# Introduction to example scenarios for walk-in tunnels and greenhouses

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# BACKGROUND

## Range of covers

## BACKGROUND

# Cultivation may be soil-bound or soilless

- Soil bound: both walk-in tunnel and greenhouse
- Soilless: almost exclusively greenhouse

## BACKGROUND

# Some of the emission driving forces are influenced such that a specific assessment may be considered

- Irrigation fully controlled
- Temperature controlled to a high extent, depending on the cover
- Ventilation and light: influenced up to fully controlled

# BACKGROUND

## Some of the emission driving forces are influenced such that a specific assessment may be considered

- Irrigation
  - Based on crop requirement
  - Surplus regulated, assumed to be not larger than in open field
  - Extremes can be avoided

# BACKGROUND

## Some of the emission driving forces are influenced such that a specific assessment may be considered

- Temperature
  - Control to some extent
  - Dependent on location
  - Annual average is expected to be not lower

## BACKGROUND

# Some of the emission driving forces are influenced such that a specific assessment may be considered

Considerations lead to conclusion that tiered approach is possible, with open field approach as first tier and dedicated scenarios as higher (second) tier.

## SCENARIO DEVELOPMENT / SELECTION

# Example scenarios are available (EFSA website)

- Soil bound
  - Leaching to groundwater
  - Drainage to surface water
- Soilless
  - Discharge to surface water

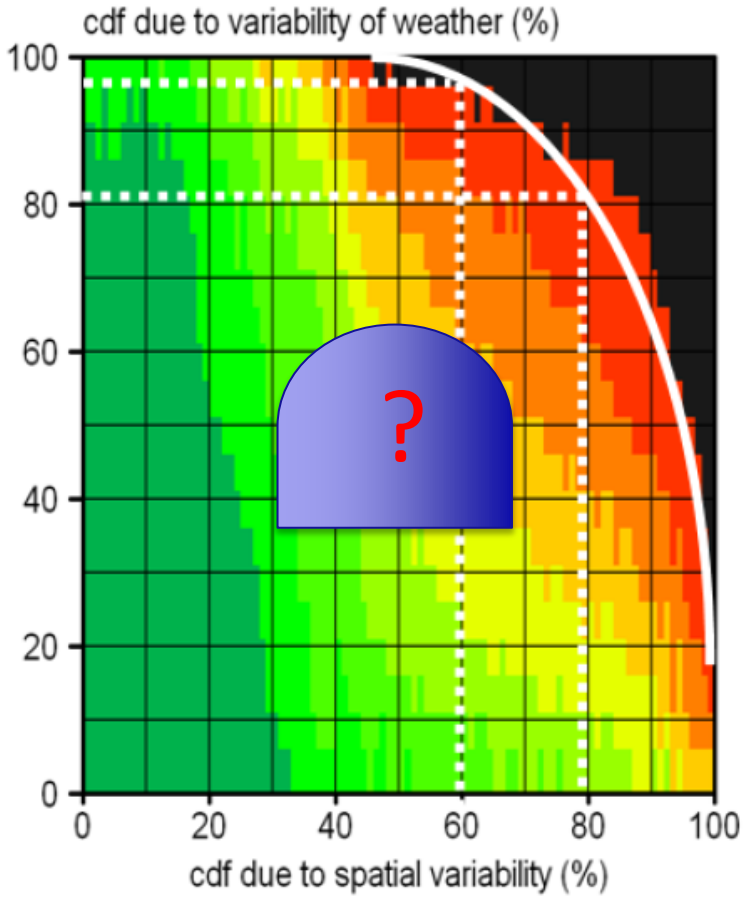
## SCENARIO DEVELOPMENT / SELECTION

# Example scenarios, general

- Unknown how they rank in the cumulative distribution at the European scale
- Purpose
  - Serve as example
  - Demonstrate what information has to be gathered to develop scenarios
  - Compare substances relative to each other
- Risk managers have to decide whether results may be used in authorisation decisions

# SCENARIO DEVELOPMENT / SELECTION

## Example scenarios, vulnerability

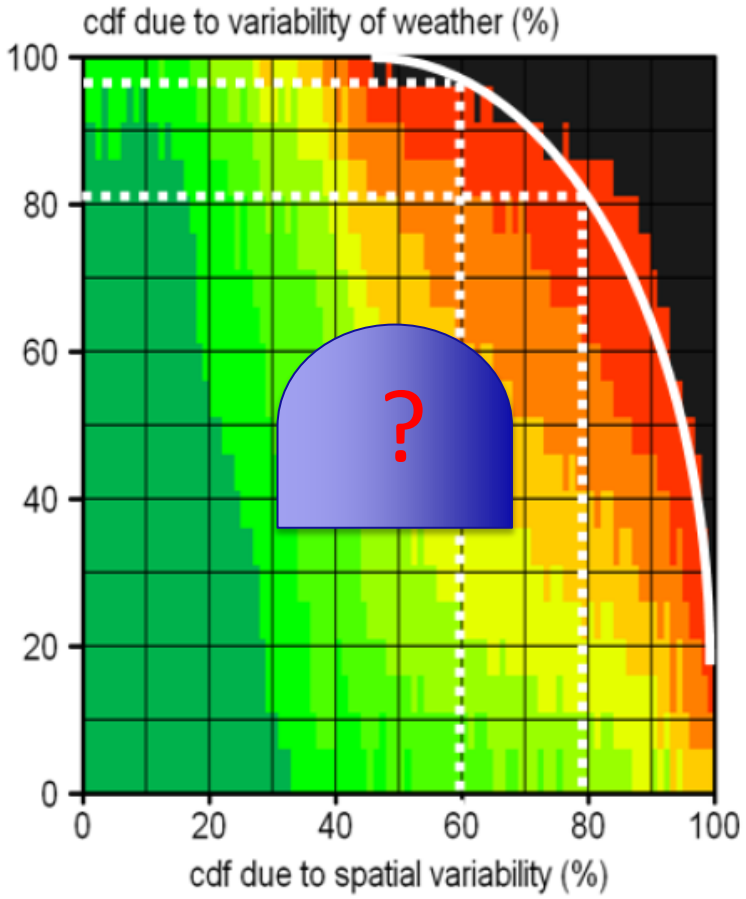



Position of examples has to be established

Future activity

## SCENARIO DEVELOPMENT / SELECTION

# Example scenarios, vulnerability 2




For open fields: plausible scenario ranking (close to) 90$^{th}$ percentile

## SCENARIO DEVELOPMENT / SELECTION

# Scenarios, justification (soil bound)

Applicants have to justify the scenario they use, even if it is one of the examples.

Aspects

- Climatic conditions
  - Water supply (amount and distribution over time)
  - Temperature regime
- Soil (a.o. %OC, hydraulic conductivity)
- Crop (management) parameters

## SCENARIO DEVELOPMENT / SELECTION

# Scenarios, justification (soilless)

Applicants have to justify the scenario they use, even if it is the example

Additional to soil bound

- Water source (with respect to parameters influencing discharge, e.g. Na)
- 'drain' fraction (water supply <> crop uptake)
- Discharge strategy

## SCENARIO DEVELOPMENT / SELECTION

# Scenarios, model selection and use (soil bound)

Leaching

- Any of the models currently used for assessments for open field

Surface water

- In line with approach for open field drainage scenarios (no-run-off)

Parameterisation of processes and defaults should be in line with approach for open field, unless adjustment due to cover is justified).

# EXAMPLE SCENARIO LEACHING

Description available (EFSA website)

Elements:

- Soil: = FOCUS Piacenza leaching scenario
- Climatic conditions: constructed
  - based on Italian climatic conditions, distribution based on water deficit
  - expert judgement (Pardossi) regarding crop requirements and common practice
  - Reasonable irrigation surplus
- Crop: typical tomato crop for region

# EXAMPLE SCENARIO LEACHING

## Climate input file

| Station | DD | MM | YYYY | RAD | Tmin | Tmax | HUM | WIND | RAIN | ETref |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | kJ/m2 | C | C | kPa | m/s | mm | mm |
| 'Pistoia' | 1 | 1 | 1901 | 1036.8 | 8.2 | 10.3 | -99 | -99 | 29.2 | 0.12 |
| 'Pistoia' | 2 | 1 | 1901 | 5580 | 3 | 14.8 | -99 | -99 | 0.1 | 0.1 |
| 'Pistoia' | 3 | 1 | 1901 | 5536.8 | -2.9 | 9.6 | -99 | -99 | 0 | 0.12 |
| 'Pistoia' | 4 | 1 | 1901 | 1011.6 | 0.4 | 2.3 | -99 | -99 | 9.9 | 0.29 |
| 'Pistoia' | 5 | 1 | 1901 | 928.8 | 1.7 | 5 | -99 | -99 | 12.4 | 0.24 |
| 'Pistoia' | 6 | 1 | 1901 | 2606.4 | 3.6 | 8.6 | -99 | -99 | 11.3 | 0.12 |

# EXAMPLE SCENARIO LEACHING

## Calculation

- Load climate file input model
- Create crop, using info from guidance
- Establish scenario by combining (selecting) the climate file, the Piacenza soil and the crop
- Define calculation parameters

# EXAMPLE SCENARIO DRAINAGE

Description available (EFSA website)

Elements:

- Soil: Dutch soil overlain with top layer high in organic matter. Soil is liable to preferential flow -> MACRO or PEARL
- Climatic conditions: constructed
  - based on Dutch climatic conditions
  - water requirement calculated
  - Reasonable irrigation surplus
- Crop: chrysantemum, more or less continuous production, which is reflected in the crop parameters
- Artificial drains discharge into ditch

# EXAMPLE SCENARIO DRAINAGE (2)

Emission of water and substance to the TOXSWA model that calculates concentrations in the surface water.

Dedicated package will become available.

# EXAMPLE SCENARIO SOILLESS

Description available (EFSA website)

Elements:

- High-tech greenhouse with fixed lay-out, schematised as a series of connected mixed water reservoirs
- Water flows dependent on crop category, calculated on basis of Dutch climatic conditions, set-points for climate control, crop water requirement and water surplus
- Crop: rose
- Water sources
  1. Rain water basin
  2. Reversed osmosis water

# EXAMPLE SCENARIO SOILLESS

## Calculations with GEM package, combination of

- WATERSTREAMS
  - Delivers water flows between reservoirs
  - Calculates water discharge from system
- Substance fate model
  - Plant uptake
  - Degradation in various parts of the system
- TOXSWA
  - Version adapted for receiving discharge from greenhouse
  - Calculates concentrations in surface water (selected ditch in the Netherlands)

# EXAMPLE SCENARIO SOILLESS

GEM package

Substance parameters from substance database SPIN (substance plug in) Plant uptake

Package is being finalised