

Adaptation of SYNOPSIS-WEB to assess environmental risk from pesticide use under realistic field conditions in Norway

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DOI 10.5073/jki.poster.2017.002

SMARTCROP - NORWAY

- Norway implemented the EU-directive on sustainable pesticide use in 2015.
- The project **SMARTCROP**, funded by the Norwegian Research Council (project no. 244526/E50), addresses the related challenges of developing and making available IPM tools and methods.
- As part of SMARTCROP, the risk-indicator SYNOPSIS-WEB was adapted to Norwegian conditions and available datasets to assess environmental impact of pesticide use.

SYNOPSIS-WEB

- SYNOPSIS-WEB is an online tool with an easy-to-use interface.
- Risk assessment is performed for a given application scenario and field, under realistic field-specific parameters.
- PRZM5** (Suárez, LA, 2006, EPA/600/R-05/111. USEPA) is used to calculate pesticide loads via surface run-off & erosion.

Field scenarios

- All input data are field-specific – input parameters are gathered from the Norwegian land-use, soil, surface water, elevation, weather and plant protection products database.
- The field scenario is selected as follows (Fig. 1):
 - create a site scenario by clicking on a field in the map
 - all necessary environmental input parameter are derived from the database, some of which can be modified by the user
 - the site scenarios are stored under the user specific account

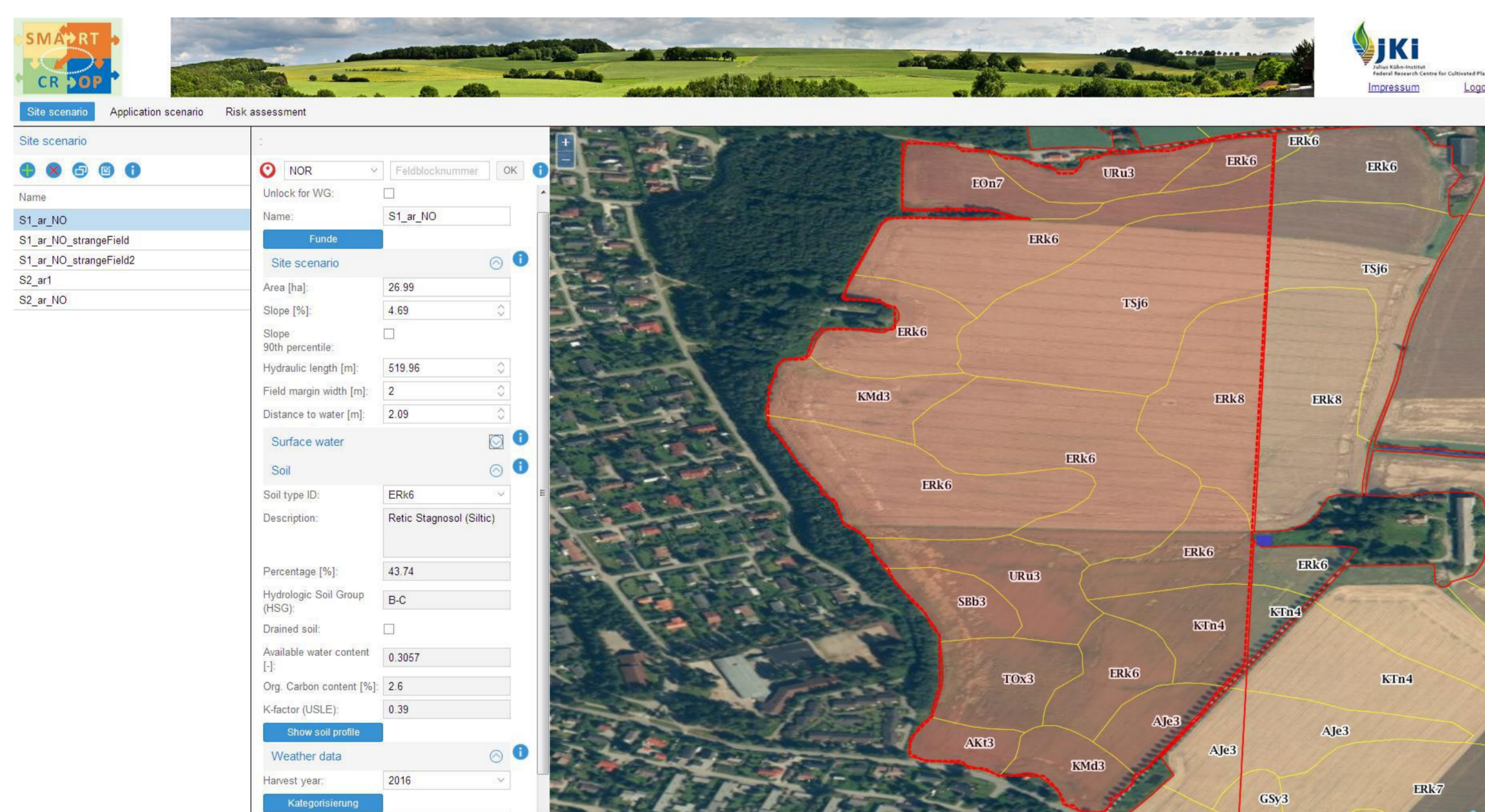


Fig. 1: Site scenario interface: with topographic, soil and weather parameters

Application scenarios

- Application scenarios include crop, chemicals, amounts applied, spraying dates and related variables as follows (Fig. 2):
 - select a crop from a drop down menu
 - enter one or more tractor rides (date, application area, application technique)
 - Input the pesticides applied in each tractor ride

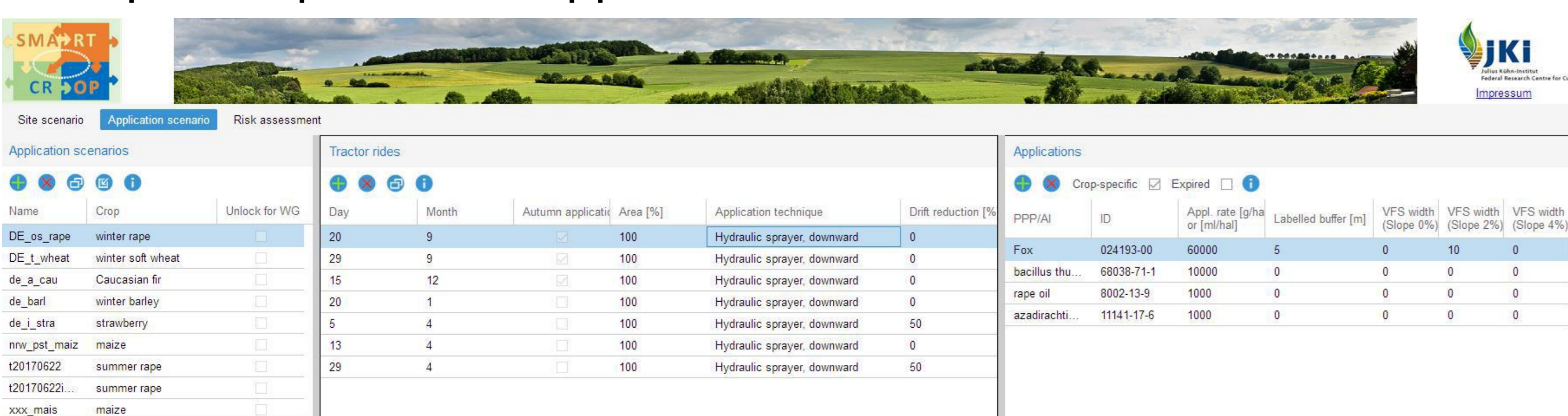


Fig. 2: Application scenario interface: crop, tractor rides and chemicals applied

Risk assessment

- The SYNOPSIS core algorithms estimate the PECs in different environmental compartments, considering pesticide loads by drift, run-off, erosion and drainage.
- Acute and chronic risk to biodiversity are calculated for multiple reference organisms as Exposure-Toxicity-Ratios (ETR).
- Options for changing crop parameters and mitigation measures are provided.
- Procedure:
 - select a combination of site and application scenario
 - calculate risk indices for all pesticide applications
 - simple presentation of risk indices in four ETR-categories (Fig. 3)
 - view acute and chronic risk indices for single reference organisms
 - view risk indices for each pesticide and for the whole application scenario (method of concentration addition)

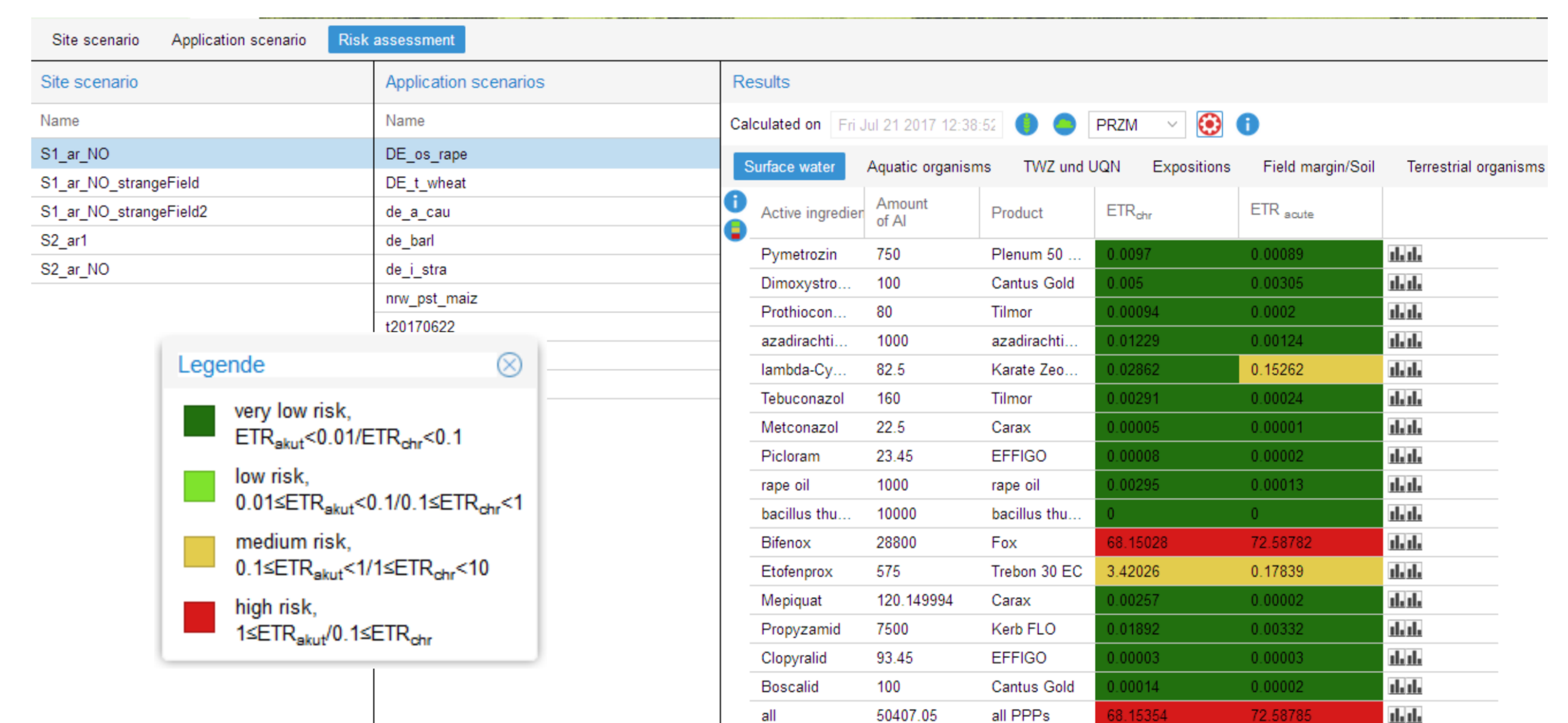


Fig. 3: Risk assessment interface: colour-coded ETR values, adjustments for crop parameters and mitigation measures

Mitigation measures

After an initial risk calculation, relevant mitigation measures can be selected to assess their impact on pesticide risk (Fig. 4):

- vegetated filter strips
- hedges
- contoured ploughing
- strip till and no-till
- tied ridges
- catch crops
- alternative pesticides with lower risk potential
- different crops

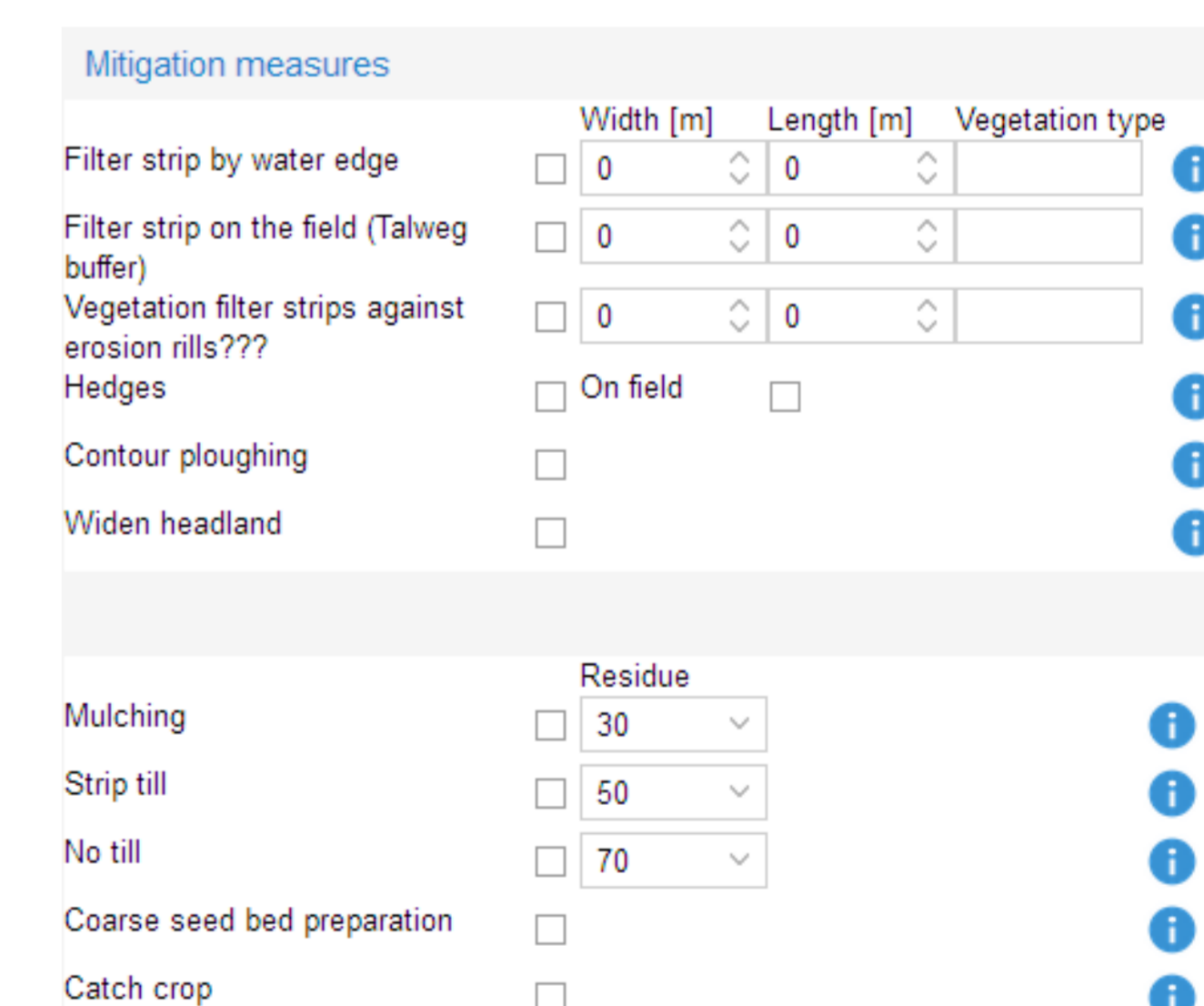


Fig. 4: Catalogue of crop specific mitigation measures

Method of calculation

- Run-off and erosion reduction via vegetated buffer strips – assessment with VFSMOD and correction of sprayed area in PRZM.
- Drift reduction according to hedge development stage.
- Runoff and erosion reduction via internal adjustments to Curve Number and Manning's factor in PRZM.

Conclusion

The comparison of the initial analysis with the improved risk calculation demonstrates directly the effect of the selected mitigation measures. This can assist advisors in

- creating better awareness of risk from pesticide use among farmers.
- convincing farmers to implement risk mitigation measures and/or to opt for lower-risk pesticides.
- optimise crops for the specific field conditions.

