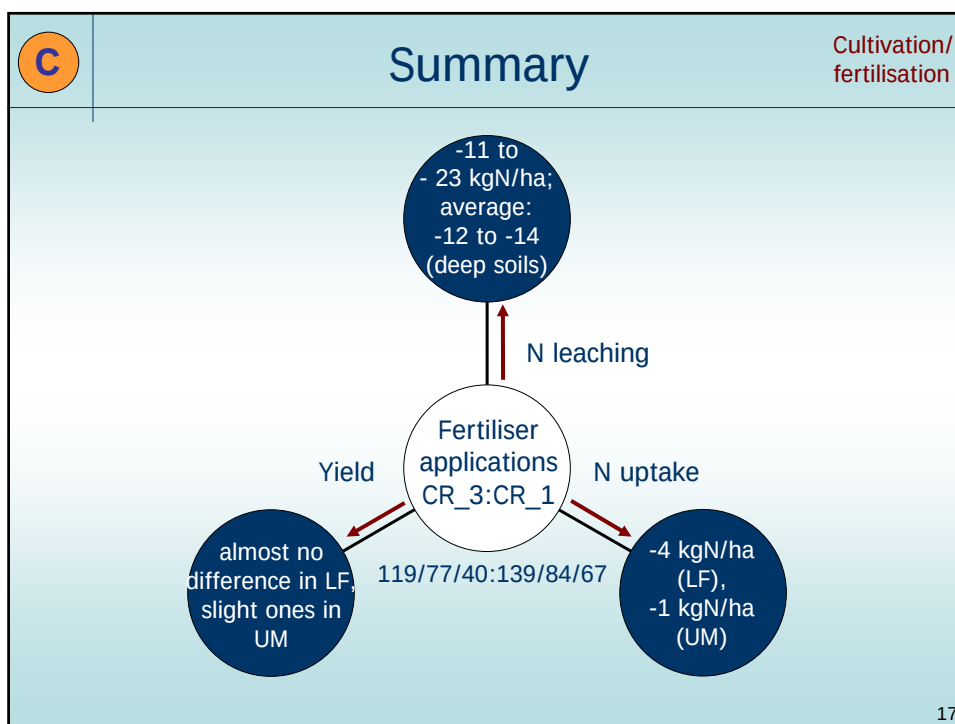
M Crop Rotations & Fertilisation Rotation & Maize			
	Maize (MZ)	Winter barley (WB)	Oil squash (OS)
Sowing date	April, 22	October, 13	April, 30
Crop rotation (fertilisation)	Fertilisation date and amounts in kgN/ha		
CR_1 (139/84/67):	- 4 days: 70 liquid slurry + 38 days: 69 urea/NH4	+ 144 days: 18.8 NO3/37.2 NH4 + 205 days: 9.4 NO3/18.6 NH4	+ 0 days: 27 urea/NH4 + 21 days: 20 NO3/20 NH4
CR_2 (145/134.5/82.5):	- 4 days: 70 liquid slurry + 0 days: 7 NO3/14 NH4 + 37 days: 27 NO3/27 NH4	+ 2 days: 52.5 liquid slurry + 152 days: 9.3 NO3/18.7 NH4 + 195 days: 27 NO3/27 NH4	- 3 days: 52.5 liqu. slurry + 0 days: 30 NH4
CR_3 (119/77/40):	- 4 days: 50 liquid slurry + 38 days: 69 urea/NH4	+ 144 days: 17.3 NO3/34.7 NH4 + 205 days: 8.3 NO3/16.7 NH4	- 20 days: 20 liqu. slurry + 0 days: 20 urea/NH4
CR_W (107/99/60):	- 4 days: 50 liquid slurry + 38 days: 57 liquid slurry	+ 144 days: 24.5 NO3/24.5 NH4 + 205 days: 50 liquid slurry	- 20 days: 40 liqu. slurry + 21 days: 10 NO3/10 NH4
Maize single-crop farming			
MZ_M/O (139):	- 4 days: 70 liquid slurry + 38 days: 69 urea/NH4	M/O = mineral and organic fertilisation	
MZ_O (139):	- 4 days: 70 liquid slurry + 38 days: 69 liquid slurry	O = organic fertilisation only	
MZ_M/O (110):	- 4 days: 50 liquid slurry + 38 days: 60 urea/NH4	M/O = mineral and organic fertilisation	











C Yield, N &
Modelling

Conclusions

- **YIELD & NITROGEN LEACHING**
 - Maize shows better development if cropped in a **rotation** than in single-crop farming (monoculture)
 - **Organic manure** (liquid slurry) is significantly **less efficient** than mineral fertilisers (in these simulations)
→ **higher N leaching** of organic manure than mineral fertilisers when the same amount is applied
 - **Groundwater protective** (< 50 mgNO₃/l):
maize 110 kgN/ha (min./org.) for many deep soils
- **MODELLING**
 - Very good simulation of **water balance**
 - Model deficiencies: **N balance** has more uncertainties – it is more complex to study and model than the water balance (Donatelli and Stockle, 1999)

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Thank you for your attention!

