The Daisy Model Newsletter
Department of Plant and Environmental Sciences
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Daisy Newsletter no. 40

1 The Daisy code

The last official release for all platforms is still version 6.45 for MS Windows, 6.45b for Mac OS and 6.44 for Linux.

We are working on an official release of version 7 and a preview can be seen here: Release v7.0.0-beta.3 · daisy-model/daisy (github.com).

2 Progress on AgroEco-HPM

Jakob Guldberg Aaes from DIKU has joined the team from Nov. 1st.

2024 have been a year where we have worked a lot "behind the scenes" and we are looking forward to 2025 where we hopefully will be able to share a lot of the things we have been working on. Both with new tools for Daisy (GeoDaisy, daisyrVis and python-adgang) and new features in Daisy (N20-emisions, PFAS-sorption and transport

We got a new email for the Daisy team daisy@ku.dk. Please contact us here if you have any questions to Daisy or the AgroEco-HPM-project.

The new R tool (daisyrVis) for loading and visualizing Daisy output can be found here: Visualization of Daisy Log Files • daisyrVis. If you use is, please gives us feedback. The tool is still under development, and we are very open to implement your suggestions.

Chapter 8 on pesticide transport in the technical description is now available on the homepage here: Chapter_8.pdf

3 Recent articles where Daisy has been used

Rydgård et al. (2024) carried out a Life Cycle Analysis (LCA) of the use of cover crops and cattle manure in biogas production (digestion). They investigated two scenarios: CCD (cover crop co-digestion) where cover crops and straw were harvested, ensiled, and co-digested with cattle manure and CMD (cattle manure digestion) where cattle manure was digested, and cover crops were incorporated in the soil. After digestion the digestate was stored and used as fertilizer. Daisy was used to simulate yield, nitrate leaching to groundwater and soil carbon storage cultivating spring barley for the two scenarios and a reference scenario (without biogas production). The simulation showed increased yield and N leaching and decreased Soil C storage for the two scenarios compared to the reference. In general, the study showed a that using ensiled cover crops for biogas production with manure could be environmentally favourable when the produced biogas was used to substitute fossil gas, however trade-offs with other environmental effects, such as increased N leaching, much be considered.

Gavasso-Rita et al. (2024) review ten crop models, including Daisy, and one intercomparison project (AgMIP) for their use to assess global production of wheat, rice and maize. The aim is to evaluate if the crop models can be used to estimate global food production and thereby global food availability as a part of improving food security for the world population. They

conclude that all the models could accurately predict crop growth and yield for most of the locations, management conditions and genotypes testes and that Daisy, together with APSIM and DSSAT, was especially useful when assessing grain filling.

Giakoumatos, Siontorou, and Sidiras (2024) reviews a number of process-based solute leaching models, including Daisy together with some empirical prediction models and AI models. They conclude that the process-based models are valuable tools for addressing soil nitrogen pollution and contributing to soil nutrient decision strategies as regards crop and fertilization management. However, they require a great amount of input data. Both empirical models and AI models can thus be a valuable alternative as they can predict nitrogen leaching with a lower data input requirement.

4 References

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Giakoumatos, Stephanos D. V., Christina Siontorou, and Dimitrios Sidiras. 2024. 'An Extensive Review of Leaching Models for the Forecasting and Integrated Management of Surface and Groundwater Quality'. *Water* 16 (23): 3348. https://doi.org/10.3390/w16233348.

Nargund, Raghavendra, Hanamant Halli, Devideen Yadav, Amresh Chaudhary, and Sudhir K. Rajpoot. 2024. 'Modeling Plant Growth, Nutrition, and Dynamics of Soil Organic Carbon Under Changing Climate and Land Use'. In *Sustainable Plant Nutrition and Soil Carbon Sequestration*, edited by Sheikh Adil Edrisi, Pradeep Kumar Dubey, Ch. Srinivasa Rao, Himlal Baral, Rajiv Kumar Chaturvedi, and Purushothaman Chirakkuzhyil Abhilash, 101–21. Cham: Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-53590-1_6.

Reimer, Marie, Möller Kurt, Jakob Magid, and Sander Bruun. 2024. 'Urban Waste Fertilizer: Effects on Yield, Nutrient Dynamics, and PTE Accumulation'. Research Square. https://doi.org/10.21203/rs.3.rs-4913891/v1.

Rydgård, Maja, Lars Stoumann Jensen, Magdalena Vinkler Schwartzkopff, Susanna Pinna, Peter Sørensen, and Sander Bruun. 2024. 'A Life Cycle Assessment of Cover Crop Ensiling and Co-Digestion with Cattle Manure'. *Nutrient Cycling in Agroecosystems*, November. https://doi.org/10.1007/s10705-024-10386-1.