

# Use Maps for Fertilizers & Environmental Exposure Assessment

Webinar 27<sup>th</sup> February 2018  
13:00-13:45 CET

# Practicalities



[leondina@fertilizerseurope.com](mailto:leondina@fertilizerseurope.com)

# Practicalities

Presentations and recording will be available at:  
<http://www.reachfertilizers.com/>

## WEBINAR

### SAVE THE DATE!

**Webinar date:** 27 February 2018

**Time:** 13:00 – 13:45 CET

### Use maps for fertilizers & environmental exposure assessment

Fertilizers Europe is delighted to announce a webinar presenting our new website REACH for fertilizers and the Fertilizers Environmental Exposure tool (FEE tool). A spreadsheet-based FEE tool has been developed together with related documents, to support registrants, formulators and downstream users in providing greater consistency and harmonised information on the safe use of fertilizers exposure and risk assessment for soil, sediment and surface waters of fertilizers. With the FEE tool, you can assess the environmental exposure of environmentally classified substances in fertilizer use. Today's focus is in the assessment of Manganese, Zinc and Copper substances.

The event is open to both members and non-members and participation to the webinar is free of charge. You can register [here](#).

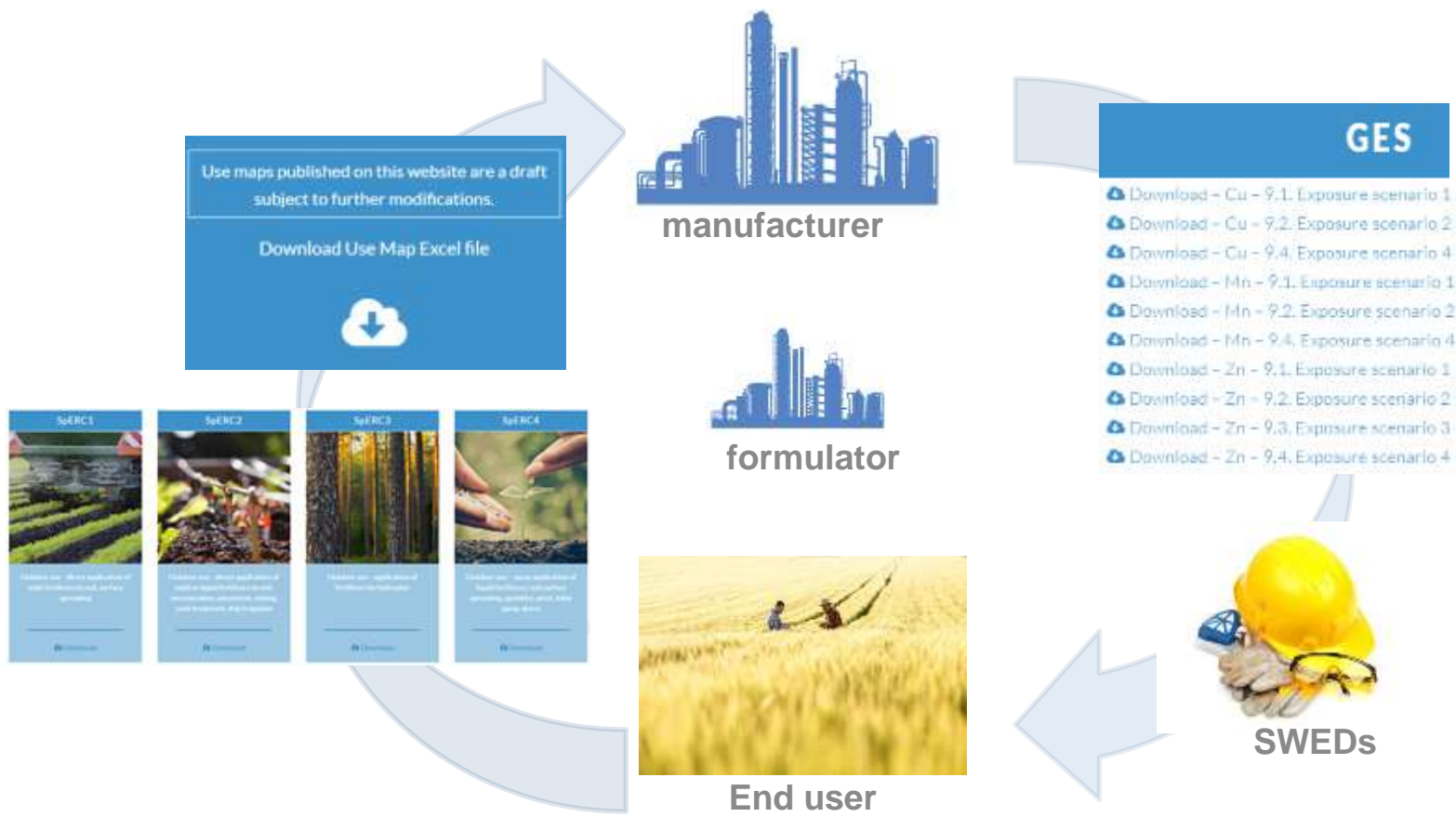
# Agenda

- Introduction
- SPERCs and FEE Tool
- Practical examples for fertilizing recommendation
- Take-home message

# Who we are



# Communication within Supply Chain



# Risk Assessment

- Companies have to perform a quantitative exposure and risk assessment for all hazardous substances.
- The existing environmental exposure tools do not take into account:
  - direct emissions to the soil
  - any direct and indirect releases from treated agricultural fields to surface water at the local scale
- To help members we have developed a FEE Tool for local exposure assessment of micronutrients (Cu, Zn and Mn)

# Risk Assessment



## FERTILIZERS ENVIRONMENTAL EXPOSURE (FEE) TOOL

User guidance for environmental exposure assessment of  
fertilizers under REACH

November 2017

Fertilizers Europe  
Avenue E, Van Nieuwenhove 2  
B-1150 Brussels, Belgium  
[secretaria@fertilizers-europe.com](mailto:secretaria@fertilizers-europe.com)  
<http://www.fertilizers-europe.com>  
+32 2 603 31 46

Developed in cooperation with ARCHE Consulting



ARCHE consulting vzw  
Lafarrestraat 30D



# SpERCs and FEE Tool

Dr. Koen Oorts  
Dr. Sabine Navis



<http://www.arche-consulting.be>

# Fertilizers Environmental Exposure Assessment

- **SPERCs:** Specific Environmental Release Categories developed covering outdoor fertilizer uses in Europe ([factsheets + background doc](#))
- **FEE-tool:** Quantitative exposure assessment of generic and specific fertilizer use scenarios ([Excel-based tool + user guidance](#))
- **Generic exposure scenarios:** Currently available for 4 SPERCs, focused on micronutrients (Cu, Mn, Zn)



<http://www.reachfertilizers.com>

# Fertilizers Environmental Exposure Assessment

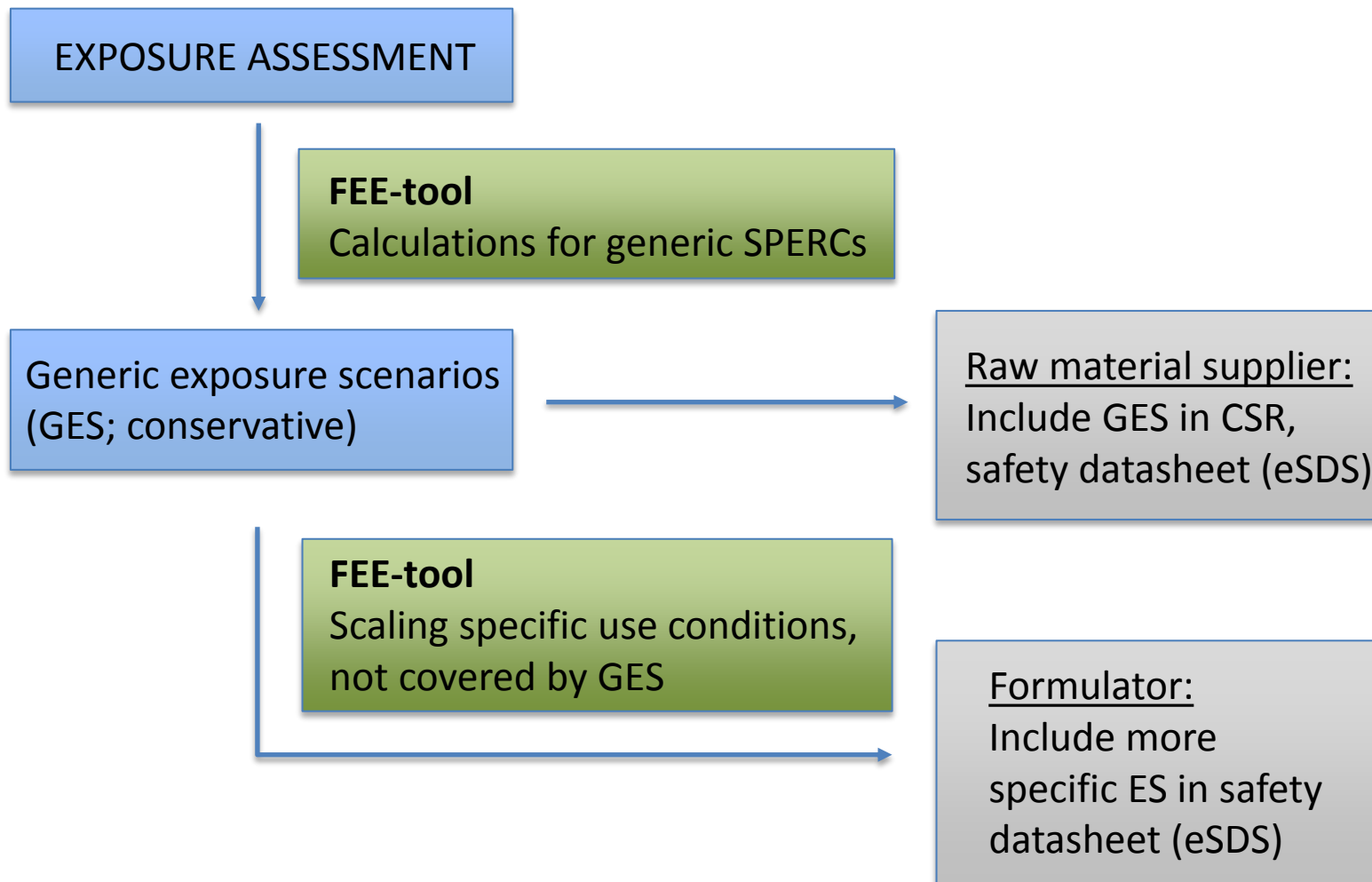
- Current REACH modelling approaches are focused on industrial chemicals
- They do not include important processes for fertilizers:
  - Emissions to soil, water and air through direct fertilizer application
  - Plant uptake, crop offtake by harvest
  - Drift and runoff to surface water



VS.



## Fertilizer exposure assessment: SPERCs + FEE-tool



# Fertilizers Europe SPERCs

- Fertilizers Europe SPERCs: based on **application technique**
- Conservative direct emission estimates to environmental compartments under nutrient deficient, normal use conditions

SpERC1



Outdoor use - direct application of solid fertilizers to soil; surface spreading

[Download](#)

SpERC2



Outdoor use - direct application of solid or liquid fertilizers to soil; incorporation, placement, mixing, seed treatment, drip irrigation

[Download](#)

SpERC3



Outdoor use - application of fertilizers by helicopter

[Download](#)

SpERC4



Outdoor use - spray application of liquid fertilizers; soil surface spreading, sprinkler, pivot, foliar spray, slurry

[Download](#)

# Fertilizers Europe SPERCs

Direct emissions surface water:  
**FOCUS drift defaults / 10**  
 (1/10th of field contributes to drift scenario)

SPERC	Description	Air (%)	Soil (%)	Surface water (%)
1	Outdoor use – direct application of solid fertilizers to soil; surface spreading	0	100	0
2	Outdoor use – direct application of solid or liquid fertilizers to soil; incorporation, placement, mixing, seed treatment, drip irrigation	0	100	0
3	Outdoor use – application of solid fertilizers by helicopter	0	100	3.32
4	Outdoor use – spray application of liquid fertilizers; surface spreading, sprinkler, pivot, foliar spray, slurry	0	100	1.57

Generic worst-case

## FOCUS drift defaults

Crop	Drift (% of application)
Cereals, spring	2.8
Cereals, winter	2.8
Citrus	15.7
Cotton	2.8
Field beans	2.8
Grass / alfalfa	2.8
Hops	19.3
Legumes	2.8
Maize	2.8
Oil seed rape, spring	2.8
Oil seed rape, winter	2.8
Olives	15.7
Pome / stone fruit, early appl	29.2
Pome / stone fruit, late appl	15.7
Potatoes	2.8
Soybeans	2.8
Sugar beet	2.8
Sunflower	2.8
Tobacco	2.8
Vegetables, bulb	2.8
Vegetables, fruiting	2.8
Vegetables, leafy	2.8
Vegetables, root	2.8
Vines, early applns	2.7
Vines, late applns	8.0
Aerial application	33.2
No drift (incorp or seed trtmt)	0

# FEE-tool: environmental fate



Guidance on information requirements and  
Chemical Safety Assessment

Chapter R.16: Environmental exposure  
assessment

Version 3.0

February 2016



REACH guidance + FOCUS model:

Model equations and scenario defaults  
(basis for Excel-based tool)

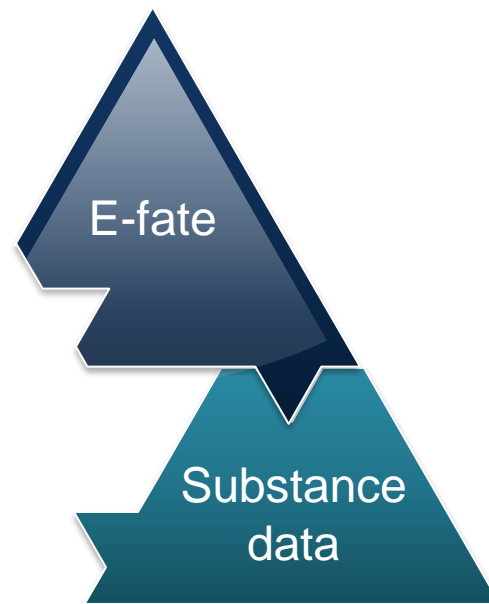
# FEE-tool: substance data

REACH dossiers (PNEC, substance properties)

Deficiency thresholds (PECregional, soil)



The screenshot shows the ECHA Substance Information page for Copper. The page includes the ECHA logo, navigation tabs (About Us, Regulate, Addressing Chemicals of Concern, Information on Chemicals, Chemicals in our Life, Support), and a search bar. The main content area is titled 'Substance information' and contains a table with three columns: Substance identity, Hazard classification & labeling, and How to use it safely. The Substance identity column lists EC / List no.: 231-159-6, CAS no.: 7440-50-8, and Mol. formula: Cu. The Hazard classification & labeling column shows a 'Danger!' warning and a 'Toxic to aquatic life with long lasting effects' hazard statement. The How to use it safely column lists 'Precautionary measures suggested by manufacturers and exporters of the substance' and 'Guidance on the safe use of the substance provided by manufacturers and exporters of the substance'.

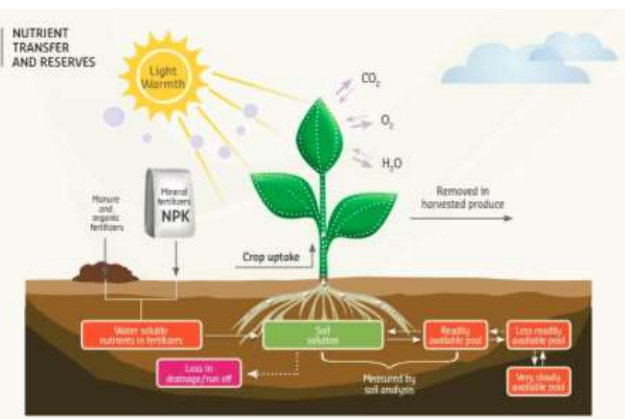
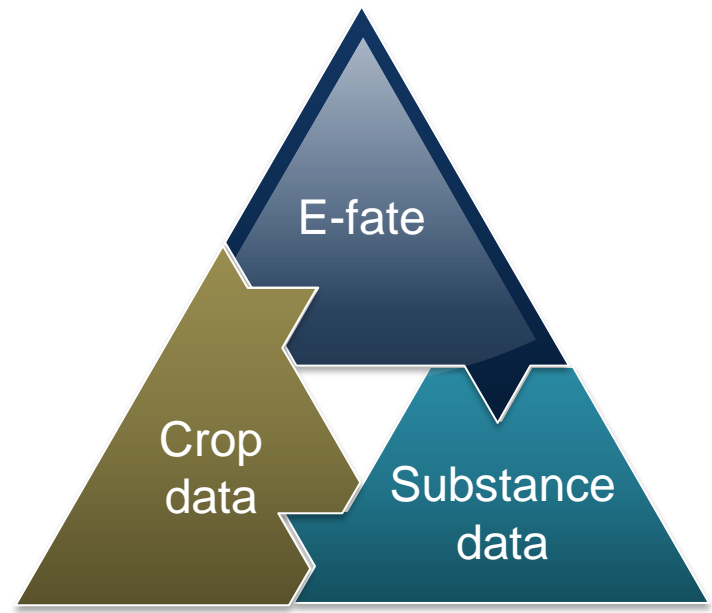


FEE-tool focuses on  
micronutrients (Cu, Mn, Zn)



# FEE-tool development: crop data

	2005	2006	2007	2008	2009	2010	2011	2012
European Union (EU-27)	11 507.22	10 824.98	10 854.22	10 808.40	10 811.03	10 711.76	11 271.68	11 271.68
France	31 383.02	30 176.86	30 144.13	31 143.37	30 903.70	30 327.05	31 385.80	31 385.80
Germany	374.14	396.48	341.29	341.39	307.94	341.90	307.89	311.1
Italy	4 332.30	3 713.81	4 831.00	4 191.00	4 768.91	3 802.22	2 006.88	1 080.7
Spain	1 078.88	1 002.70	1 041.70	1 452.88	1 478.88	1 324.49	1 412.18	1 403.4
Poland	4 448.38	4 568.38	4 483.70	4 486.48	4 486.48	4 486.48	4 486.48	4 486.48
UK	6 211.70	7 038.28	6 804.40	6 804.40	6 191.89	6 191.89	6 191.89	6 191.89
Sweden	323.13	309.28	346.88	270.20	287.88	380.30	313.18	313.18
Denmark	112.20	102.10	118.17	202.20	288.48	214.48	202.70	202.7
Netherlands	4 440.18	4 100.11	4 080.11	4 081.78	381.88	381.88	381.88	381.88
Belgium	6 244.20	6 702.28	6 571.30	6 229.88	5 982.49	6 148.88	6 288.22	6 211.1
Austria	6 248.20	6 048.28	6 241.20	6 229.88	6 242.91	6 242.91	6 242.91	6 242.91
Czechia	801.14	848.28	881.20	848.88	848.41	848.41	848.41	848.41
Slovakia	1 129.20	1 129.28	1 129.20	1 129.28	1 129.28	1 129.28	1 129.28	1 129.28
Slovenia	112.20	112.28	112.20	112.28	112.28	112.28	112.28	112.28
Lithuania	1 000.20	1 000.28	1 000.20	1 000.28	1 000.28	1 000.28	1 000.28	1 000.28
Latvia	100.20	100.28	100.20	100.28	100.28	100.28	100.28	100.28
Estonia	100.20	100.28	100.20	100.28	100.28	100.28	100.28	100.28
Hungary	2 100.20	2 100.28	2 100.20	2 100.28	2 100.28	2 100.28	2 100.28	2 100.28
Croatia	100.20	100.28	100.20	100.28	100.28	100.28	100.28	100.28
Bulgaria	1 100.20	1 100.28	1 100.20	1 100.28	1 100.28	1 100.28	1 100.28	1 100.28
Romania	1 100.20	1 100.28	1 100.20	1 100.28	1 100.28	1 100.28	1 100.28	1 100.28
Portugal	1 100.20	1 100.28	1 100.20	1 100.28	1 100.28	1 100.28	1 100.28	1 100.28
Malta	100.20	100.28	100.20	100.28	100.28	100.28	100.28	100.28



EUROSTAT database (crop type specific yield)  
 Literature review (crop micronutrient concentrations)

# FEE-tool: Generic assessment

## INPUT

1. Substance	Copper
2. Specific Environmental Release Category (SpERC)	SpERC 1: Outdoor use - solid application; surface spreading
3. Single or multiple applications per growing season?	Multiple
Total annual fertilizer use rate	3,00 [kg/ha/year]
Number of applications	2
Time between applications	10 [days]
Fertilizer use rate per application	1,50 [kg/ha]

**GREEN** mandatory input

## Steps 1 – 3: Generic assessment

1. Selection of substance (Cu, Mn, Zn or “Other”)
2. Choice of SPERC (SPERC 1 – 4)
3. Single or multiple applications and yearly use rate

Generic assessment = generic crop type

# FEE-tool: Refined assessment

## INPUT

1. Substance	Copper
2. Specific Environmental Release Category (SpERC)	SpERC 1: Outdoor use - solid application; surface spreading
3. Single or multiple applications per growing season?	Multiple
Total annual fertilizer use rate	3,00 [kg/ha/year]
Number of applications	2
Time between applications	10 [days]
Fertilizer use rate per application	1,50 [kg/ha]
4. Refinement options	
Crop type	Cereals, spring
Crop cover (interception)	Minimal crop cover, BBCH 10-19
European crop yield scenario	High
Crop substance concentration	[g/l]
Crop yield	[t/ha]

**GREEN** mandatory input  
**BLUE** optional input

Step 4: Refined assessment (scaling options)

# FEE-tool: Refined assessment

	Runoff	Crop offtake	Leaching	Volatilization	Biodegradation
SPERC 1	X	X	X	X	X
SPERC 2		X	X	X	X
SPERC 3	X		X	X	X
SPERC 4	X	X	X	X	X

Not included in EUSES

Refinement options:

- European crop yield scenario
  - Crop substance concentration
  - Crop type
  - Crop growth stage
- } Crop offtake (removal from field)
- } Potential for runoff

# FEE-tool: Refined assessment

## Crop type specific assessment

4. Refinement options	
Crop type	Generic crop
Crop cover (interception)	No interception, bare soil, BBCH 00-09
European crop yield scenario	Generic crop
Crop substance concentration	-----
Crop yield	Cereals, spring
5. Risk management measures	Cereals, winter
	Citrus
	Field beans

### FOCUS defaults (drift)

Cereals, winter	2,8
Citrus	15,7
Field beans	2,8
Grass / alfalfa	2,8
Hops	19,3



# FEE-tool: Risk Management Measures (RMMs)

## INPUT

1. Substance	Copper
2. Specific Environmental Release Category (SpERC)	SpERC 1: Outdoor use - solid application; surface spreading
3. Single or multiple applications per growing season?	Multiple
Total annual fertilizer use rate	3,00 [kg/ha/year]
Number of applications	2
Time between applications	10 [days]
Fertilizer use rate per application	1,50 [kg/ha]
4. Refinement options	
Crop type	Cereals, spring
Crop cover (interception)	Minimal crop cover, BBCH 10-19
European crop yield scenario	High
Crop substance concentration	[g/l]
Crop yield	[t/ha]
5. Risk management measures (RMM) *	50 (% drift reduction)

**GREEN** mandatory input  
**BLUE** optional input  
**YELLOW** RMMs

\* To be justified, and translated into specific RMMs in correspondence with (national) requirements and product labelling

Step 5: Risk management measures -> selection drift reduction (50, 75, 90%)

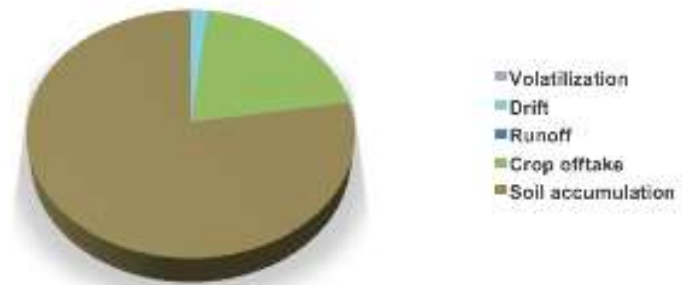
**NB:** RMMs should be aligned with national requirements and product labeling

# FEE-tool: Exposure assessment

## OUTPUT

Exposure scenario	
Substance	Copper
SpERC	SPERC 4: Outdoor use - spray application of liquid fertilizers; soil surface spreading, sprinkler, pivot, foliar spray, slurry
Application rate (total)	3 kg/ha/year
Number, timing applications	1 application
Crop type	Hops
Crop growth stage	Bare soil, BBCH 00-09
European crop yield scenario	High
Risk management measures	None

Emission estimate	[kg/ha]	[%]
Volatilization	0,0000	0,00
Drift	0,0580	1,90
Runoff	0,0012	0,04
Crop offtake	0,6263	20,48
Soil accumulation	2,3725	77,6

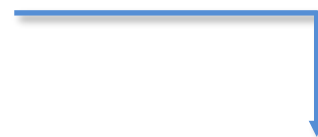


# FEE-tool: Risk assessment

Environmental compartment	Exposure assessment						Effect assessment		Risk characterisation	
	C local year 1	C local year 10	PEC regional	PEC total year 1	PEC total year 10	Unit	PNEC	Unit	RCR year 1	RCR year 10
Soil (agricultural)	0,79	7,9	14,0	14,8	21,9	mg/kg dw	65,0	mg/kg dw	0,23	0,34
Freshwater (dissolved)	1,8	1,8	2,9	4,7	4,7	µg/L	7,8	µg/L	0,61	0,61
Sediment	1,9	1,9	67,5	69,4	69,4	mg/kg	87,0	mg/kg	0,80	0,80
Groundwater				0,0079	0,0117	mg/L				

Maximum safe application rate calculation	
Most sensitive environmental compartment year 1	freshwater
Most sensitive environmental compartment year 10	freshwater
Target RCR	0,90
Estimated max application rate year 1	6,79 kg/ha/year
Estimated max application rate year 10	6,79 kg/ha/year

RCR < 1 = no risk for scenario  
RCR > 1 = refinement needed



Calculation safe application rate:  
based on most sensitive  
environmental compartment



# Generic Exposure Scenarios (GES)

## GES

- [Download - Cu - 9.1. Exposure scenario 1](#)
- [Download - Cu - 9.2. Exposure scenario 2](#)
- [Download - Cu - 9.4. Exposure scenario 4](#)
- [Download - Mn - 9.1. Exposure scenario 1](#)
- [Download - Mn - 9.2. Exposure scenario 2](#)
- [Download - Mn - 9.4. Exposure scenario 4](#)
- [Download - Zn - 9.1. Exposure scenario 1](#)
- [Download - Zn - 9.2. Exposure scenario 2](#)
- [Download - Zn - 9.3. Exposure scenario 3](#)
- [Download - Zn - 9.4. Exposure scenario 4](#)

Generic exposure scenarios available for download:

- SPERCs 1 – 4
- Micronutrients Cu, Mn, Zn

# Generic Exposure Scenarios (GES)

## GES

### 9.4. Exposure scenario 4: Widespread use by professional workers Outdoor use - spray application of liquid Cu fertilizers

Product category used: PC 12: Fertilizers

Sector of use: SU 1: Agriculture, forestry, fishery

**Environment contributing scenario(s):**

CS 1	Outdoor use - spray application of liquid Cu fertilizers; soil surface spreading, sprinkler, pivot, foliar spray, slurry	ERC 8e Fertilizers Europe SPERC 8e.4.v1
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Generic exposure scenarios available for download:

- SPERCs 1 – 4
- Micronutrients Cu, Mn, Zn

Table 9.4.2. Exposure concentrations and risks for the environment

Protection target	Exposure concentration	Risk quantification
Fresh water	Local PEC: 6.7 µg/L	0.86
Sediment (freshwater)	Local PEC: 71.4 mg/kg	0.82
Sewage treatment plant	Not relevant (no STP)	
Marine water	Not relevant (no emissions to marine water)	
Sediment (marine water)	Not relevant (no emissions to marine water)	
Agricultural soil	Local PEC: 14.5 mg/kg dy	0.22



Exposure based on results FEE-tool: C local + PEC regional

# Fertilizers Environmental Exposure Assessment

- ✓ SPERCs
- ✓ FEE-tool
- ✓ Generic exposure scenarios



# Fertilizers environmental exposure assessment



(Soon) available for download:

- Generic exposure scenarios - already available
- SPERC-files for import in CHESAR
- User guidance document for CHESAR



**FERTILIZERS ENVIRONMENTAL EXPOSURE ASSESSMENT**

**USER GUIDANCE FOR CHESAR**

*Expected March 2018*

# Practical Examples For Fertilizing Recommendations

Reetta Puska



[www.yara.com](http://www.yara.com)

# SpERCs

SpERC1



Outdoor use - direct application of solid fertilizers to soil; surface spreading

SpERC2



Outdoor use - direct application of solid or liquid fertilizers to soil; incorporation, placement, mixing, seed treatment, drip irrigation

SpERC3



Outdoor use - application of fertilizers by helicopter

SpERC4



Outdoor use - spray application of liquid fertilizers; soil surface spreading, sprinkler, pivot, foliar spray, slurry

# Manganese for potato –spERC2

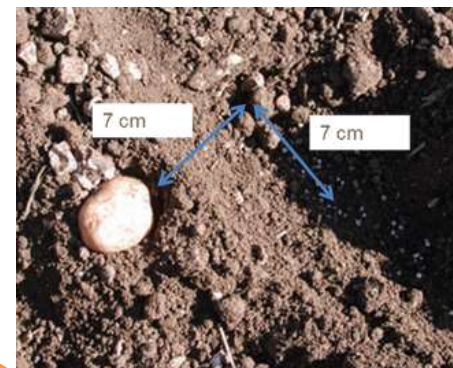
## RECOMMENDATION

- 1 application of granular fertilizer with Mn per summer into row -> spERC2
- 2 kg Mn / ha / year

## INPUT

1. Substance	Manganese
2. Specific Environmental Release Category (SpERC)	SPERC 2: Outdoor use – direct application of solid or liquid fertilizers to soil; incorporation, placement, mixing, seed treatment, drip irrigation
3. Single or multiple applications per growing season?	Single
Total annual fertilizer use rate	2,00 [kg/ha/year]
4. Refinement options	
Crop type	Potatoes
Crop growth stage (BBCH)	Bare soil, BBCH 00-09
European crop yield scenario	High

No runoff or drift due to placement techniques



## OUTPUT

Environmental compartment	Exposure assessment						Effect assessment		Risk characterisation	
	C local year 1	C local year 10	PEC regional	PEC total year 1	PEC total year 10	Unit	PNEC	Unit	RCR year 1	RCR year 10
Soil (agricultural)	0,44	4,4	0,0	0,4	4,4	mg/kg dw	12,4	mg/kg dw	0,04	0,35
Freshwater (dissolved)	0,0	0,0	0,0	0,0	0,0	µg/L	12,8	µg/L	0,00	0,00
Sediment	0,0	0,0	0,0	0,0	0,0	mg/kg	36,1	mg/kg	0,00	0,00
Groundwater				0,0004	0,0037	mg/L				

# Zinc for grassland – spERC1

## RECOMMENDATION

- 2 applications of granular fertilizer with Zn per summer -> **spERC1**
- à 0,5 kg Zn / ha -> 1 kg Zn / year
- Interval between applications 40 days

## INPUT

1. Substance	Zinc
2. Specific Environmental Release Category (SpERC)	SPERC 1: Outdoor use - direct application of solid fertilizers to soil; surface spreading
3. Single or multiple applications per growing season?	Multiple
Total annual fertilizer use rate	1,00 [kg/ha/year]
Number of applications	2
Time between applications	40 [days]
Fertilizer use rate per application	0,50 [kg/ha]
4. Refinement options	
Crop type	Grass / alfalfa
Crop growth stage (BBCH)	Minimal crop cover: BBCH 10-19
European crop yield scenario	Medium

Refinement: crop cover reduces runoff



Scenario information: SPERC 1: Outdoor use - direct application of solid fertilizers to soil; surface spreading; e-fate model	Refined assessment	Unit
Fraction available for drift (during application)		%
Drift refinement, after reduction based on RMM		%
Fraction available for run-off (30 days after application)	0,312	%
Runoff reduction	10	%
Crop substance concentration	39,0	g sub: t yield.
Crop yield	5,3	kg sut
Crop offtake	0,206	

## OUTPUT

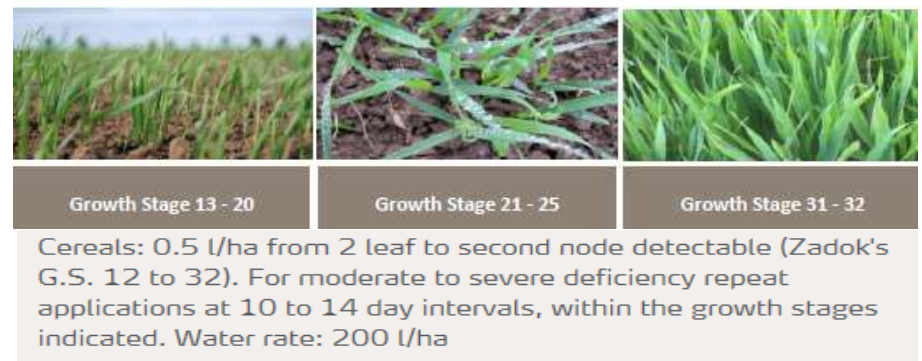
Environmental compartment	Exposure assessment						Effect assessment		Risk characterisation	
	C local year 1	C local year 10	PEC regional	PEC total year 1	PEC total year 10	Unit	PNEC	Unit	RCR year 1	RCR year 10
Soil (agricultural)	0,26	2,6	41,3	41,6	43,9	mg/kg dw	107,0	mg/kg dw	0,39	0,41
Freshwater (dissolved)	2,7	2,7	3,4	6,1	6,1	µg/L	20,6	µg/L	0,30	0,30
Sediment	10,0	10,0	45,0	55,0	55,0	mg/kg	235,6	mg/kg	0,23	0,23
Groundwater				0,2970	0,3136	mg/L				



# Copper for cereals –spERC4

## RECOMMENDATION

- 3 applications of foliar fertilizer with Cu per summer -> spERC4
- á 0,25 kg Cu / ha -> 0,75 kg Cu / year
- Interval between applications 10-14 days



## INPUT

1. Substance	Copper
2. Specific Environmental Release Category (SpERC)	SPERC 4: Outdoor use - spray application of liquid fertilizers; soil surface spreading, sprinker, pivot, foliar spray, slurry
3. Single or multiple applications per growing season?	Multiple
Total annual fertilizer use rate	0,75 [kg/ha/year]
Number of applications	3
Time between applications	10 [days]
Fertilizer use rate per application	0,25 [kg/ha]
4. Refinement options	Generic crop Base soil, BBCH 00-09 High [a] [t/ha]
5. Risk management measures (RMM) *	(% drift/reduction)

No refinement options selected

Scenario information: SPERC 4: Outdoor use - spray application of liquid fertilizers; soil surface spreading, sprinker, pivot, foliar spray, slurry	Input parameters e-fate model		Unit
	Default assessment	Refined assessment	
Fraction available for drift (during application)	15,7		%
Drift refinement, after reduction based on RMM	not considered		%
Fraction available for run-off (30 days after application)	0,039		%
Runoff reduction	not considered		%

## OUTPUT

Environmental compartment	Exposure assessment						Effect assessment		Risk characterisation	
	C local year 1	C local year 10	PEC regional	PEC total year 1	PEC total year 10	Unit	PNEC	Unit	RCR year 1	RCR year 10
Soil (agricultural)	0,25	2,5	14,0	14,2	16,5	mg/kg dw	65,0	mg/kg dw	0,22	0,25
Freshwater (dissolved)	14,8	14,9	2,9	17,7	17,8	µg/L	7,8	µg/L	2,28	2,28
Sediment	15,2	15,2	67,5	82,7	82,7	mg/kg	87,0	mg/kg	0,95	0,95

Refinement needed !

# Copper for cereals –spERC4

## RECOMMENDATION

- 3 applications of foliar fertilizer with Cu per summer -> spERC4
- á 0,25 kg Cu / ha -> 0,75 kg Cu / year
- Interval between applications 10-14 days



Growth Stage 13 - 20

Growth Stage 21 - 25

Growth Stage 31 - 32

Cereals: 0.5 l/ha from 2 leaf to second node detectable (Zadok's G.S. 12 to 32). For moderate to severe deficiency repeat applications at 10 to 14 day intervals, within the growth stages indicated. Water rate: 200 l/ha

## INPUT

1. Substance	Copper
2. Specific Environmental Release Category (SpERC)	SPERC 4: Outdoor use – spray application of liquid fertilizers, soil surface spreading, sprinkler, pivot, foliar spray, slurry
3. Single or multiple applications per growing season?	Multiple
Total annual fertilizer use rate	0,75 (kg/ha/year)
Number of applications	3
Time between applications	10 (days)
Fertilizer use rate per application	0,25 (kg/ha)
4. Refinement options	
Crop type	Cereals, spring
Crop growth stage (BBCH)	Minimal crop cover, BBCH 10-19
European crop yield scenario	Blue soil, BBCH 06-09
Crop substance concentration	100 (µg/L)
Crop yield	10 (t/ha)
5. Risk management measures (RMM) *	(% drift reduction)

Scenario information: SPERC 4: Outdoor use - spray application of liquid fertilizers; soil surface spreading, sprinkler, pivot, foliar spray, slurry	Input parameters		Unit
	Default assessment	Refined assessment	
Fraction available for drift (during application)	15,7	2,76	%
Drift refinement, after reduction based on RMM	not considered		%
Fraction available for run-off (30 days after application)	0,039		%
Runoff reduction	not considered		%

**Refinement 1:** cereal instead of "generic crop" -> spray boom height is low for cereals -> drift will be reduced

**Refinement 2:** canopy coverage selected -> may lead to runoff reduction

## OUTPUT

Environmental compartment	Exposure assessment						Effect assessment		Risk characterisation	
	C local year 1	C local year 10	PEC regional	PEC total year 1	PEC total year 10	Unit	PNEC	Unit	RCR year 1	RCR year 10
Soil (agricultural)	0,23	2,3	14,0	14,2	16,3	mg/kg dw	65,0	mg/kg dw	0,22	0,25
Freshwater (dissolved)	2,8	2,8	2,9	5,7	5,7	µg/L	7,8	µg/L	0,73	0,73
Sediment	2,9	2,9	67,5	70,4	70,4	mg/kg	87,0	mg/kg	0,81	0,81

**Refinement 3:** (not applied here) : country-specific buffer zones or drift reducing spray nozzles **would help** to reduce the drift further

# Zinc for forest –spERC3

## RECOMMENDATION

- Helicopter spreading of granules -> spERC3
- 0,6 kg Zn / ha
- Max 3 applications during forest lifecycle



## INPUT

1. Substance	Zinc
2. Specific Environmental Release Category (SpERC)	SPERC 3: Outdoor use - application of solid fertilizers by helicopter
3. Single or multiple applications per growing season?	Single
Total annual fertilizer use rate	0,60 [kg/ha/year]
4. Refinement options:	
Crop type	Forest (aerial application)
Crop growth stage (BBCH)	Full canopy; BBCH 49-89
European crop yield scenario	Low
Crop substance concentration	
Crop yield	
5. Risk management measures (RMM) *	50 (% drift reduction)

Scenario information: SPERC 3: Outdoor use - application of solid fertilizers by helicopter	Input parameters - fate model		Unit
	Default assessment	Refined assessment	
Fraction available for drift (during application)	33,2		%
Drift refinement, after reduction based on RMM	not considered	16,60	%
Fraction available for run-off (30 days after application)	0,347		%
Runoff reduction	not considered	70	%

Refinement: GPS maps secure spreading accuracy and reduce drift 50-100 %

## OUTPUT

Environmental compartment	Exposure assessment						Effect assessment		Risk characterisation	
	C local year 1	C local year 10	PEC regional	PEC total year 1	PEC total year 10	Unit	PNEC	Unit	RCR year 1	RCR year 10
Soil (agricultural)	0,20	2,0	41,3	41,5	43,3	mg/kg dw	107,0	mg/kg dw	0,39	0,40
Freshwater (dissolved)	9,8	9,8	3,4	13,2	13,2	µg/L	20,6	µg/L	0,64	0,64
Sediment	36,4	36,4	45,0	81,4	81,4	mg/kg	235,6	mg/kg	0,35	0,35
Groundwater				0,2965	0,3091	mg/L				

## **GES and FEE tool for the easy management of environmentally safe fertilizer recommendations**

- Fertilizers are applied by variable techniques and timing for the crops
- Target is to avoid and cure nutrient deficiencies which would reduce crop yield and quality
- Protection of all environmental compartments is a key issue
  - ✓ Generic Exposure scenarios will cover the most common fertilizing practices
  - ✓ FEE tool allows to calculate the efficacy of risk management measures applicable for the less common fertilizing programs and special crops
    - > Scaling
    - > DU CSR



# Take-home message

# Take-home message

- Use maps, SPERCs and FEE-tool allow for harmonization of fertilizers exposure and risk assessments within the supply chain
- Facilitate improved communication and information in the CSR and extended Safety Data Sheets

Thank you!



<http://www.reachfertilizers.com/>