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Mitigation of surface runoff and soil erosion in potato farming

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The potato is known as a particularly erosion-prone crop due to its late seed development and the unique structure of its seedbed (wide-rows). Therefore, improved tillage practices are needed in order to counteract and mitigate adverse effects of erosion.

This research evaluates the effectiveness of three mitigation measures – furrow greening, micro-dams heaped between furrows, and greened micro-dams – over a three-year study period in Lower Austria. Runoff plots were used to quantify surface runoff and collect each treatment's eroded material during precipitation events. The contents were emptied after each event, dried, weighed, and, if possible, analyzed for grain size distribution and nutrient composition. Additionally, the soil water content of the ridges and furrows and the potato yield was determined for each treatment in the 2021 field campaign to evaluate further effects of each treatment.

Results show that with a furrow greening soil erosion was reduced between 48 – 83% compared to the control treatment. By heaping micro-dams, soil erosion was reduced by 79 – 98%, and with the additional greening of micro-dams sediment yield was lowered by 94 – 99%. Micro-dams increased the water content in the furrows after a precipitation event but not in the ridges. Regarding potato yield, no significant difference was observed between treatments.

The results of this study show the potential of micro-dams to reduce on-site and off-site effects of soil erosion on sloped agricultural land. Depending on the steepness of the slope and the intensity of precipitation events, breaking of micro-dams can occur and therefore lose their mitigation effect. Through the additional greening of micro-dams, further stabilization could be reached, thus withholding precipitation events of higher intensities.