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Evaluating crop dynamics: A three-year study of hull-less barley and lentils in intercropping systems

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Intercropping systems are gaining attention as a sustainable alternative to monocropping, but research on hull-less barley as a suitable companion plant for lentil production is limited. Within the European project CROPDIVA (www.cropdiva. eu), a three-year field study under a low-input system was carried out at two locations in central Switzerland using three hull-less barley (Oak Ruby, AF Cesar, Goljiat) and four spring lentil genotypes (Anicia, Beluga, Grüne Berry, Château). Using an identical overall plant density, different cropping systems (pure versus mixed) and fertilisation levels were evaluated. It was assessed whether intercropping would improve land use efficiency (land equivalent ratio: LER), reduce the pressure of weeds, diseases, pests and reduce lodging of lentils, while achieving equivalent yields compared with pure stands.

The study presents crop dynamics over three years to determine whether hull-less barley is a suitable companion plant for lentil intercropping. Preliminary results indicate that lentil varieties with similar growth pace as hull-less barley are key to successful intercropping. Anicia and Grüne Berry showed lower yields in intercropping than in pure stands, while Beluga outperformed in LER, weed suppression and lodging resilience. In contrast, Château performed worst in terms of yield but was moderate in terms of weed competition. Hull-less barley varieties AF Cesar and Oak Ruby were better suited as companion plants than Goljiat, which overgrew the lentils. These findings suggest that field diversification can be achieved without yield loss, given the right combination of species and cultivars. Furthermore, the inclusion of a second crop supports the hypothesis that intercropping can stabilise yields while enhancing land use efficiency. The results of currently running analyses will be presented and discussed. Future research should explore mixed intercropping systems with more further varieties and the development of harvesting equipment designed for costeffective post-harvest kernel separation from intercropping systems.

Biography

Filippo Carmenati is a 4th year PhD student in the Research group Extension Arable Crops at the Swiss federal research institute for agriculture (Agroscope) and enrolled at ETH Zürich. His research is part of the EU project CROPDIVA (grant number 101000847) studying cropping system diversification through the use of underrepresented arable crops. Beside intercropping experiments for lentil production, he is also involved in the evaluation of spring and winter genotypes of hull-less barley and on the quantification of provisioning and regulating ecosystem services delivered by lentils, buckwheat and narrow-leaved lupin under pure and mixed stands. He is supervised by Dr. Susanne Vogelgsang and Prof. Johan Six filippo.carmenati@agroscope.admin.ch

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