Science Societies

Installation, repair, retrieval, and economic returns of S3DI systems in corn and cotton rotations

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USDA photo by Lance Cheung.

Shallow subsurface drip irrigation (S3DI) can be cost-effective for row crops, but only if the system lasts in the field for many years without requiring major repairs. This study tracked how long S3DI systems lasted in five fields in Georgia that were planted to either corn or cotton and documented the costs of installing, repairing, and eventually removing them after 4, 5, 6, or 8 years of use.

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1. What does S3DI stand for?

a. Seasonal subsurface drip installation.

b. Soil-surface supplemental drip irrigation.

c. Shallow subsurface drip irrigation.

d. Shallow soil drainage and irrigation.

2. Approximately how deep below the soil surface was S3DI tubing buried in the trials?

a. 0.5 inches.

b. 2 inches.

c. 6 inches.

d. 12 inches.

3. S3DI systems can be particularly useful for small, irregularly shaped fields common in the Southeastern United States.

a. True.

b. False.

4. Which two crops were grown in the fields evaluated in this study?

a. Corn and peanut.

b. Cotton and peanut.

c. Soybean and corn.

d. Corn and cotton.

5. Why can peanut production create greater maintenance challenges for shallow subsurface drip irrigation systems than corn or cotton?

a. Peanut production requires higher operating pressures that accelerate tubing wear.
b. Peanut roots are more likely than corn or cotton roots to clog emitters.
c. Dense peanut foliage provides rodents with protective cover, increasing tubing damage.
d. Peanut harvesting routinely removes or damages buried drip tubing.

6. What management approach was primarily used after S3DI installation to prepare the seedbed without disturbing the drip tubing?

a. Moldboard plowing.
b. Conventional disking.
c. Strip tillage.
d. Deep ripping.

7. GPS guidance was considered important for field operations because equipment traveling off the intended path could damage buried drip tubing.

a. True.
b. False.

8. What caused extensive mechanical damage to the S3DI system in the Shellman S3 field?

a. Cotton harvest equipment.
b. Rodent feeding.

c. Excessive irrigation pressure.

d. A GPS guidance error during strip tillage.

9. What practice was implemented after the GPS-related damage occurred in the S3 field?

a. Drip tubing was installed twice as deep.

b. Strip tillage was discontinued.

c. All field operations were performed manually.

d. A calibration area was established to test and correct GPS.

10. What was identified as the major source of biological damage to drip tubing?

a. Rodents.

a. Insects.

c. Plant roots.

d. Soil microorganisms.

11. The study demonstrated that drip tubing could remain viable for at least 8 years under a corn–cotton rotation.

a. True.

b. False.

12. Across the systems evaluated, approximately how much did annualized S3DI installation costs range?

a. $10–$25/ac/year.

b. $30–$50/ac/year.

c. $70–$86/ac/year.

d. $120–$150/ac/year.

13. Why did field shape influence the installation cost of the S3DI systems?

a. Wider fields required more irrigation pumps.

b. Wider fields required more main-line tubing.

c. Long fields required thicker drip tubing.

d. Irregular fields required higher operating pressure.

14. Based on the study, which field configuration would generally help reduce S3DI installation costs?

a. Fields with a high length-to-width ratio.

b. Square fields only.

c. Short, wide fields.

d. Fields with the greatest possible slope.

15. Annual repair costs across the individual irrigation systems ranged approximately from

a. $0–$0.50/ac/year.

b. $1–$18/ac/year.

c. $25–$50/ac/year.

d. $70–$86/ac/year.

16. Fuel was one of the largest expenses associated with retrieving the drip tubing.

a. True.

b. False.

17. Why was drip tubing more expensive to retrieve at Shellman than at Dawson?

a. Shellman had substantially steeper slopes.

b. The tubing was installed deeper at Shellman.

c. Heavier soil required slower retrieval speeds and increased labor costs.

d. The tubing had to be retrieved by hand.

18. Approximately what percentage of gross revenue did the yearly costs of S3DI installation, repair, and retrieval represent across the two locations?

a. 2%.

b. 5%.

c. 11%.

d. 25%.

19. What range of partial net revenue was reported for the S3DI systems evaluated in the study?

a. $150–$350/ac/year.

b. $400–$600/ac/year.

c. $650–$750/ac/year.

d. $816–$1,006/ac/year.

20. Based on the overall analysis, approximately how long would it take for cumulative repair costs to exceed the cost of replacing the S3DI system?

a. 2–5 years.

b. 5–8 years.

c. 10–20 years.

d. More than 30 years.

This quiz was drafted with AI assistance and reviewed by the editorial team for accuracy and appropriateness.

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