Managing runoff from plastic-covered tunnels

What are the issues?

- During rains, water intercepted by plastic covers is channeled into post rows (furrows with tunnel-supporting posts), accelerating soil erosion, especially on slopes, which ultimately degrades surface water quality.
- Nutrients and pesticides associated with sediments in runoff from plastic covered tunnels may cause surface water bodies to exceed water quality standards.
- Water in post rows promotes weed growth which increases herbicide use and labor costs.

Erosion path from tunnel runoff

Weeds, if not controlled, may spread to crop beds

What treatments have been tested?

Barley cover crop

Application:
Before post installation with a seed spreader, lightly rake seed at 500 lbs/acre into the soil and establish with sprinkler irrigation used for raspberry.
After post installation you can incorporate seed with rototiller when soil is moist between the rains.

Maintenance:
Mow before flowering or as needed for access to crop. Barley can be terminated in early tillering stage with grass herbicides such as sethoxydim (Poast). Barley residue and stubble will still benefit in runoff management. You may need to reseed in areas lacking cover in the second wet season. The entire post row may not need to be seeded, water tends to flow on one side of the post row. See picture below for preferential growth where water flows.

Benefits and costs:

- Can reduce amount of runoff and prevent runoff during light rains
- Can reduce nitrate in runoff 20-40% compared with bare soil when good ground cover is maintained. Reduce nitrate leaching to groundwater 52-90% compared to bare soil
- Reduces turbidity and sediment loading > 90% compared to bare soil, and therefore potential for soil-adsorbed pesticide movement
- Reduces phosphorus in runoff 30-75% compared with bare soil
- Can reduce weed densities by preventing wind dispersed seed from reaching soil and competing with weeds germinating from soil
- The less compacted soil is more comfortable for workers to walk on
- Costs approximate $60/A to establish and maintain for post rows in a 3-year raspberry production cycle

Weed block fabric

Application:

- Unroll and pin by hand to cover the post-row surface between beds prior to post installation
- If applied after post installation–use narrower rolls on each side of the posts and connect them with pins

Maintenance:

None, but prevent soil deposits on the fabric. At the end of crop cycle: unpin and roll up for potential reuse.

Benefits and costs:

- Reduces turbidity and sediment loading >80% compared to bare soil and therefore potential for soil-adsorbed pesticide movement
- Reduces phosphorus in runoff 30-75% compared with bare soil.
- Provides nearly complete weed control
- Costs approximately $160/A for post rows in two 3-year raspberry production cycles (reused once)

Yardwaste mulch

Raspberry shoots (suckers) penetrate mulch and will require control

Application:

Deliver by tractor to post rows prior to post installation and spread to cover the entire post-row with a 2-3-inch thick layer. Mulch is <2-inch coarse screened material and quality/cost varies among suppliers.

Maintenance:

None, may require replacement in bare spots after intensive runoff

Benefits and costs:

- Can reduce amount of runoff and prevent runoff during light rains
- Can reduce nitrate in runoff when good ground cover is maintained. Reduces nitrate leaching to groundwater 70% compared with bare soil
- Reduces turbidity and sediment loading >90% compared to bare soil and therefore potential for soil-adsorbed pesticide movement.
- Reduces phosphorus in runoff 50-80% compared with bare soil
- Provides good weed control if maintained at 2-3-inch-thick layer but may promote shoot/sucker growth in caneberries.
- Costs vary with supplier and spreading equipment $160-190/A for post rows in a 3-year raspberry production cycle

Polyacrylamide (PAM)

Application:
PAM is a non-toxic polymer that binds soil particles and prevents their movement. Spread to post rows at recommended rate (example: approximately 2 lbs/A for Simplot Soilbuilder granular formulation) (0.15 lb/post row before rains).
Wetted PAM on soil forms a seal that can be effective during multiple rains unless broken by disturbance.

Maintenance:
Reapply prior to rains if soil is disturbed with foot or mechanical traffic.

Benefits and costs:

- Reduces turbidity and sediment loading >90% compared to bare soil and therefore potential for soil-adsorbed pesticide movement
- Reduces phosphorus in runoff 50-75% compared with bare soil
- Costs approximately $190/A for post rows in a 3-year raspberry production cycle

From left to right: Turbidity of runoff from post rows with: mulch, weed barrier fabric, bare soil, polyacrylamide and barley cover crop

For questions about soil and water conservation treatments, please contact:
RCD—Jamie Whiteford jamiewhiteford.vcrcd@gmail.com or UCCE-Ventura County farm advisors—Oleg Daugovish odaugovish@ucanr.edu or Ben Faber bafaber@ucanr.edu