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Response of *Sonchus arvensis* to mechanical and cultural weed control

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Perennial weeds are an increasing problem in Finland, particularly in organic farming. *Sonchus arvensis* L. (perennial sowthistle) is among the most common and harmful perennial weeds. Controlling it using physical weed control methods is not an easy task. However, crop competition and cultural practices like mowing, hoeing and bare fallowing provide some possibilities for management of *S. arvensis*.

In order to study the biology and physical control of *S. arvensis*, a 3-year field experiment was established in 2001 at Vihti, southern Finland. The experiment was sown on a clay soil (containing 6–12% organic matter) field under organic production, infested heavily with *S. arvensis*. The experimental design was randomised blocks with five replicates. The experimental field was fertilized with pig slurry (plant available N 60–100 kg ha⁻¹) at cereal sowing time.

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. In 2003 the whole field was sown with spring wheat. Prior to cereal harvest, plant samples from two 0.5 m × 0.5 m quadrats were cut at the soil surface. The growth stage and height of each *Sonchus* shoot were assessed, as well as the number of shoots and dry mass per quadrat.

Statistical analyses were performed with the SAS statistical package. The plot-wise pooled numbers of *S. arvensis* shoots were square root transformed and the biomass log-transformed before subjecting to statistical tests with the MIXED procedure with the Tukey adjustment.

In 2001 *S. arvensis* was most abundant in fibre hemp and first year's timothy + red clover ley, and rather abundant also in cereals without inter-row hoeing. Bare fallowing reduced the density and dry mass of *S. arvensis* most. Also inter-row hoeing reduced *S. arvensis* density compared to hemp or ley. Highest *S. arvensis* dry mass was observed in hemp plots. Fibre hemp is known to be a competitive plant, but in this field it grew poorly in both years.

Also in 2002 the density and dry mass of *S. arvensis* were highest in hemp plots and in oats plots with no mechanical weed control. The density and dry mass of *S. arvensis* were lowest in the bare fallow treatments. In plots where oats was grown after previous summer's bare fallow, the dry mass of *S. arvensis* was significantly smaller than in hemp, oats, or hoed oats plots.

The rating of the treatments according to the control effect was: bare fallow > ley > cereal with inter-row hoeing > cereal > fibre hemp.

The results suggest that the following measures could be implemented in order to suppress *S. arvensis* infestation: A crop which is competitive in the conditions of the given field should be chosen. Bare fallow is an effective way to reduce *S. arvensis*, but it's a costly method which may impair soil structure, in case of ample precipitation. Mowing the ley seems to have effect on *S. arvensis*; it would be profitable to have a perennial, regularly mown green fallow or silage ley included in crop rotation.

Mechanical control in crop stand is also possible; inter-row hoeing in cereals seems to impede *S. arvensis*, if it is done 2–3 times during the growing season. Inter-row hoeing is effective between cereal rows, but it can't control the weeds within the crop rows. The subsequent effect of different treatments, assessed in spring wheat in 2003, will be published later.