

Weeds and weed management in peppers

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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, cabbages and lettuces. 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 sweet and hot peppers grown in Italy (I), Poland (PL), Portugal (P), Spain (E) was collected.

In 2012, the world production of peppers was 31 millions of tons on 1.9 millions of hectares. In the surveyed countries peppers crop surface is about 32750 ha (E 19000 ha, I 11000 ha, PL 2500 ha, P 250 ha.).

The majority of the crop is transplanted. In Spain, direct seeding was studied and the results transferred to farmers but this technique has not been adopted. The season of planting is late spring (April and May). Single-row distance is 0.80 to 1.00 m, while double-row distance is 1.20 to 1.50 m, with a planting density of 3-4 plants m⁻², depending on cultivars.

Peppers suffer severe weed competition due to low initial growth rates. The critical period for weed control in transplanted crops was about from 25 to 45 days after planting. Polyethylene mulching and drip irrigation is generally used to avoid weeds and to optimize irrigation. Localised irrigation instead of sprinkler irrigation and fertigation instead of broadcast fertilisation can also help to reduce weed emergence and competition.

The weed communities are commonly very rich of species and their composition is highly variable in relation to climate, soil, crop rotation and crop period. The most important and frequent species are: *Cyperus rotundus*, *Datura stramonium*, *Xanthium strumarium*, *Portulaca oleracea*, *Solanum nigrum*, *Sonchus oleraceus*, *Picris echioides*, *Chenopodium album*, *Amaranthus* spp., *Portulaca oleracea*, *Polygonum* spp., *Convolvulus arvensis*, *Setaria verticillata*, *Digitaria sanguinalis*, *Setaria glauca*, *Echinochloa crus-galli*, *E. colona*, *Sorghum halepense*. However, *Cyperus rotundus*, *Solanum nigrum*, *Sorghum halepense*, *Amaranthus* spp. *Echinochloa crus-galli*, *Chenopodium album*, *Galinsoga* spp. may also be key weeds in the surveyed countries. Some species are becoming important: *Diploaxis erucoides* and *Malva sylvestris* in E, *Ambrosia artemisifolia* e *Amaranthus hybridus* in I, *Galinsoga* spp. in PL.

Conventional weed control is based on herbicides application; options are restricted to: glyphosate (E, I, PL, P), pendimethalin (E, I, P), oxadiazon (I), napropamide (E), clomazone (E, I) and graminicides (E, I). However, mechanical weed control (hoeing) is often used to compensate for poor herbicide efficacy.

IWM generally involves: 1) false seedbed technique followed by shallow harrowing or by glyphosate application; 2) pre-transplanting herbicide application; 3) post-transplanting inter-row hoeing or rotary cultivation.

Common strategy for organic production is: 1) false seedbed technique followed by shallow harrowing; 2) transplanting; 3) repeated inter- and intra-row cultivation (i.e. hoeing, split-hoeing and/or finger weeding) through the growing season; 4) hand-weeding. The use of starch-based biodegradable films are increasing, while other biodegradable mulching materials is under study. In Spain, paper is a promising candidate because it controls all weeds including *C. rotundus*, which pierces the plastic films.