1. ABOUT THE DATASET  
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Title: Integrating food and energy production on farmland: database of Decision Support Tools (DSTs)   
  
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Rights-holder(s): University of Reading

Publication Year: 2024  
  
Description:

Decision Support Tools (DSTs) can be used by farmers to support decision making on-farm through a wide range of processes and activities. Value4Farm is a collaborative initiative funded by the EU Horizon Europe program and aims to increase on-farm renewable energy production while preserving food production, soil health, biodiversity, and reducing water and fertiliser usage. This research sought to explore the range of DSTs available to farmers to support food and energy production and the integration of food and energy production on farmland.

A search of databases, including Web of Science, online education providers, organisations working with farmers and publications was undertaken and a range of DSTs focusing on aspects of food and energy production were identified. A variety of features of each DST was explored and recorded, including its aims, methods of use and geographical scope.

This spreadsheet contains a full list of DSTs identified and evaluated, with a brief description of the DST, its scope and purpose for users, the process and outputs users receive from the DST, languages the DST interface is available in, the cost to farmers for using the DST and a link to the DST.

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2. TERMS OF USE  
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3. PROJECT AND FUNDING INFORMATION  
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Title: Value4Farm  
  
Dates: September 2023 – February 2027   
  
Funding organisation: European Union Horizon Europe Research and Innovation programme  
  
Grant no.: 101116076

4. CONTENTS  
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Food\_and\_energy\_DSTs.xlsx - spreadsheet generated using Microsoft Excel, contains a full list of all the DSTs collated and reviewed and categorising information.

Number of variables: 12

Number of cases/rows: 62

List of variables:

* Description / Summary - taken from the DST or associated website
* Scope - Topic or area covered by the DST. Sustainability DSTs covered a range of aspects, for example, carbon emissions and energy use and crop production
  + Specific crop
  + Crop production
  + Energy production
  + Energy use
  + Renewable energy
  + Greenhouse gases / Carbon emissions
  + Sustainability
* Purpose - The overarching aim of the DST
  + Knowledge transfer / exchange
  + Education
  + Benchmarking / Certification
  + Assessment or auditing
  + Reporting
  + Monitoring change / progress
  + Mixed
* Access - How users access the DST. Downloaded software includes specifically designed software and (e.g.) Excel spreadsheets designed for the process. Other could include paper-based, specific monitoring devices / hardware and a mixture of apps and downloaded software.
  + Online
  + App
  + Downloaded software
  + Other
* Geographical scope - Area covered by DST, regional could be geographical (e.g. Europe) or pedo-climatic.
  + Global
  + Regional
  + National
* Process / Activities / Method - The processes users undertake in the DST to support their decision-making.
  + Data collation / collection
  + Audit
  + Monitoring change / progress
  + Modelling / scenario generation
  + Learning / Education
  + Mixed
* Outcome / Results / Output - The format the outputs of the DST take.
  + Text
  + Data / numerical
  + Graphs / images
  + Benchmarking
* Cost associated - Some DSTs offer some aspects for free and charge for others – this would be mixed. N.B. This is the cost to farmers as users; some DSTs were free for farmers but charged companies.
  + Yes
  + No
  + Mixed
  + Unknown
* Language(s)
  + English
  + English and additional languages
  + Unknown if any additional to English
* Input from end-users in development - This can be determined for some from the DST description or accompanying papers. Input could involve co-design through to end-users' comments shaping subsequent iterations of the DST. “Yes” was selected only if it was explicitly stated that end-users were involved.
  + Yes
  + No
* URL

5. METHODS  
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DSTs were identified using the following sources

Databases and Search Engines:

* Cordis - <https://cordis.europa.eu/>
* Web of Science - <https://www.webofscience.com>
* Google Scholar
* Google
* Apple App Store
* Google App Store

Websites:

* AgLEDx - https://agledx.ccafs.cgiar.org
* USDA Ag Data Commons - https://data.nal.usda.gov/search?query=lca%20tool

Publications:

* Arulnathan, V., Heidari, M.D., Doyon, M., Li, E. and Pelletier, N. (2020) Farm-level decision support tools: A review of methodological choices and their consistency with principles of sustainability assessment. Journal of Cleaner Production, 256, 120410. https://doi.org/10.1016/j.jclepro.2020.120410
* Gutiérrez, F., Htun, N.N., Schlenz, F., Kasimati, A. and Verbert, K. (2019) A review of visualisations in agricultural decision support systems: An HCI perspective. Computers and Electronics in Agriculture, 163, 104844. https://doi.org/10.1016/j.compag.2019.05.053
* Nicholson, F., Krogshave Laursen, R., Cassidy, R., Farrow, L., Tendler, L., Williams, J., Surdyk, N. and Velthof, G. (2020) How Can Decision Support Tools Help Reduce Nitrate and Pesticide Pollution from Agriculture? A Literature Review and Practical Insights from the EU FAIRWAY Project. Water, 12, 768. https://doi.org/10.3390/w12030768
* Rose, D.C., Sutherland, W.J., Parker, C., Lobley, M., Winter, M., Morris, C., Twining, S., Ffoulkes, C., Amano, T. and Dicks, L.V. (2016) Decision support tools for agriculture: Towards effective design and delivery. Agricultural Systems, 149, 165-174. <https://doi.org/10.1016/j.agsy.2016.09.009>

Education / Course Providers:

* Coursera - https://www.coursera.org/
* EdX - https://www.edx.org/
* FutureLearn - https://www.futurelearn.com/
* Udemy - https://www.udemy.com/

Organisations:

* Food and Agriculture Organisation (FAO) - https://www.fao.org/home/en
* National Farmers’ Union (NFU) - https://www.nfuonline.com/

Combinations of the following terms were used in the search process: DST, DSS, Farming, Agriculture, Decision Support Tool, Decision Support System, Renewable energy, Energy generation, Energy production, Energy use, Crop production, Arable crops.

As the focus of the review was DSTs which considered food (arable crops) and energy use or production, or a combination of these, DSTs which focussed on the following aspects were excluded:

* solely on livestock and livestock management;
* solely on the financial aspects of farming;
* on crops not grown within Europe (e.g. sugarcane and oil palms); and
* solely on aspects of farming such as pesticide or fertiliser application, water quality, soil management, and pest control, where there was no consideration of food production or energy use and/or production.

Identified DSTs were then reviewed and categorised according to the following criteria:

* DST Scope
* Purpose or aim of the DST
* How users access the DST
* Geographical scope, the area covered by the DST
* The processes users undertake in the DST to support their decision-making
* The format the outputs of the DST take
* Cost of the DST associated to farmers as users
* Language(s) the DST interface is available in
* Whether there was input from end-users in development