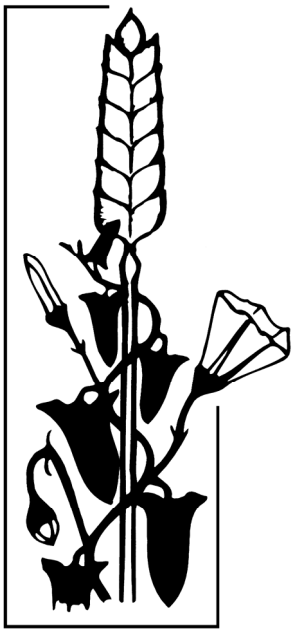

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Overwintering and regrowth of *Sonchus arvensis* roots in Finland as affected by fragmentation and burial in three different soil types

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Successful physical control of perennial weeds may be promoted by knowledge about how different factors affect their survival and regrowth. Among these factors belong tillage or other mechanical control and the resulting fragment size of reproductive underground organs. In this study the effect of root fragmentation, burial depth and soil type on overwintering and regrowth of *Sonchus arvensis* L. (perennial sow-thistle) was studied.

Three field experiments with eight replicates were conducted, each on different soil type: clay, sand and organic soil. *S. arvensis* roots were cut to different lengths (24, 12 or 6 cm), and the number of root fragments (2, 4 or 8) was selected so that the totalling length of roots was 48 cm in each plot. The roots were buried at two depths (5 cm or 15 cm) in autumn 2001 to overwinter in the field. In spring 2002, when the first shoots had about 6 leaves, the plants were dug up, their root length and shoot biomass measured.

During the winter *S. arvensis* root length was reduced by decay and, in organic soil, also due to feeding by larvae of *Agriotes* sp. beetles. Of the original total 48 cm root length, on average 33 cm (69%) was recovered in spring. Average root length survival percentages for different soils were: clay 91%, sand 77%, organic soil 38%. Burial depth had little effect on survival (5 cm 71%, 15 cm 68%) while survival percentage was higher in long than short fragments (6 cm 58%, 12 cm 71%, 24 cm 77%).

Both the original root length and burial depth affected *S. arvensis* regrowth in spring. However, the effect varied between soil types. Generally, the shorter the root fragments were the less they produced above-ground fresh weight; 6, 12 and 24 cm fragment length resulted in 0.6, 0.9 and 1.3 g fresh weight per plot (overall average), respectively. Burial depth had a strong influence on above-ground fresh weight; 5 cm and 15 cm burial depth resulted in 1.6 and 0.2 g fresh weight per plot (overall average), respectively. While 2 × 24 cm fragments buried 5 cm deep produced 2.2 g above-ground fresh weight, 8 × 6 cm fragments buried 15 cm deep produced only 0.09 g above-ground fresh weight. However, fragment length had no effect on above-ground fresh weight at shallow burial in clay soil, while having a marked effect in organic soil: 24 cm and 6 cm fragment length resulting in 1.7 and 0.2 g, respectively.

Based on the results, fragmenting the roots to smaller pieces in autumn and burying them deeper reduces the initial shoot biomass of *S. arvensis* plants in spring. As a consequence, *S. arvensis* will not be able to fully compete with the crop plants which get the advantage at early growth stages. To utilize the control potential of this approach, it would be beneficial to develop machinery and techniques that allow – besides strong fragmentation – to determine the burial depth of roots.

References

Vanhala P, Lötjönen T, Hurme T & Salonen J (2006). Managing *Sonchus arvensis* L. using mechanical and cultural methods. Agricultural and Food Science 15: 444-458.