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Effect of crop species and management practices on perennial weeds in organic farming

Petri Vanhala¹, Timo Lötjöner² and Jukka Salonen¹

¹MTT Agrifood Research Finland, Plant Production Research, Jokioinen, Finland.

²MTT Agrifood Research Finland, Agricultural Engineering Research, Vihti, Finland.

Correspondence to: petri.vanhala@mtt.fi

Perennial weeds are an increasing problem in Finland, particularly in organic farming. Controlling perennials with non-chemical methods is not an easy task. However, crop competition and cultural practices like mowing, hoeing and bare fallowing provide some possibilities for management of perennial weeds.

In order to study the biology and non-chemical control of perennial weeds, a three-year field experiment was established in 2001 at Vihti, southern Finland. The experiment was placed in a clay soil (containing 6–12% organic matter) field under organic production, infested moderately with *Cirsium arvense*, *Elymus repens* and *Stachys palustris*, and heavily with *Sonchus arvensis*. The experimental design was randomised blocks with five replicates. The treatments consisted of various crop plants and cultural practices, including fibre hemp, spring cereal (barley in 2001, oats in 2002) with or without inter-row hoeing, bare fallow and ley (timothy + red clover) with mowing. The development of crop and weed plants was observed weekly. Prior to the harvest of cereals, plant samples from two 0.5 m × 0.5 m quadrats were cut at the soil surface. The growth stage and the height of each shoot of perennial weeds were assessed, as well as the dry mass of each weed species.

S. arvensis was most abundant in fibre hemp and first year's timothy + red clover, and rather abundant also in cereals without inter-row hoeing. Bare fallowing reduced *S. arvensis* most effectively. Spring-sown timothy and clover remained short in 2001, and also the early growth of fibre hemp was slow. Fibre hemp grew poorly in both years in this experiment. In all crops, except fibre hemp in 2002, the majority of *S. arvensis* infestation even at the harvest time consisted of small plants with 1–6 leaves, thus being at the compensation point (Håkansson 1969) or smaller. The highest percentage (6% in 2001, 44% in 2002) of *S. arvensis* plants with ripening seeds was in hemp. The effect of crop species and management practices on the other – less frequent – weed species was rather similar with some exceptions. Ley was not effective in reducing *E. repens* or *S. palustris*, and *C. arvense* recovered well after the bare fallow.

The primary analysis of results suggests that the following measures could be done in order to suppress perennial weeds by using non-chemical methods. A crop which is competitive not only generally but also in the conditions of the given field should be chosen. Bare fallow is an effective way to reduce most perennial weeds. Mechanical control in crop stand is also possible; inter-row hoeing in cereals seems to impede perennial weeds. It should, however, be realised that different weed species may give dissimilar response to the same treatment: ley is not effective against *E. repens*, and bare fallow – at least when carried out as in this experiment – does not take good effect on *C. arvense*. The experiment is still running; the subsequent effect of different treatments will be assessed during the summer 2003.

References

Håkansson, S. 1969. Experiments with *Sonchus arvensis* L. 1. Development and growth, and the response to burial and defoliation in different developmental stages. Lantbrukshögskolans annaler 35, 989–1030.