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Tied-Ridging: Great Concept, But Rare Implementation — A Review of Knowledge and Risk Reduction Options

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Abstract

Water deficit is the main factor limiting crop production in rainfed farming systems under arid and semi-arid environments. In these environments uni- and bimodal rainfall regimes prevail, while annual total precipitation is low, erratic and highly variable between years. In addition, high intensity rainfall events lead to significant run-off water and soil losses from sloping fields. To avoid these losses tied-ridging has been developed as a soil and water conservation technique. The technique consists of establishing contour furrows with cross-ties, creating mini-basins. Water collected in the basins overflow the cross-ties when rainfall is heavy and follow the furrows that are built at a slight angle to the contour.

Tied-ridging has been shown capable of reducing run-off by more than 75 %, soil loss up to 95 % and to improving greatly soil water availability and consequently increasing yields up to over 50 %. Reduced surface run-off and higher infiltration has been proved not only to increase plant available soil water, but also to significantly contribute to groundwater recharge. The effects of tied-ridging on soil water, yield and groundwater recharge are, however, highly variable in space and time. This variability in combination with the fixed additional investment for ridging might be the principal reason for the limited implementation so far.

Results from over 100 articles published on tied-ridging research are structured and examined to assess whether it is possible to tailor multi-factorial threshold values, for precipitation, slope, soil type, crop, tied-ridge dimensions, that are required to allow a significant positive impact of tied-ridging. Furthermore, the published data are analysed for their suitability to describe functions that can be integrated into current water and crop growth models. Integration of tied-ridging as an management option into these models could serve farmers, extension workers and researchers to predict the impact of tied-riding. This could eventually reduce the risk of investment loss, promote implementation and ultimately improve food security. Remaining knowledge gaps identified are translated into into specific research questions.

Keywords: Furrow diking, run-off, soil conservation, tied-riding, water conservation

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