

Weed Management in Organic Vineyards and Orchards

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Weed management in organic vineyards and orchards is a challenge due to the lack of registered herbicides that are available for use. Thus, growers usually have to rely on alternate tools for weed management in organic orchards and vineyards.

These tools include mechanical and thermal weed control methods, to name a few. Mechanical and thermal (flaming in particular) tools can generate dust and smoke and this can have implications associated with air quality regulations in the San Joaquin Valley (SJV).

There are a few new postemergence broad-spectrum herbicides labeled for use in organic systems. Similarly, there are new non-chemical weed control machines being designed. However, the efficacy and economics of these new tools have not been tested adequately in field studies.

Therefore, on-farm studies were conducted in 2010 in a transition-organic almond orchard at California State University, Fresno, a commercial organic raisin grape vineyard, in Selma, and in a commercial organic winegrape vineyard in Madera comparing several organic weed management options.

Treatments included

- steam (Batchen Stinger®),
- flame (orchard only),
- French plow (raisin vineyard only),
- Bezzeries cultivator (vineyards only),
- and organic herbicides Greenmatch® (all sites), and Burnout® (orchard only).

Non-treated control plots were also included at each site. The experimental design was a randomized complete block in the orchards and a split-plot in the vineyards. Each study site had four replicates of each treatment combination.

Weed densities by species, weed biomass, and visual estimates of percent weed control compared to the non-treated control were taken. In the vineyards, time required for hand weeding a month after the initial treatments were applied, and crop yield and quality parameters were also assessed. Yields were not taken for almond as it was a young non-bearing orchard.

In the almond orchard study, the steam treatment provided 3-4 weeks of weed suppression, flaming provided 2-3 weeks of weed suppression while the organic herbicides provided 4-8 weeks of weed suppression. The control with steam, flame, and organic herbicides

was better when the weeds were at the seedling or early growth stages. The results were also affected by the type of weed species. For example, none of the treatments were effective against certain species such as puncturevine (*Tribulus terrestris*) and cut-leaf evening primrose (*Oenothera laciniata*), although some suppression was observed at earlier growth stages of these weeds. The *Conyza* sp. (horseweed and hairy fleabane) generally regrew soon after the thermal treatments. Therefore, monthly or bi-monthly applications of these treatments will be necessary depending on the regrowth of the weeds. It may not be safe to use a flamer in the orchards after early spring because of fire hazards in an arid environment such as that in the SJV.

In the vineyard studies, steam was less effective in the raisin vineyard but more effective in winegrape vineyards because, at the time of the treatment application, of weeds in the raisin vineyards were larger, at a later growth stage, and consisted of different weed species than weeds in the winegrape vineyard. As in the almond orchard, weed suppression by steam was limited to 2-3 weeks. Steam was not effective on nutsedge (*Cyperus* sp.). The organic herbicide provided selective bundown of certain broad-leaved weed species such as shepherd’s purse (*Capsella bursa-pastoris*) but had no effect on nutsedge and other grasses. The mechanical weed control treatments (French plow and Bezzerides cultivator) provided the greatest amount of weed control (>90% control for almost 3 months). However, there may be disadvantages associated with mechanical weed control because of the soil disturbance process. For example, root injury was observed with the French plow. The mechanical treatments reduced hand weeding time by about 70% compared to the non-treated control. The steam and herbicide did not reduce hand weeding time. No effect of any of the treatments was observed in grape yield and quality.

The studies will be repeated in 2011.

