2013 Blackeye Cowpea Germination with Subsurface Drip

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Subsurface drip irrigation (SDI) is being used on an increasing number of acres on the west side of California's San Joaquin Valley for cotton and tomatoes. Although the economic return from blackeye cowpeas would not justify installation of subsurface drip for their own sake, growers who already have SDI for other crops might want to plant blackeyes in their crop rotation. Among the challenges for growing blackeyes with SDI are weed control and stand establishment. This project was initiated to investigate if subsurface drip tape could adequately wet the top of a 60-inch bed in order to germinate two rows of seed planted on the bed shoulders, roughly a lateral distance from the tape of 13-15 inches.

METHODS

To evaluate whether the subsurface drip system could be used to germinate a blackeye crop, a test was set up using beds in which a single line of drip tape was placed 10 inches below the soil surface in the center of a 60-inch bed. The soil was a Hesperia coarse loam. Two seed rows were planted near the shoulders of the bed. This placed each seed row approximately 15 inches laterally from the drip tape and close to 8-9 inches higher than the tape. The drip tape used was: Bowsmith BigFoot, 5/8" ID, 8 mil wall thickness, 12" emission point spacing, 0.45 gpm/100 ft at 8 psi. The soil was dry at the initiation of the test. Seed was placed 1 to 2 inches deep. The length of row tested was 200 ft.

Three germination scenarios were evaluated in an unreplicated test:

1 Continuous irrigation until the entire bed surface was completely wetted.

2. 12 hrs. with the water on followed by 12 hrs. off. Sequence continued until bed surface was completely wetted. Referred to as the 12 hrs. on / 12 hrs. off treatment.

3. 6 hrs. with water on followed by 6 hrs. off. Sequence continued until bed surface was completely wetted. Referred to as the 6 hrs. on / 6 hrs. off treatment.

RESULTS

For all treatments, it required approximately 2.2 inches of applied water to completely wet the bed surface (Table 1), reaching the seed rows and resulting in excellent crop germination. In this

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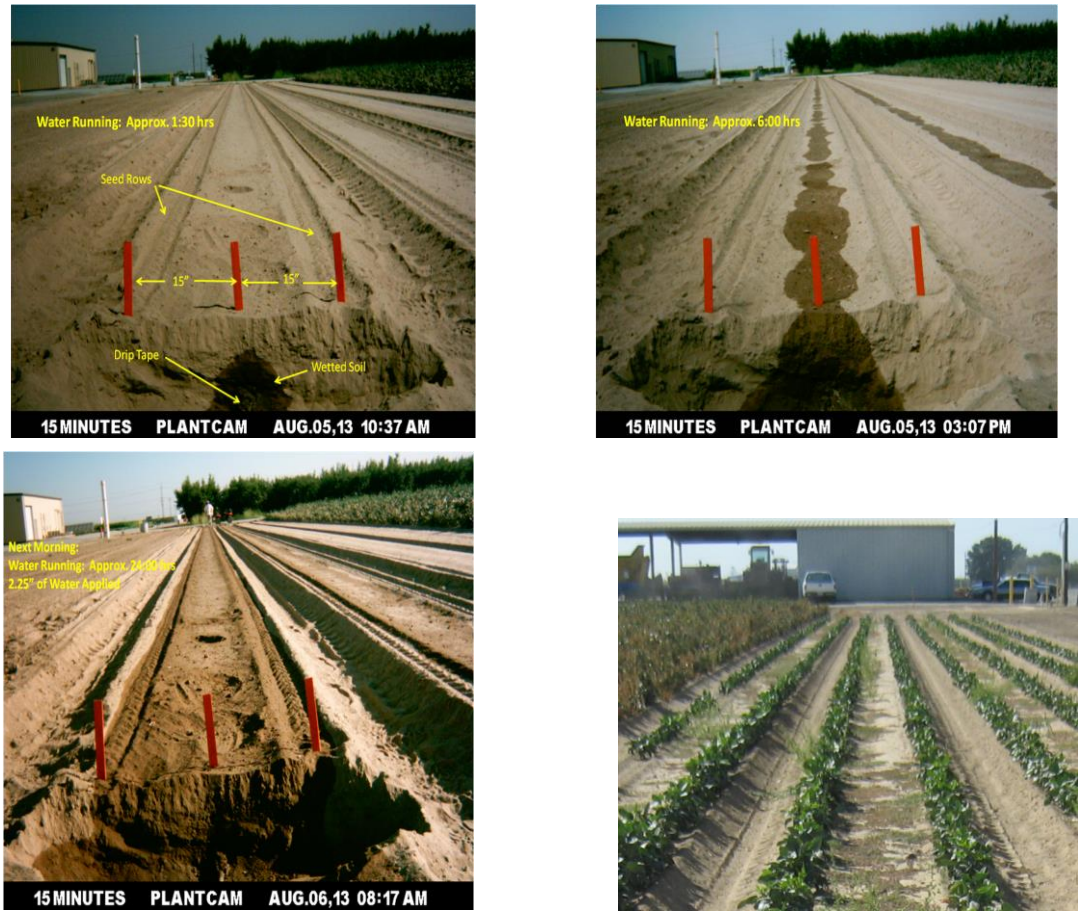
case, pulsing or surging the water on and off did not result in germination with less water as is sometimes claimed.

Table 1. Inches required to totally wet the bed surface, 2013 Blackeye SDI Germination Test, UC Kearney Research and Extension Center, Parlier, CA

Treatment	Water Applied to Totally Wet the Bed Surface (inches)
Continuous	2.3
12 hrs. on/ 12 hrs. off	2.3
6 hrs. on/ 6 hrs. off	2.3

To visually inspect the progress of the bed wetting, a trench was carefully cut across a bed, deeper than the drip tape, near the end of the field. A time lapse camera was set up to take photos on a 15-minute interval, documenting the wetting of the bed.



Figures show an early stage of running the drip tape (top left); after 6 hours (upper right); after 24 hrs with the bed wetted to the seed rows which are marked by the two outside orange stakes (lower left); and the blackeye stand several weeks after emergence and growth (lower right).

DISCUSSION

While many growers have reported difficulties germinating crops with subsurface drip irrigation, the subsurface drip system used for this test would have been excellent for germination, even under the sandier soil texture conditions at the Kearney Ag Center. Soil conditions always play a role in water movement. Experience would suggest that this would be a difficult soil to get to "sub" in order to wet the top of the bed thoroughly. Still, we were able to successfully wet the entire bed, using slightly more than 2" of applied water. We think the major reason for the success in this test was the use of a high-flow drip tape. Many drip tape systems use low-flow tape which may have greater difficulty moving water laterally and vertically as compared to a high-flow drip tape.

Use of a high-flow drip tape should be considered if germination is a critical capability desired in a subsurface drip system. However, it is recommended that a field test be conducted to check for water subbing and seedbed wetting because soil conditions play such a key role in water movement and this test was only on one soil type.

This project did not address using herbicides with SDI. Currently there are no post emergence broadleaf herbicides registered for use in blackeye cowpeas in CA. Current practices employ predominantly pre-plant, mechanically incorporated soil residual herbicides usually with furrow irrigation prior to incorporation. However with the top of the bed wetted as it was in this project, it might be enough to "set" soil residual herbicides such as Dual, Treflan, or Prowl that could be sprayed on top or incorporated into the top few inches of the bed prior to running water through the drip tape. These methods should be evaluated for weed control performance and safety to the crop before commercial use.

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