

Decision support systems (DSS)

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Factsheet about integrated weed management



Introduction

Decision support systems (DSS) are in general defined as computer-based tools that help to make decisions, solve problems and support or disprove conclusions. DSS's can support farmers to make the right decisions in weed management. Various forms of information required for growing crops are integrated in a DSS, including information related to weeds specifically. DSS's collect and provide data from the environment such as climatic conditions or the presence of pests and the composition and density of weed flora. These data are analysed by the models in the DSS resulting in a range of suitable measures or treatments for each case.

Applicability

There are several DSS's designed for weed management. They can define whether it is necessary to apply a chemical treatment and suggest dose rates of herbicides, including options for reduced dose rates. Examples of DSS's that have been efficiently tested in situ in Europe are the Danish Crop Protection Online-Weeds and the Dutch Minimum Lethal Herbicide Dose. They provide information regarding weed flora composition and the abundance of actual weed populations within a field¹. DSS's still lack information on weed seedbank dynamics in the soil¹, which makes them only useful for short-term decision making. Although the practical use of DSS's needs further research to make them useful for long-term weed management decisions, DSS can already be used to get insight in the conditions.

Efficacy

DSS's are not used widely in weed management and crop protection, although they have potential. Although

DSS methodologies can be a useful tool in terms of integrated weed management, their potential is still limited¹.

DSS's already can provide important knowledge regarding the weeds-crops competition in a field and suggest the most appropriate herbicides against the most dominant weed species at the optimum time for application, the dose rate and method². Considering that monitoring and scouting play a major role in integrated weed management, DSS's can support weed management by giving information throughout the growing season. This information can either be used to make informed decisions or to evaluate the effectivity of previously applied tactics and strategies³.

Core results

- If spraying is done according to the collection of site-specific data herbicide inputs can be decreased up to 60% in cereals⁴
- Herbicide inputs can be decreased in major crops by application of herbicides according to the suggestion of an DSS such as IPMwise^{3|5}
- It has been well established that DSS technology reduces herbicide use by approximately 40% compared to reference herbicide treatments⁶.

Extra information

See <https://iwmpraise.eu/publications/> for all crop diversification strategies and their definitions, and for more information on integrated weed management.

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1 | Kanatas, P., Travlos, I. S., Gazoulis, I., Tataridas, A., Tsekoura, A., & Antonopoulos, N. (2020). Benefits and Limitations of Decision Support Systems (DSS) with a Special Emphasis on Weeds. *Agronomy*, 10(4), 548. doi:10.3390/agronomy10040548

2 | Rossi, V., Meriggi, P., Caffi, T., Giosuè, S., & Bettati, T. (2010). A Web-based Decision Support System for Managing Durum Wheat Crops. 10.5772/39386.

3 | Riemens, M., Sønderkov, M., Moonen, A.-C., Storkey, J., & Kudsk, P. (2022). An Integrated Weed Management framework: A pan-European perspective. *European Journal of Agronomy*, 133, 126443. doi:10.1016/j.eja.2021.126443

4 | Jensen, H. G., Jacobsen, L.-B., Pedersen, S. M., & Tavella, E. (2012). Socioeconomic impact of widespread adoption of precision farming and controlled traffic systems in Denmark. *Precision Agriculture*, 13(6), 661-677. doi:10.1007/s11119-012-9276-3

5 | Rydahl, P. (2003). A web-based decision support system for integrated management of weeds in cereals and sugarbeet. *EPP0 Bulletin/OEPP Bulletin*, 33(3), 455-460.

6 | Jørgensen, L. N., Noe, E., Langvad, A. M., Jensen, J. E., Ørum, J. E., & Rydahl, P. (2007). Decision support systems: barriers and farmers' need for support*. *EPP0 Bulletin*, 37(2), 374-377. doi:10.1111/j.1365-2338.2007.01145.x