

Effects of weed dynamics between conventional and organic cultural systems

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Organic farming has grown in importance during the last 20 years in Italy. Weed management is generally more critical in organic than in conventional farming, as only non-chemical means can be applied. In these conditions, the knowledge of the effect of organic cultural system on weed population dynamics appears essential to optimize weed management.

The aim of this study was to determine at field scale the weed evolution in time, in conventional and organic cultural systems. The study was carried out in north western Italy over the period 2004-2007, in a crop-rotation including wheat, pea, maize and wheat. The following three cultural systems were compared: conventional (CONV; reference system); organic system based on the use of farmyard manure (OFM); organic system based on the use of a combination of green manure and intercropping (OGI). In both organic systems weed management was carried out applying stale seed bed technique combined with mechanical interventions with spring tine harrowing, inter-row harrowing and ridging. In conventional system weeds were controlled by means of herbicides.

Over the period of the study, seed bank resulted quite stable in the conventional system, while it increased by about 5 % in both organic.

Weed density assessed in OFM increased during the monitored period: in wheat it increased, by about 300% (from 74 to 254 plants/m²), while in pea an increase of about 30% (from 220 to 340 plants/m²) was recorded. Weed density increased also in OGI, both in wheat (56%) and pea (300%). A clear effect on weed density in maize due to the cropping system was not observed. In this crop the weed presence was more influenced by weather conditions. The year with the highest infestation was 2005 which had a density roughly twice that recorded in the other years, in all cropping systems.

Weed composition did not vary remarkably in the conventional system while an important increase of perennial weeds, such as *Cirsium arvense*, *Sorghum halepense*, *Convolvulus arvensis* was observed in organic systems. A notable increase of annual grasses, such as *Echinochloa crus-galli*, *Panicum dichotomiflorum* and *Setaria viridis*, has also been recorded, in particular in organic maize, because of the limited activity of the mechanical means against these weeds.