

Study looks at subsurface drip for control of weeds

By Ching Lee

Subsurface drip irrigation could substantially reduce weeds when used in arid-growing regions, and conservation tillage could be incorporated to reduce the use of herbicides, according to a study by the University of California, Davis.

In previous comparative studies, subsurface drip irrigation was shown to be more efficient than furrow irrigation in terms of nitrogen and water use with similar or greater crop yield. The studies also reported better weed control with this form of irrigation. Researchers concluded that subsurface drip irrigation could help farmers get more economic benefits from conservation tillage by allowing them to use less herbicides and reducing the need to maintain furrows.

For the UC Davis field trial, processing tomatoes were planted at the UC Davis Russell Ranch Sustainable Agricultural Facility to examine the use of subsurface drip irrigation with conservation tillage for weed control, yield and fruit quality. The plots were divided into subsurface drip irrigation and furrow irrigation, conservation tillage and standard tillage, and herbicide and no herbicide. The experiments were conducted in 2003 and 2004.

Researchers found practically no weeds in the subsurface drip irrigation plots in both years because the seeds could not germinate in the dry surface soil, whereas furrow irrigation provided ideal conditions for weed germination. Pigweed, lambsquarters and black

nightshade were the dominant weeds encountered in the study area.

While herbicide and tillage reduced weed density by about 50 percent, tillage controlled weeds only on the sides of the bed and furrow but not in the tomato plant line itself. Less hand-weeding time was required in subsurface drip irrigation treatments compared to furrow irrigation in both years.

As with weed density, weed biomass was highest in the furrow irrigation treatments. Tillage helped to destroy weeds in the furrow area, but in the conservation tillage plots, they continued to germinate and grow with each irrigation.

Yields were low in both years because the tomatoes were planted late. The best-quality fruit was observed in the furrow irrigation-standard tillage-herbicide plots in 2003. With no herbicides used, however, the furrow irrigation plots produced less yield and marketable fruit than the subsurface drip irrigation plots. The furrow irrigation plots also yielded more rotten fruit, possibly due to increased surface moisture.

In 2004, the subsurface drip irrigation plots produced 10 percent more fruit and marketable fruit than the furrow irrigation plots. The subsurface drip irrigation plots also produced more green fruit and less rotten, overripe fruit than the furrow irrigation plots, an indication that there may be a delay in maturity in those plots.

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