

Weeds and weed management in lettuce

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The EWRS Working Group "Weed Management Systems in Vegetables" was established with the aim of collecting and disseminating information and results on weeds and weed control strategies in vegetables, identifying gaps in knowledge and defining new research projects. So far the working group has published reviews on onions, tomatoes, carrots, peas and cabbages. Information about key weeds, new weeds or species that have recently become problematic, effect of competition, weed management programmes in integrated and organic production, approved herbicides and those currently undergoing registration for use in lettuce grown in Germany (D), Italy (I), Jordan (HKJ), The Netherlands (NL), Poland (PL), Portugal (P), Slovenia (SLO), Spain (E), Switzerland (CH), Turkey (TR) and United Kingdom (UK) was collected.

Although the majority of the lettuce crop is grown as an outdoor spring-summer crop (E 37000 ha, TR 20000 ha, I 18000 ha, D 12500 ha, UK 7000 ha, HKJ 1900 ha, CH 1700 ha, NL 1300 ha, PL 600 ha, SLO 350 ha,), early and late productions are obtained by non-woven materials (fleece), clear/white plastic mulch, row covers and greenhouse cultivations to satisfy year-round consumption. Black polyethylene and black biodegradable plastic (Mater-Bi) mulching are usually preferred where weed control is a priority in comparison to yield earliness. Lettuces are mainly transplanted as modules, but may be also direct-drilled.

The weed communities are typically very species rich and their composition is highly variable in relation to climate, soil and crop period.

Weeds that are most problematic in lettuce are those that are taxonomically related and not controlled by herbicides, in particular, *Galinsoga* spp., *Anthemis* spp., *Matricaria* spp., *Senecio vulgaris* and *Sonchus oleraceus*.

However, *Capsella bursa-pastoris*, *Diplotaxis* spp., *Fumaria officinalis*, *Papaver rhoeas*, *Veronica* spp., *Viola arvensis*, *Stellaria media*, *Urtica urens*, *Chenopodium* spp. and *Poa annua* may also be key weeds in early cultivations whilst *Amaranthus* spp., *Polygonum* spp., *Portulaca oleracea*, *Digitaria sanguinalis* and *Echinochloa crus-galli* may occur in late cultivations.

Some species are becoming important: *Rorippa sylvestris* in CH, *Abutilon theophrasti*, *Galinsoga parviflora*, *Xanthium spinosum*, *X. strumarium* in P, *Aethusa cynapium*, *Bidens tripartita* in D, *Cruciferae* in SLO, and *Oxalis pes-caprae* and *Calendula arvensis* in I.

Transplanted crops rarely suffer severe weed competition, but late maturing varieties and all drilled crops are particularly susceptible due to low initial growth rates. Typically there is no critical period of competition such that a single weeding 2-3 weeks after transplanting is sufficient to prevent yield loss. However, there is a zero tolerance of weeds that may hinder hand-harvesting or lead to contamination of minimally processed lettuces.

Conventional weed control is based on herbicide application; options are restricted to trifluralin (I, UK, HKJ), chlorpropham (I, UK, NL), pendimethalin (E, I, UK, D, CH, HKJ), propachlor (I, UK), propyzamide (E, I, UK, D, CH, P, PL, SLO), carbetamide (NL), benfluralin (E, I), chlorthal (E, I), oxadiargyl (E), oxadiazon (I), oxyfluorfen (HKJ) and graminicides (E, I, P, D, SLO, HKJ). No pre- or post-emergence/transplanting herbicides are registered in TR. In CH, flufenazet 0.6 L/ha applied immediately before planting showed a total control of *Galinsoga* spp. Common strategies for organic production are false seedbed technique, mechanical (i.e. split-hoeing and/or finger weeding) and manual weeding; planting on ridges and use of starch-based biodegradable mulches are increasing.