Strawberry Transplant Establishment with Sprinkler vs. Primarily Drip Irrigation

Ben Faber*, Oleg Daugovish, and Bill Rutan

University of California Cooperative Extension, 669 County Square Dr. Suite 100, Ventura, CA 93003

Strawberry (*Fragaria × ananassa*) transplants in California are planted through narrow holes in raised beds covered with polyethylene mulch (Fig. 1). They are typically irrigated with overhead sprinklers for the first 5 to 6 weeks after planting to leach salts and facilitate root establishment (Fig. 2); most of this sprinkler-applied water runs off the plastic without reaching the plant and is not recovered (Fig. 3). The plants are subsequently irrigated with buried drip tape during the following 8 months. In the fall of 2013, we compared the use of either 4 buried (5 cm) drip lines, 4 lines at bed surface or exclusively sprinkler irrigation with subsequent use of 3 buried lines after initial plant establishment. Two or 3 lines of drip are standard. Sprinklers were also present in the drip-only treatments and were used twice when the Santa Ana winds (strong, dry winds, common in Southern California in fall) blew. Treatments were set up in a Complete Randomized Block Design with four replications.

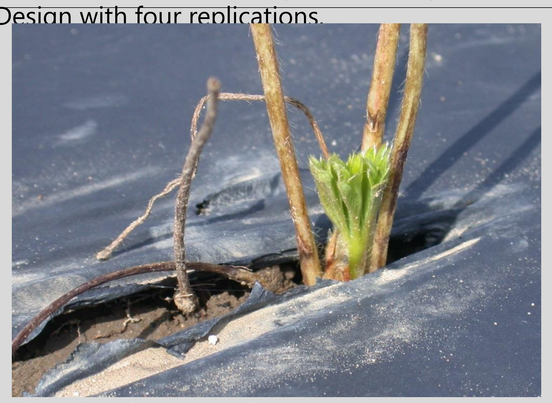


Fig. 1. Strawberry transplant

Fig. 2. Typical overhead irrigation for plant establishment

Fig. 3. Runoff from plastic during sprinkler irrigation

Results : Water use Oct 8 - Nov. 12, 2013

Treatment	gal./acre
4-Drip	15,260*
Sprinkler	47,250**

*11, 200 gal. by drip & 4,060 gal. from 2 sprinkler runs during Santa Ana conditions
**Collected by cans

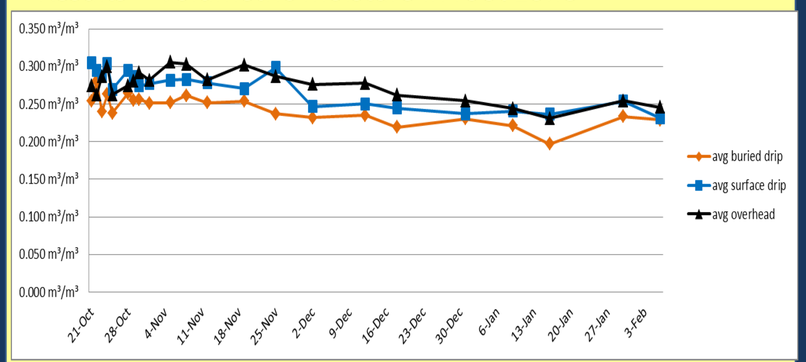
Water use was significantly different between four drip and sprinkler only plots

Results: Plant establishment and canopy size Nov. 26, 2014

Surface 4 lines	Buried 4 lines	Sprinkler
98.5% survival	98.6% survival	98.3% survival

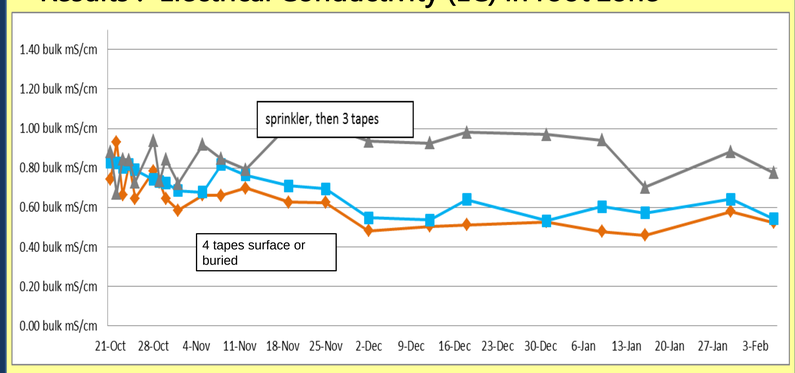
Treatments had similar survival rates, but surface drip plants after 6 weeks were 22% smaller than the other treatments

Results – Volumetric moisture in root zone



Volumetric moisture content within the root zone were similar for all treatments

Results : Electrical Conductivity (EC) in root zone



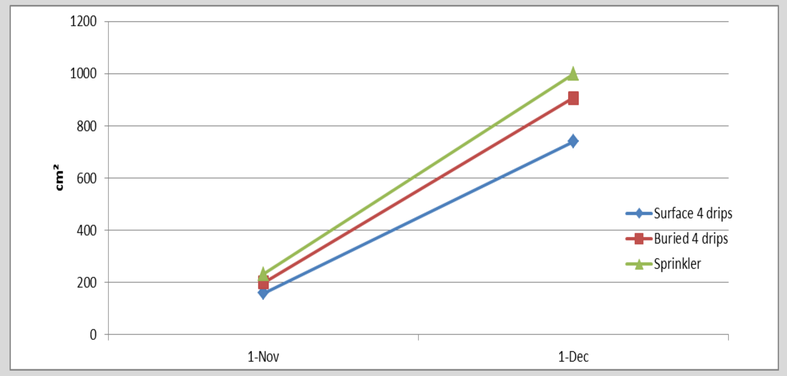
EC was similar in all treatments during establishment and higher in the sprinkler/3 drip lines beds after sprinklers were removed (Nov 16) compared to 4-drip line beds

Results : Specific ions in root zone

	4 drip surface	4 drip buried	Sprinkler, then 3 drip
chloride	0.64 meq/L	0.79 meq/L	2.74 meq/L
sodium	5.89 meq/L	7.09 meq/L	9.97 meq/L
EC sat paste	3.66 dS/m	4.21 dS/m	3.99 dS/m
sulfate	39.2 meq/L	36.3 meq/L	45.2 meq/L

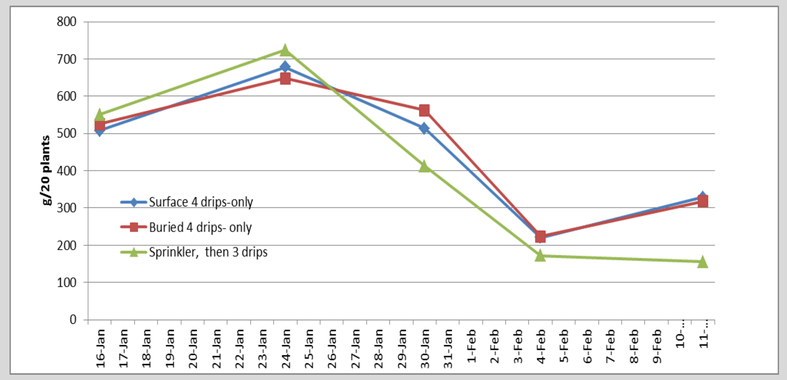
4-drip line systems were more effective in leaching sodium and chloride from plant root zones than sprinkler irrigation, but plant tissues in 4-drip plots had about 20% less nitrogen (data not shown) suggesting it may be leached and need to be monitored

Results – Plant canopy / size



Canopy growth of plants with 4 surface drip lines was delayed likely due to sub-optimal plant root-to-soil contact: planting holes filled up by loose soil during manual drip tape movement from initial installation position.

Results – Marketable fruit yield



Marketable fruit yield was similar among treatments during the fresh fruit production period of the season.

Summary

- Additional drip lines hydrated root zones and leach salts effectively (may leach N)
- Additional lines conserve water (minimize overhead irrigation) and prevent runoff with no negative effect on yield
- As a precaution, when strong winds occurred (high ET rates), sprinklers were used, but water was still conserved. Plants irrigated overhead cooled to the temperature of water but returned to or slightly above air temperature in 6-10 min after end of irrigation.
- Future direction is to document fumigation improvement with additional drip lines and evaluate effects of hot winds and overhead vs drip-only irrigation on plant performance.

Acknowledgements

California Strawberry Commission

Ito Brothers farms (Oxnard, CA)

Walmart foundation

University of Arkansas