



Practical examples on how the EFSA Guidance Document for predicting environmental concentrations of substances in soil can be used

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ACKNOWLEDGEMENT

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PUBLIC CONSULTATION: THE PROCESS

Interaction with stakeholders

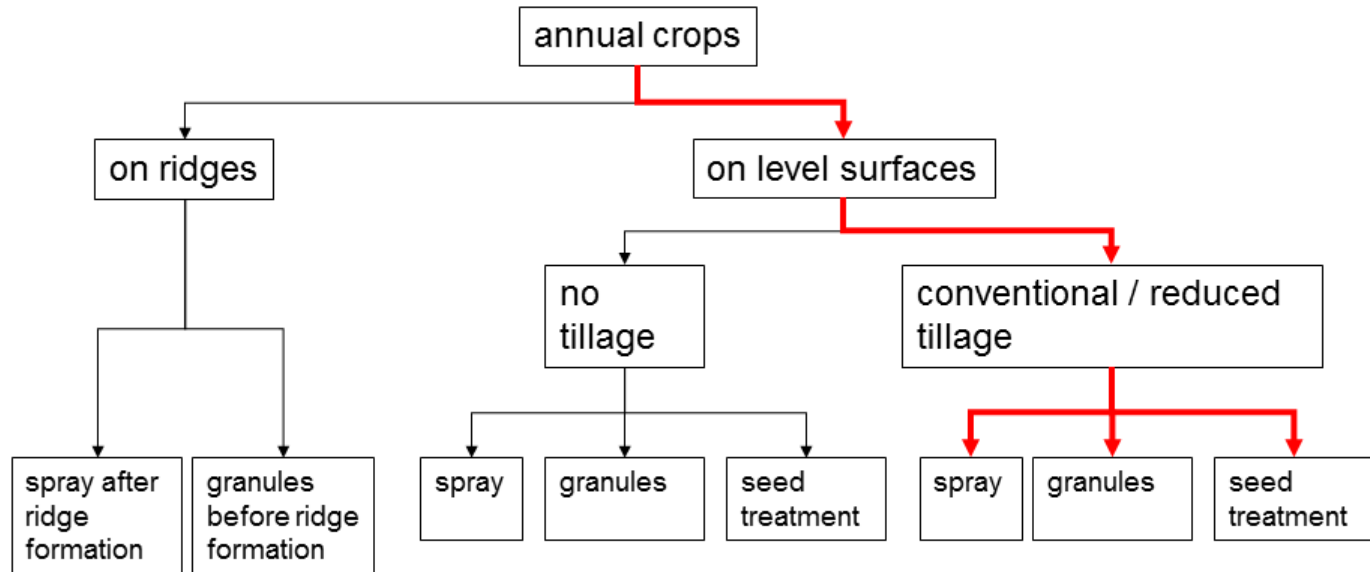
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- IRIS workshop at the start of the project
 - The PPR Panel took considerations from this workshop into account when developing a scientific opinion
 - Based on two PPR Opinions EFSA developed a Guidance Document

 - Public consultation launched from July - Sept, 2014
 - GD on sections on annual crops published in April 2015
 - <http://www.efsa.europa.eu/en/efsajournal/pub/4093>

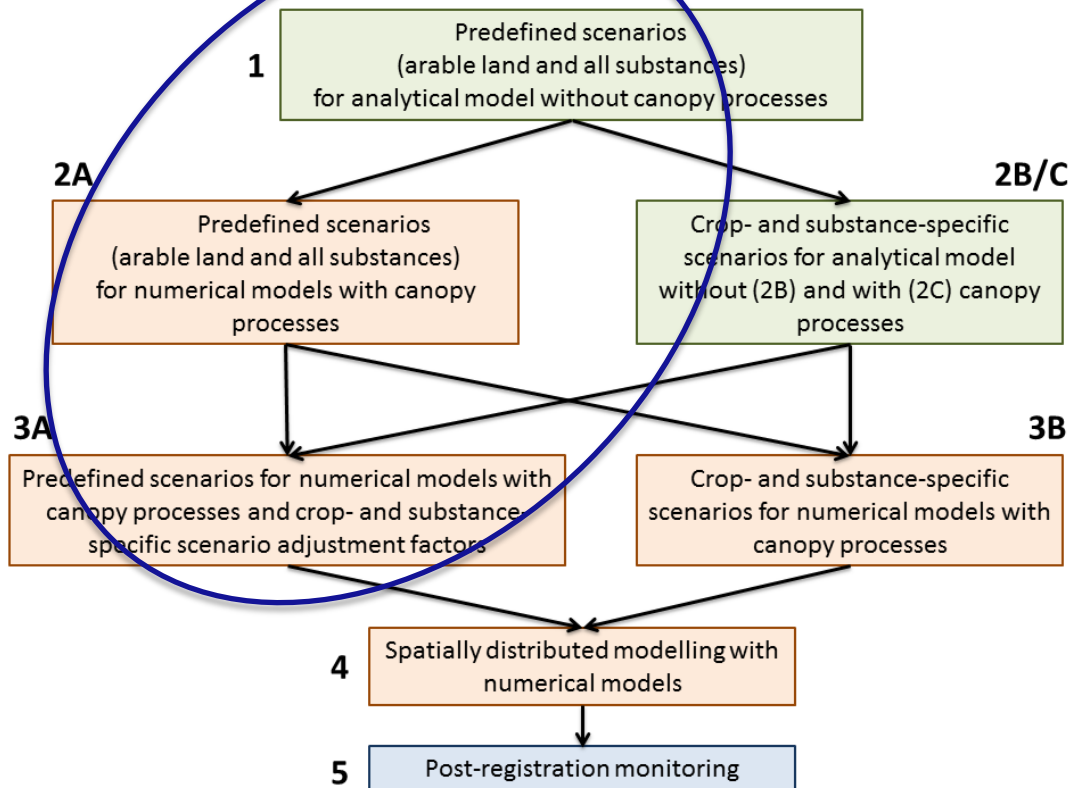
HIGHLIGHTS OF FINAL GUIDANCE DOCUMENT

Annual crops with conventional tillage

- Guidance for crops grown on ridges, annual crops where no tillage is applied and permanent crops in preparation

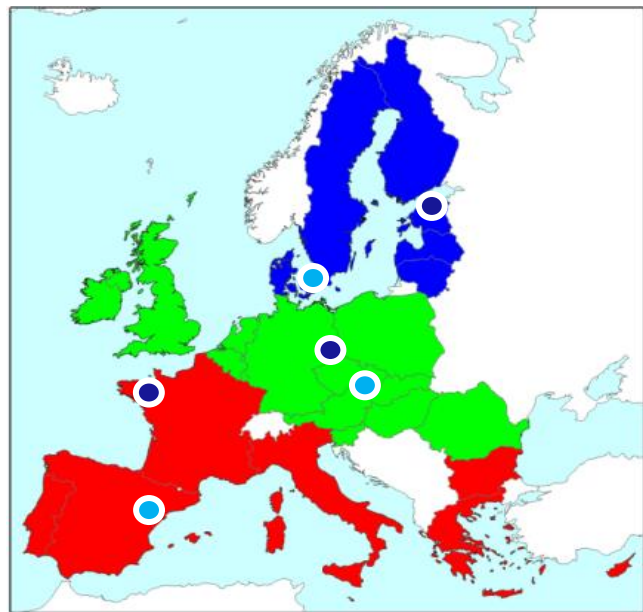


PREDEFINED SCENARIOS



- Predefined scenarios at Tier 1, 2A and 3A – assessment for **total area of annual crops**
- Tier 1 based on analytical model, Tier 2A and 3A based on numerical models

SIX PREDEFINED SCENARIOS

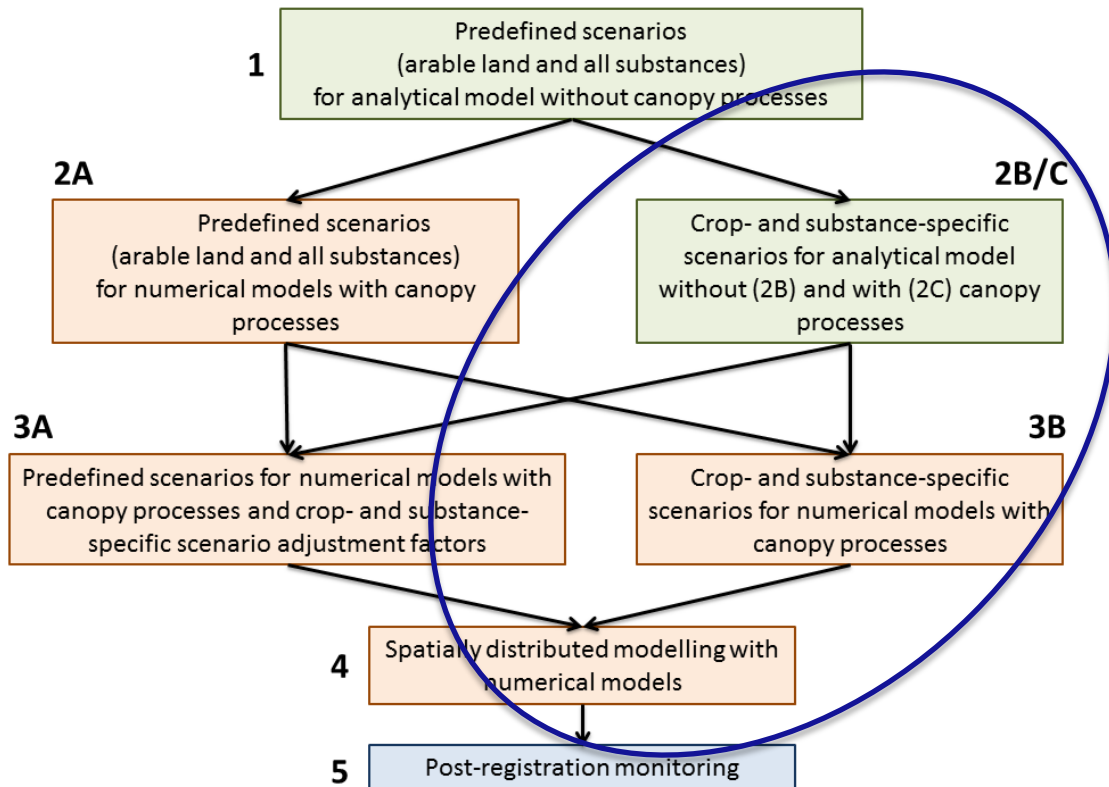


- concentration in total soil
- concentration in pore water

	T (°C)	OM (%)	PEC (mg/kg)
North	5 ↓	12 ↓	1.0 ↓
Centre	8 ↓	9 ↓	0.8 ↓
South	11 ↓	5 ↓	0.6 ↓

	T (°C)	OM (%)	PEC (mg/L)
North	8 ↓	2.2 ↑	0.23 ↑
Centre	9 ↓	1.6 ↑	0.26 ↑
South	13 ↓	0.9 ↑	0.32 ↑

ASSESSMENT FOR A SPECIFIC CROP

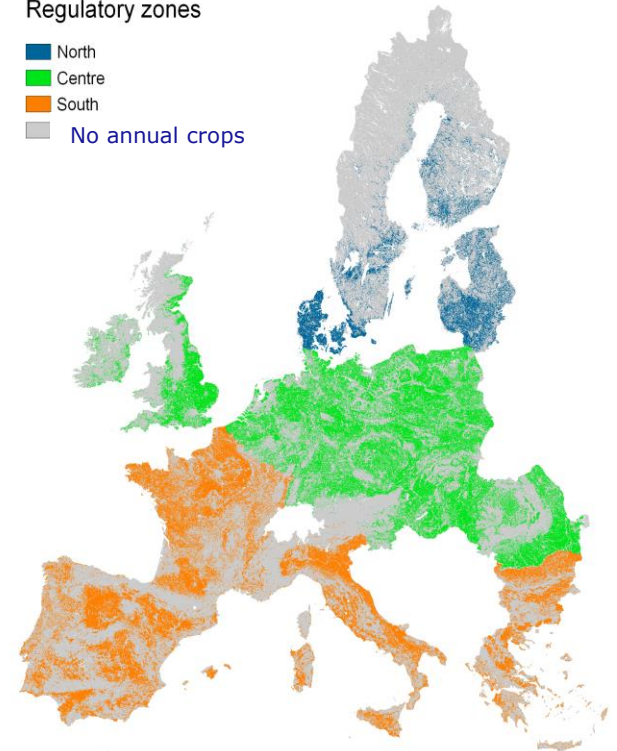
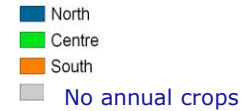


- At Tier 2B/C, 3B and Tier 4 assessment for **the area of a specific crop**
- Tier 2B/C with analytical model, Tier 3B and 4 with numerical model

ALL TIERS AIM AT THE SAME PROTECTION GOAL

- The exposure concentration should not exceed the regulatory acceptable concentration in 90% of the area of intended use of a pesticide in three regulatory zones
- The area of intended use is approximated by **the area of the crop in which the pesticide is intended to be used**

Regulatory zones



SO ADJUSTMENT FACTORS NEEDED AT LOWER TIERS

- Higher tiers should be less conservative than lower tiers, therefore

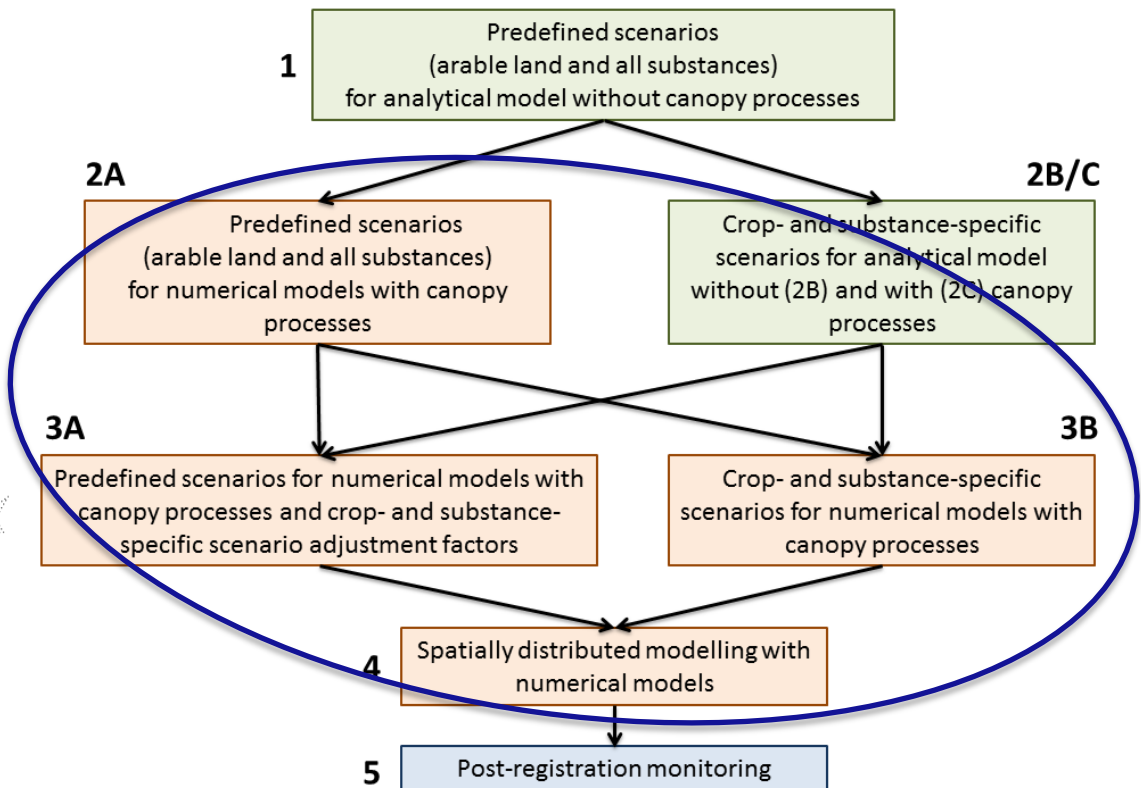
Tier	Scenario adjustment factors	Model adjustment factors
1	+	+
2A	+	-
2B	-	+
2C	-	+
3A	o	-
3B	-	-
4	-	-

Model adjustment factors to ensure that the simple analytical model is more conservative than the numerical models used at higher tiers

Scenario adjustment factors to account for differences between the area of a specific crop and total area of annual crops

- Application of these factors does not make the final assessment more conservative, because **at the highest tiers (3B and 4) these factors are not applied**

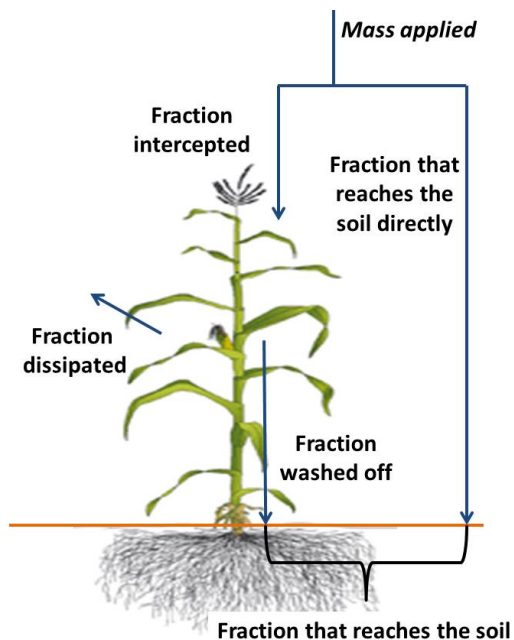
CROP INTERCEPTION IN THE TIERED APPROACH



- Crop interception and canopy processes may be included in all tiers, except Tier 1 and Tier 2B
- **Predefined tables** to be used in combination with the analytical model (Tier 2C)
- In response to requests by applicants, **canopy processes may be simulated** in PEARL and PELMO (so in all other tiers).

CROP INTERCEPTION: REFINEMENT POSSIBLE

Canopy processes in PEARL and PELMO were successfully harmonised



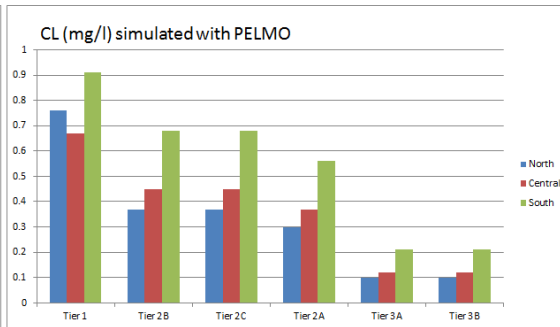
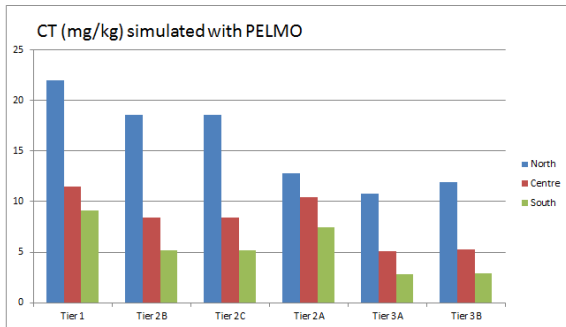
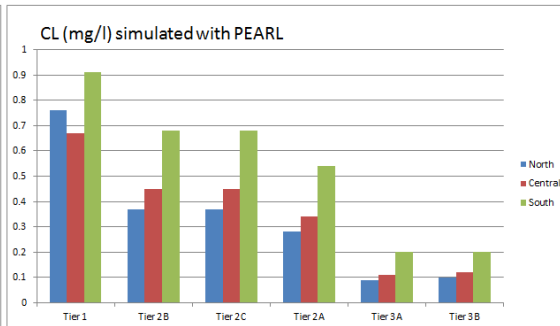
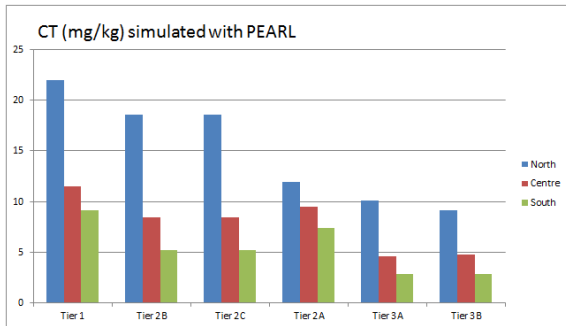
- Process descriptions were exactly the same
- LAI: a so-called spring-point was entered in PELMO so that crop development is harmonised
- Crop cover: Now calculated from the LAI in PEARL and PELMO using Beer's law

PRACTICAL EXAMPLES ADDED

Six examples were added to show how the GD can be used

Example 1	Application to the soil
Example 2.1	Application to the crop canopy, default crop parameter
Example 2.2	Application to the crop canopy, substance specific crop parameter
Example 3.1	Soil pH dependent sorption (sigmoid relationship)
Example 3.2	Soil pH dependent sorption (linear relationship)
Example 4	Parent and metabolites
Example 5	Accounting for the rapidly dissipation fraction derived from field dissipating studies (F_{field})
Example 6	Exposure assessment based on the total amount in soil

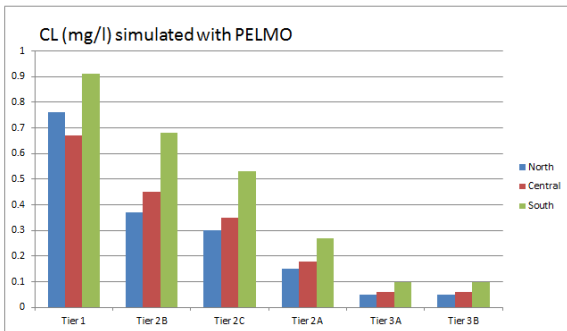
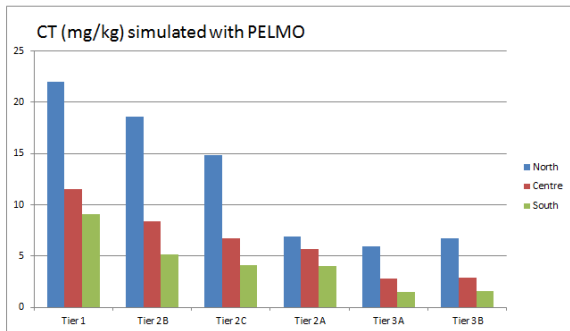
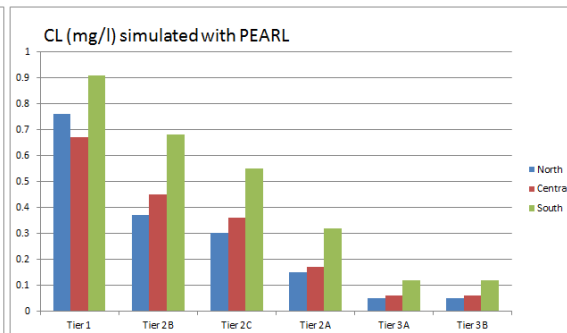
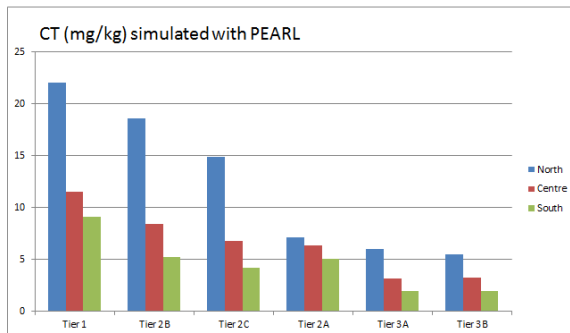
1: APPLICATION TO THE SOIL SURFACE



- $DegT50=250$ days
- $K_{om} = 1000$ L/kg
- Application of 1 kg/ha in winter wheat, one day before emergence
- Maximum concentration averaged over 5 cm

- Concentrations decrease when going to higher tiers
- Differences between PEARL and PELMO are small

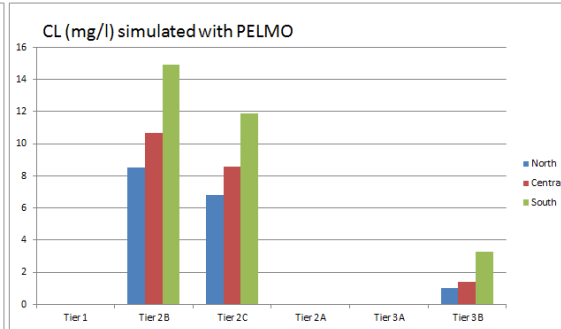
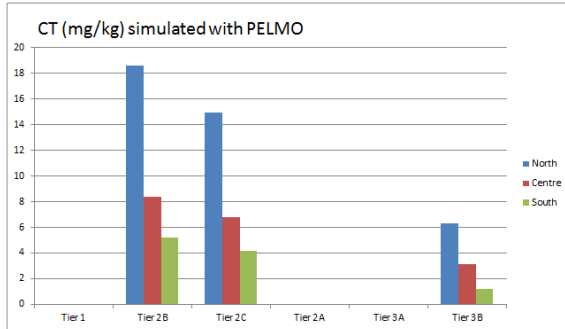
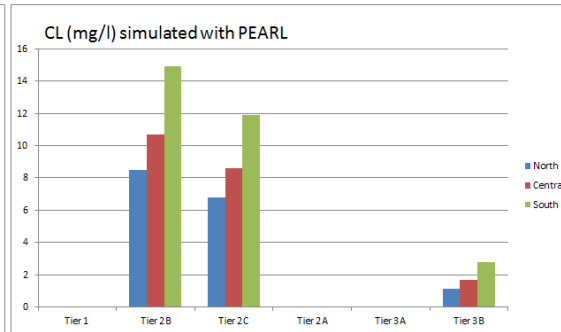
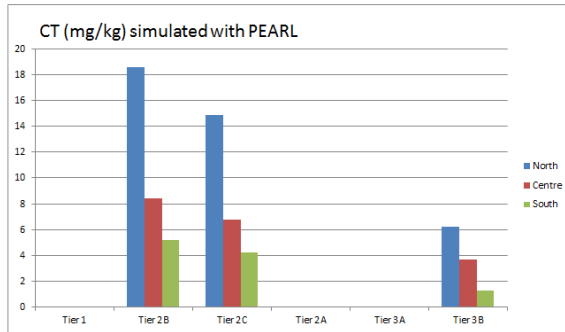
2: APPLICATION TO THE CROP CANOPY



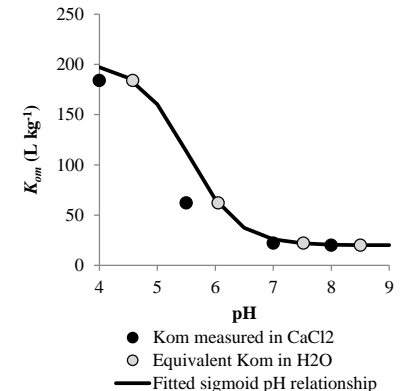
- $DegT50 = 250$ d
- $K_{om} = 1000$ L/kg
- $DisT50$ crop = 2 d
- Two applications of 0.5 kg/ha in winter wheat at BBCH 10-19 and BBCH 40-59
- Maximum concentration averaged over 5 cm

- Tier 2C now different from Tier 2B
- Larger differences between PERSAM and numerical models

3: SOIL pH - DEPENDENT SORPTION

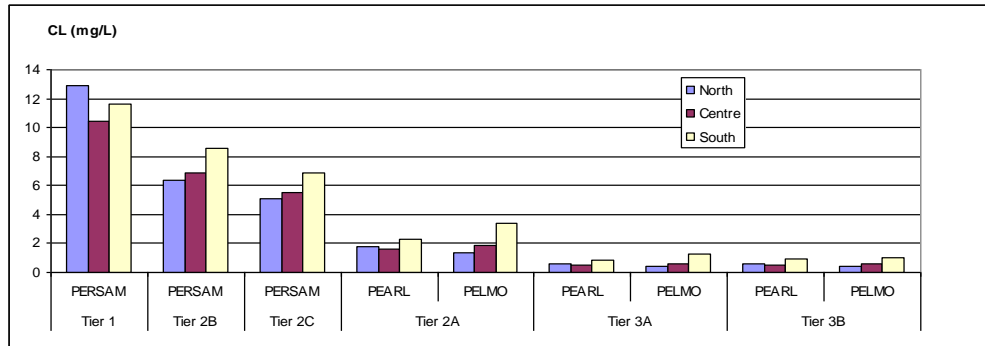
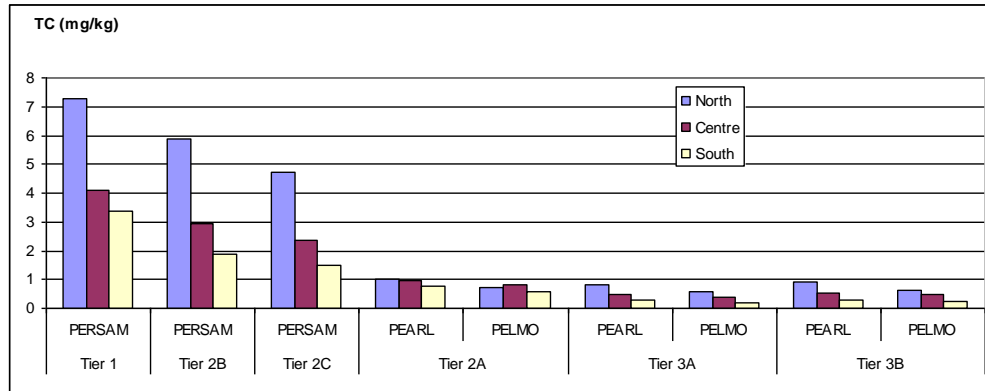


- Weak acid, $pK_A=4.7$
- K_{om} available in four soils (pH in $CaCl_2$)
- First convert to pH in water
- Then fit function



- No results for predefined scenarios
- Note that CL is much higher: lower K_{om} at high pH value

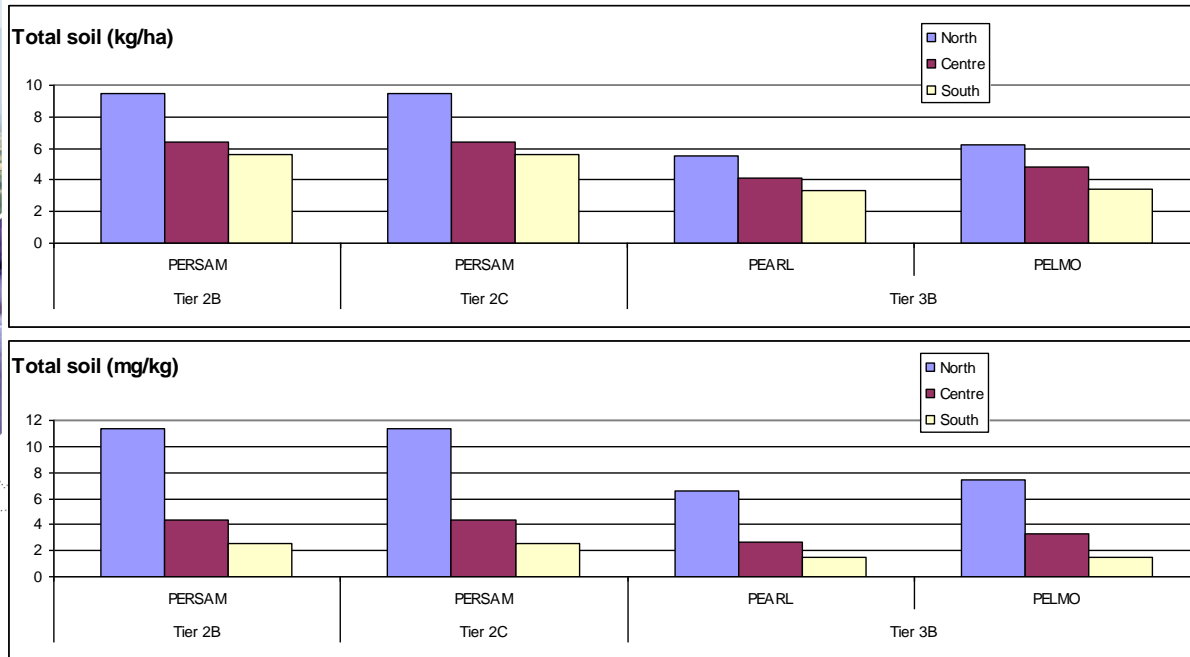
4: PARENT AND METABOLITE



- Parent short living
DegT50: 25 days
KOM: 1000 L/kg
- Metabolite M1:
DegT50: 100 d
KOM: 10 L/kg
- Molar ratio: 0.33
Formation fraction: 0.7

- Tiered approach also works for metabolites
- Comparable concentrations in the liquid phase and in total soil

6: EXPOSURE ASSESSMENT BASED ON APP.RATE



- *winter cereals*
- *1 kg/ha 1 day before crop emergence*
- *Kom 1000 L/kg*
- *DegT50: 250 d*
- *soil exposure based on top 20 cm of soil*

- *Tiered approach works for this problem*
- *No results for predefined scenarios possible (inappropriate value of the soil bulk density)*

CONCLUDING REMARKS

- The guidance was developed for application of pesticides but may also be applicable for exposure assessment of other substances applied to soil
- The practical examples show that the **tiered approach works well** (i.e. higher tiers are less conservative) and that the differences between the numerical models are small
- Guidance for crops grown in ridges, annual crops where no tillage is applied and permanent crops will follow
- **Conservativeness** of resulting risk assessments to soil organisms cannot be assessed before guidance on effect assessment to in soil organisms becomes available