Experimental assessment of soil protection by vegetation for current crops and for up-coming EU glyphosate ban

Jakub Stašek, Josef Krása, Adéla Roudnická, Tomáš Dostál, Martin Mistr, Jan Devátý

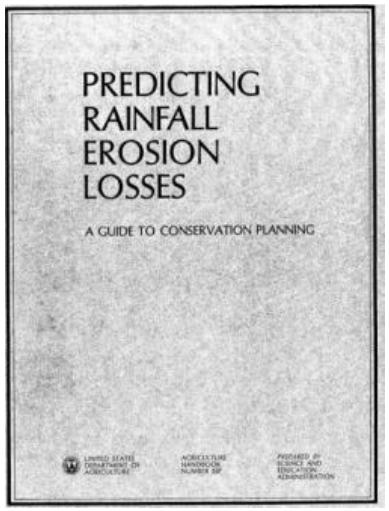
Faculty of Civil Engineering, CTU in Prague

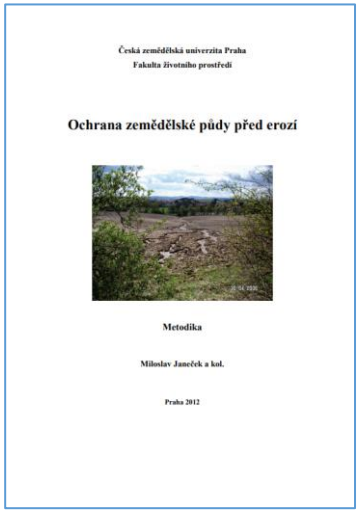
Workplace and equipment

- **Department of Soil Water Conservation**
  - **Faculty of Civil Engineering, Czech Technical University in Prague**
- **Rainfall simulator**
  - **field 8x2m**
  - **laboratory 2x1m**

Cover management factor- C factor in Czech Republic

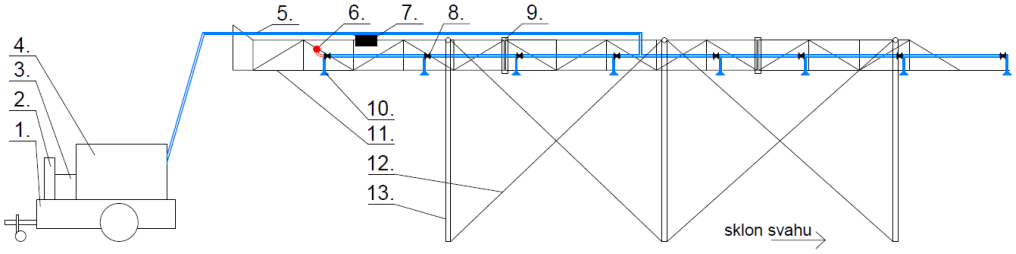
- **Predicting Rainfall Erosion Losses by Wischmeier & Smith (1978)**
  - **Transformed into czech conditions by Janeček (2002)**
  - **Modified and updated in Janeček (2012)**





Field rainfall simulator

- **The aim is to estimate crop cover factor for RUSLE**
- **Experiments on bare soil and crops**
- **Dry and wet soil conditions**
- **Artificial rainfall → surface runoff and sediment transport → collecting samples**
  - **60 mm/h for 30 minutes after surface runoff starts**
  - **Samples taken every 2,5 minute**



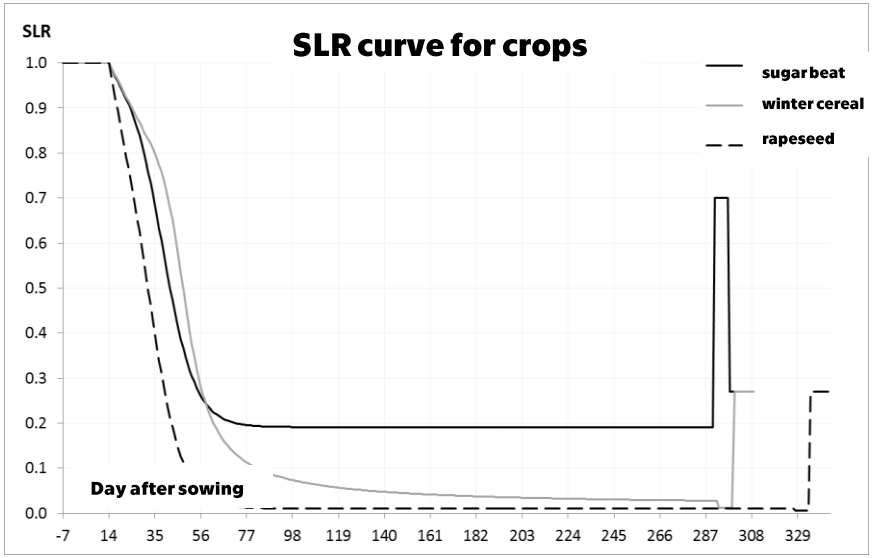
Dataset of experiments

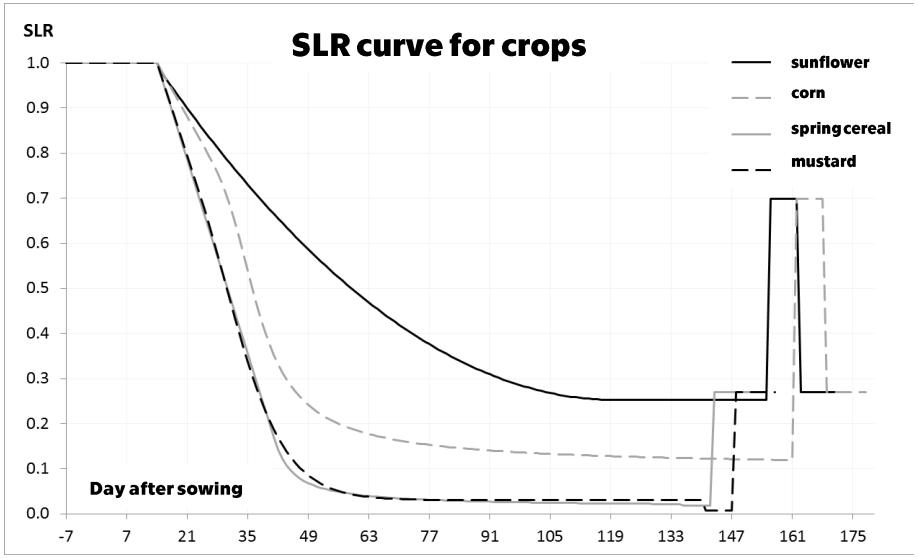
- **Since 2016 experiments on several plots, 3x per year, in total 341**
  - **In 2016 - 65 experiments**
  - **In 2017 - 71 experiments**
  - **In 2018 - 77 experiments**
  - **In 2019 - 44 experiments**
  - **In 2020 - 84 experiments**
- **On most common crops and various management practices**
  - **Cereals (wheat, barley, rye)**
  - **Corn, sunflower, *sorghum***
  - **Rapeseed, pea, mustard, alfalfa, buckwheat**
  - **And bare soil as reference**
- **Dry and wet soil conditions**

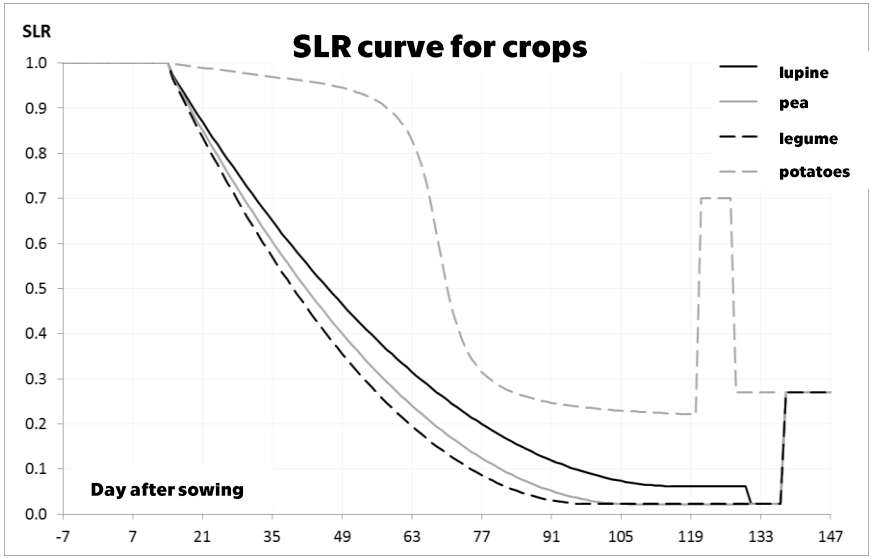
Preliminary results – SLR curves

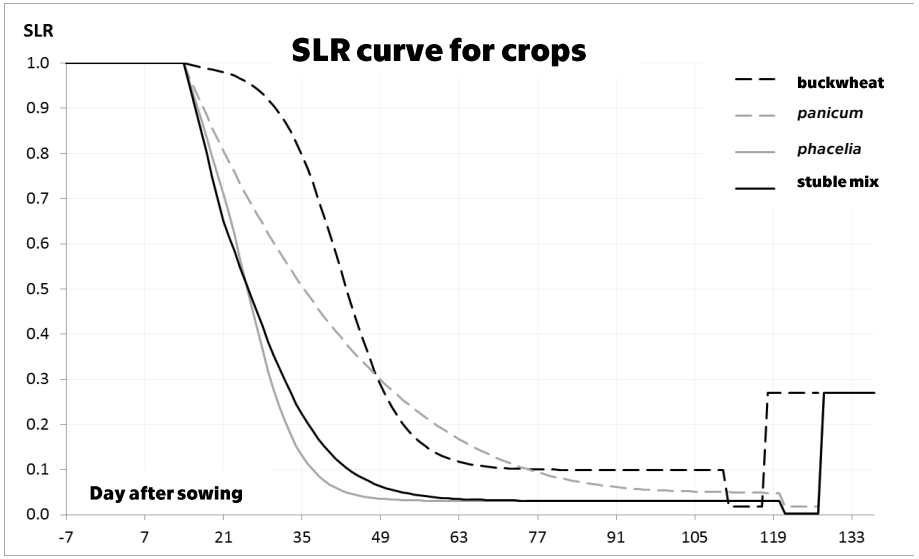
- SLR – Soil Loss Ratio is an estimate of the ratio of soil loss under actual conditions to losses experienced under the reference conditions (bare soil)
  - C factor value is an average Soil Loss Ratio weighted according to the distribution of R during the year
- Start with sowing date and has several fixed intervals
  - 14 days for first crop development stage
  - curve itself – based on measured data
  - 7 days after harvesting – based on measured data
  - 7 days soil preparation phase before tillage – measured data

CTU
CZECH TECHNICAL UNIVERSITY IN PRAGUE









- SLR curves show increasing soil protection as the plant develop
- Differences in crops
  - In the speed of soil protection development
  - In the final SLR
- Curves are better for later processing
  - Easy to change for local agricultural condition and combine with local R factor
- With the upcoming glyphosate ban it is important to search for alternative methods of farming
  - and know which ones are good for environment

CTU
CZECH TECHNICAL UNIVERSITY IN PRAGUE

Run-off database

- **Publicly available database of runoff experiments**
  - **aims for large dataset**
- **Valuable resource for calibration and validation of mathematical models**

RunoffDB (cvut.cz)

CTU
CZECH TECHNICAL UNIVERSITY IN PRAGUE

Thank you

jakub.stasek@fsv.cvut.cz

The contribution was prepared in the frame of projects No. QK1920224 (Possibilities of anti-erosion protection on farms to avoid the use of glyphosate), and H2020 SHUi (Soil Hydrology research platform underpinning innovation to manage water scarcity in European and Chinese cropping systems).