The dynamics of *Cirsium arvense* and *Elytrigia repens* in long-termed organic crop rotation experiments

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Cirsium arvense and *Elytrigia repens* are perennial weeds prevalent in organic cropping systems in Scandinavia. This study analysed the population dynamics of both species in long-termed crop rotation experiments conducted at three sites (coarse sand, silt and sandy loam) in Denmark from 1997-2009. The purpose was to gain insights into the factors influencing perennial weeds population changes over time, especially those important for outbreaks of *C. arvense* and *E. repens* infestations. Data were obtained from three cycles of four-year crop rotations with various cash crops and annual grass-clover subjected to four treatment combinations: with and without animal manure and with and without catch crops. The perennials were controlled by different tillage and mowing strategies between and within crops. The experiment on coarse sand was quickly infested with *E. repens* while *C. arvense* gradually invaded the experiment on sandy loam. At the third site, perennial weeds did not become noteworthy problems in the 12-year period. The reason for this could not be explained in differences of fertility among sites but rather in site characteristics and weed management measures employed. Pulse crops and spring cereals caused the highest population increases of *E. repens* on coarse sand, especially when preceded by grass-clover. However, grass-clover with mowing had the opposite effect on *C. arvense* growth on sandy loam and crops succeeding grass-clover were predominantly least infested. Similar to *E. repens*, vigorous *C. arvense* growth was associated with pulse crops but spring cereals versus winter cereals were not markedly different in their suppressing abilities against *C. arvense*. Potatoes grown in ridges that were rotary tilled and winter rye suppressed the *E. repens* population, but tillage between crops was necessary to decrease the population. In contrast, stubble cultivation had very little effect on *C. arvense*. Manuring generally reduced *E. repens* growth by 28% whilst no differences were seen for *C. arvense* between manured and non-manured treatments. Apparently, the improved crop growth caused by fertilisation increased crop competition enough to counterbalance any growth stimulation of *C. arvense*.

This study clearly revealed the importance of benefitting from significant crop suppression for the management of perennial weeds under circumstances with no access to strong weed control methods such as herbicides. Well established and fast growing crops producing large quantities of crop biomass might be valuable tools for the suppression of perennial weeds in organic cropping systems, especially *C. arvense* while this is less clear for *E. repens*. Grass-clovers and similar crops suited for mowing also play an important role for the control of *C. arvense* while mechanical interventions are more important to supplement the management of *E. repens*.

References

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