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**Tillage systems for the benefit of agriculture
and the environment**

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Weed problems in various tillage systems in the Nordic countries

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The practice of reduced or no-tillage for small grain cereals has increased in the Nordic countries in order to reduce erosion and nutrient leaching and to save operational and machinery costs for tillage. This mainly applies to spring cereals, but in recent years ploughless tillage in winter cereals has received more attention. This presentation deals with commonly seen weed problems associated with various tillage systems in the Nordic countries illustrated by results from some case studies. Traditionally, inverting tillage by the mouldboard plough is intended for weed control, seedbed preparation and incorporation of straw residues into the soil. In Finland, grass weeds, such as *Phleum pratense*, *Alopecurus* spp., *Poa* spp. and *Festuca* spp., are found to increase in no-tillage systems as compared to ploughing (Jalli, 2006). Grass weeds, such as *Alopecurus myosuroides*, *Apera spica-venti* and *Poa annua*, are seen as problems in Danish non-inverting tillage systems including the perennial grass weed *Elymus repens* (Melander, 1994). In Norway perennial weeds and other overwintering weed species such as *Cirsium arvense*, *E. repens*, *P. annua*, *Stellaria media*, *Matricaria perforata* and typical 'grassland' species are causing problems when the land is not ploughed (e.g. Tørresen et al. 2003). This generally also corresponds with the Swedish situation (Fogelfors, pers. comm., Håkansson, 2003, pp. 193-196). Also problems with volunteer oats should be mentioned in this context. The effect of tillage on the abundance of summer annual weeds varies according to the individual species. Ploughing in spring causes only slightly more weeds compared to autumn ploughing. Non-inversion tillage systems strongly depend on glyphosate usage for cleansing the land prior to crop sowing, but selective post-emergence herbicides should follow this treatment to attain satisfactory control. Especially, the timing of the glyphosate treatment is an important issue for the success of weed control under non-inversion tillage.

Håkansson, S., 2003. Weeds and weed management on arable land: an ecological approach. CABI Publishing, Wallingford.

Jalli, H., Laine, A. Känkänen, H., 2006. No-till cultivation suppresses broad-leaved weeds but favours grasses. NJF Seminar 378 Tillage systems for the benefit of agriculture and the environment, Abstract.

Melander, B., 1994. Impact of non-inversion tillage on weeds in temperate regions. Proceedings EU-Concerted Action N^o AIR 3 - CT 93 -1464, No-Tillage - Workshop I, 49-58.

Tørresen, K.S., Skuterud, R., Tandsæther, H.J., Hagemo, M.B., 2003. Long-term experiments with reduced tillage in spring cereals. I. Effects on weed flora, weed seedbank and grain yield. Crop Prot. 22, 185-200.