

Working time requirements for farm management work in organic and herbicide-reduced production of arable crops

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Keywords: Labour, farm management, plant protection, pesticide reduction.

Abstract

Alternative production methods often differ in working time requirements (WTR) for fieldwork. However, there are also WTR differences for tasks in farm management (FM), which are often not considered in detail. In the present study we compared the production schemes organic, herbicide-free / -reduced, and conventional as reference for three exemplary crops (winter wheat, potato, sugar beet) using a FM labour model. Similar to the WTR for fieldwork we found that there are marked differences in the WTR between crops for FM works. Organic production generally requires less FM and thus less WTR compared to herbicide-free and conventional which show very similar WTR.

Introduction and objectives

Farm management (FM) tasks are an important part of the overall works that have to be done on a farm. Even though they may greatly vary from farm to farm, FM and general farm work can account for up to 35 % of the overall working time required of a typical farm (Forster 2002). Organic farming, which prohibits the use of chemical-synthetic pesticides, is typically more labour intensive than conventional agriculture (Crowder and Reganold 2015). However, there is only limited knowledge on the differences in WTR for FM in organic compared to conventional farms. In the present study we used an established model to estimate WTR for FM on farms using the production schemes organic and herbicide-free / -reduced as well as conventional as reference scheme, for three exemplary crops: (i) winter wheat (WW), (ii) sugar beet (SB) & (iii) potato (PO). Our study provides evidence-based data for decision support on the choice between conventional and environmentally friendly crop production schemes.

Methods and data

The WTR for FM tasks was calculated with the established OffWo model (Moriz 2007; Moriz 2010). Where necessary the OffWo model was updated to reflect typical more current working practices such as digital filing, ordering and accounting. Both models were adapted for the production processes of three selected crops according to specified assumptions.

Results and discussion

According to our modelling assumptions, organic cultivation requires less field inspections compared to conventional cultivation, no storage inspections for plant protection chemicals (PPCs) (except for PO), no purchase of PPCs (or less for PO) and less need for advice for the cultivation of the respective crop because no (or less for

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PO) PPCs are used. On the other hand, organic farming usually involves more record-keeping activities and application works. Based on our assumptions, herbicide-free / -reduced farming requires more time for filling direct payment applications than conventional farming, which outbalances time-savings in other tasks for WW and PO. For WW, the WTR for plant protection-related FM tasks ranged from 3.7 Man power hours per hectare (MPH/ha) for organic to 5.6 MPH/ha in herbicide-free farming, with a weighted average for field number and field sizes. For SB, the respective figures were between 4.4 (organic) and 6.8 MPH/ha (conventional, herbicide-reduced). For PO the respective WTR was between 8.0 MPH/ha for organic and 10.6 MPH/ha for herbicide-free. This is due to differences in the implementation of the individual FM tasks. In relation to the total WTR for FM tasks, the share of FM tasks with a direct or indirect relation to plant protection measures for WW ranges from 16 % for organic to 23 % for herbicide-free cultivation. For SB, the proportions range from 28 % in organic to 35 % in conventional cultivation; for PO, the proportions range from 32 % in organic to 39 % in herbicide-reduced cultivation. In general, WTR for FM tasks are higher in PO and SB than for WW production (see Fig. 1). The share of the FM WTR to the total of field and FM WTR differed between crops and production schemes: it ranged for WW between 19 % for organic and 46 % for conventional, for SB from 3 % for organic to 26 % for herbicide-reduced, and for PO from 12 % for organic and 15 % for herbicide-free.

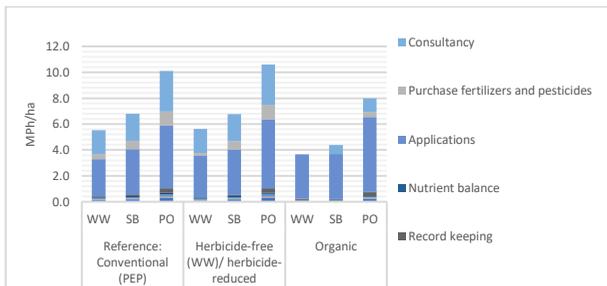


Figure 1: WTR for FM for WW, SB and PO under different production schemes.

Conclusions

The effects of organic or herbicide reduced production on WTR for FM differ between the crops. FM tasks require a considerable part of the overall WTR for a crop. Lower FM WTR for organic cropping can partly compensate for higher WTR for field works. However, assigning FM tasks to certain crops is not trivial because while there are some FM tasks related to the cultivation of specific crops, many others relate to the whole farm.

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