

Overview of Integrated Weed Management in Organic Systems

*Steven A. Fennimore, U.C. Davis, 1636 E. Alisal St., Salinas, CA, 93905
safennimore@ucdavis.edu*

Summary. Weed management in organic specialty crops is fairly similar to conventional crop production, with one big exception – there is no herbicide rescue treatment for organic crops. Because weeds give no second chances in organic crops you must manage weeds well every day. The principles of weed management in organic crops are universal – field selection, prevention, sanitation and control. Here we will describe each of these points separately.

Field selection. This means carefully choosing a field and avoidance of areas with difficult weed problems. For example it would be extremely difficult and costly to grow organic crops in a field severely infested with perennial weeds such as field bindweed or yellow nutsedge. Fields severely infested with perennial weeds should be cleaned up in the fallow before attempting to grow any crop.

Prevention. This means managing the weed population in the field by avoiding the introduction of weed seed into the soil seedbank. Management of weed seedbanks requires a long-term approach to weed management that focuses on more than just the current crop. For example, by preventing weeds from setting seed even though the crop in the field is past the stage when weed competition can hurt the crop, we practice preventative weed management. A grower who consistently prevents weeds from going to seed will increase the odds of having a clean field. Weed management will be far easier in a clean field with a small weed seedbank than in a severely infested seedbank. Another example of prevention is the use of clean composted manure or organic amendments. A thorough composting process will kill most of the weed seed in organic amendments, and prevent the introduction of weed seed into the field.

Sanitation. This is really just a form of prevention. It is important to control weeds in the vicinity of the field because wind-blown seed from common groundsel, common sowthistle, and hairy fleabane can enter the seedbank in the field from surrounding areas such as fence rows and ditch banks. Control of weeds in the areas around the field is necessary to prevent contamination of the seedbank in the organic field. Similarly, it is essential to clean tillage equipment before moving from fields infested with perennial weeds or other difficult to control weeds to uninfested fields. Soil should be removed from the implement by high-pressure washing to prevent transport of seed or other weed propagules.

Control. These are practices that are used to suppress weeds and consist of cultural, physical and chemical controls.

Cultural control. Pre-plant irrigation to stimulate weed growth can improve the level of weed control before planting. This cultural practice is used to deplete weed seeds from the upper soil layer. After bed formation, the field is irrigated to stimulate weed emergence. Approximately 7 to 14 days after pre-plant irrigation (longer in clay soils), emerged weeds should be removed with shallow tillage, compliant herbicides or propane flaming. This process works by establishing a clean soil layer depleted of weed seed close to the soil surface. If tillage is used, it is important to keep the tillage implement on shallow settings so that the clean soil near the surface is not contaminated with viable weed seed from deeper in the soil. Many weed seeds will remain in deeper layers but most of these deep seeds will not germinate. If time permits, the process of pre-plant irrigation can be repeated a second time to remove weeds that escaped the first pre-plant irrigation cycle. Other examples of cultural controls are the use of transplants instead of direct seeded crops. Transplants are larger and less susceptible to weed competition than seeded crops.

Physical control. Examples of physical control are cultivation and hand weeding. Cultivation in the crop row is an old but reliable method of weed control that kills weeds by uprooting them. Hand weeding is very effective, but also very expensive. The objective of the organic weed management program should be to do everything possible to minimize the cost of hand weeding. Other examples of physical weed control are the use of plastic, paper or straw mulches to suppress weeds. Plastic mulches work well, but are expensive and generally only used in valuable crops like strawberry. Use of paper mulches is being evaluated, but they decompose quickly and are subject to tearing. Straw mulches have been used for years, but must be deep enough to shade out weeds. Straw must either be grown in the same field, e.g. wheat, and then planted into, or the straw must be transported into the field. Solarization with clear plastic mulch during the hottest months of the year is also a very effective means of weed control in interior valleys of California.

Chemical control. There are a limited number of organic-compliant herbicides available. To date all are contact herbicides with no soil activity. So far these products are primarily used by home owners, and there is little use in commercial agriculture due to high cost and weak activity. This may well change in the future as this is an active area of research.