The Daisy Model Newsletter
Department of Plant and Environmental Sciences
University of Copenhagen

Daisy Newsletter no. 8

Merry Christmas and Happy New Year

from us to you

The Daisy code

No changes, the version is still 5.28.

A job opportunity at KU

Would you like to work with us? We are presently looking for an Associate Professor of Agro-hydrology and Biophysical Modelling. The associate professor will be part of the Agro-hydrology research group at the Department of Plant and Environmental Sciences, Faculty of Science, University of Copenhagen. The associate professor´s main tasks will be to conduct research, including scientific publication and communication, within the field of soil physics and soil-plant-atmosphere processes and to perform research-based teaching. Focus is on quantification of processes and biophysical mechanistic modelling. The details can be found on:

http://jobportal.ku.dk/videnskabelige-stillinger/?show=867157 .

Recent projects where Daisy has been used

The report by Petersen et al. listed below is unfortunately only available in Danish. It concerns *the effect of tillage systems on pesticide leaching to field drains*. Four systems were compared, from conventionally ploughed followed by two different types of harrow-treatments to superficial harrowing before sowing and direct sowing. Focus was on the influence of the different systems on hydraulic conductivity and its development over the year. As the bulk density in the minimum tillage systems is lower than in conventional tillage, we had expected much higher hydraulic conductivity, but this was not the case. We also spent considerable time measuring and modeling the changes in bulk density and hydraulic conductivity over the year in the field and in the wheel tracks, following tillage, root development, plant cover, and exposure to rain and frost with quite good results. However, it turned out that the decisive factor was the variation of the measured hydraulic conductivity rather than its average. In the conventional systems, the number of measurements of hydraulic conductivity that were close to zero was higher, thus also representing a larger area with poor conductivity. Particularly the wheel tracks in the conventional plots had low hydraulic conductivity and in the conventional system about 25 % of the total area consisted of wheel tracks at sowing.

The conventional and minimum tillage system requires rather different pesticide use, so typical spraying scenarios were established for each of the systems and the generated parameters were used to model pesticide leaching. A synthetic weather series (hourly values) representing Eastern Zealand was used to drive the simulations (99 periods of 15 years, covering three full crop rotations) of, in total 1485 years, on two soils. Leaching was evaluated for the last 10 years of each rotation. Leaching was in average 6 times higher from the wheel track areas than from the rest of the conventional fields. The main differences between conventional and minimum tillage was that different pesticides were the main leachers. In total there was no certain effect of treatment. The simulated 10-year series varied greatly with respect to leaching, indicating that it is very difficult to deduce systematic effects of soil tillage on pesticide leaching to drains based on field trials without solid model support. Glyphosate could only be simulated realistically, when sorption kinetics was included.

The report by Kløverpris et al. is *an environmental life cycle assessment of Danish cereal cropping systems*. The modelling aspects mainly build on the article by Peltre et al. (2016), mentioned in Newsletter 5.

Recent articles and reports

Petersen, C.T., Nielsen, M.H., Rasmussen, S.B., Hansen, S., Abrahamsen, P., Styczen, M and Koch, C.B. (2016): Jordbearbejdningens indflydelse på pesticidudvaskning til markdræn. Bekæmpelsesmiddel-forskning nr. 167. Miljøstyrelsen (the Danish EPA, English summary).

Kløverpris, J.H., Bruun, S. and Thomsen, I.K. (2016): Environmental life cycle assessment of Danish cereal cropping systems. Impacts of seeding date, intercropping and straw removal for bioethanol. DCA report no. 081