Strip cropping of alternating perennial grass–clover and annual rye–vetch intercrops when grown within an organic farming system - DTU Orbit (18/01/2019)

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A field experiment was carried out including alternating perennial ryegrass (*Lolium perenne* L.)–clover (*Trifolium repens*+*Trifolium pretense* L.) pasture mix with annual winter rye (*Secale cereale* L.)–vetch (*Vicia villosa* L.) intercrops. The annuals were established after soil incorporation of a 1st-year grass–clover in a 6-m wide strip as both inter- (IC) and sole crops (SC): (1) rye SC, (2) vetch SC and (3) rye–vetch IC. The perennial strips were established without incorporating the 1st-year grass–clover in an equivalent 6-m wide strip. This resulted in an early interspecific competitive advantage for the perennial strip and especially limiting growth of the rye component. Relative clover proportion in the sward increased with increasing distance to the annual strip indicating more available soil mineral N in the interface between the perennial and the annual strip. Compensative growth of the grass–clover when grown in close proximity to the annual strip was only partly counterbalancing the decreased total crop productivity in the rye–vetch intercrop. Across the whole growing season (September–August) approximately the same amount of biomass was produced when dividing the field into strips (6m×6m) as compared to growing the same area with the traditional single-field cropping strategy. There was a greater total aboveground plant N uptake in sole cropped vetch and the rye–vetch intercrop compared to the rye sole crop due to vetch N2-fixture, but with severe vetch-growth depression when intercropped. The amount of vetch-N2 fixed was reduced with about 9gNm−2 when intercropped as compared to the sole cropping situation. Light interception by the annual crop when grown in close proximity to the grass–clover strip was reduced due to the lower aboveground biomass yield and assumed belowground competitive interactions. Less soil water content below the perennial strip indicated greater water uptake, than below the annual strips. Unfortunately, the present strip cropping system did not possess the right balance of co-existence and complementarity. However, from a practical point of view the system was manageable indicating potentials to diversify agricultural fields and develop future cropping systems which are more complex and thereby resilient to externalities.

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