

**SUBSURFACE DRIP IRRIGATION AND
CONSERVATION TILLAGE METHODS FOR
COTTON ON A SOIL WITH COMPACTED LAYERS**

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Abstract

Subsurface drip irrigation offers many advantages for management of water and nutrients, but its effectiveness may be limited by weather or soil conditions. Solving soil problems, such as compaction, in subsurface drip irrigation systems is understandably difficult using deep tillage. In a previous experiment with cotton under no-tillage culture and subsurface drip irrigation, there was no yield difference in either of two years for two irrigation drip line spacings (38 and 76 in.), three irrigation amounts (1/4, 3/8, and 1/2 in. per application), or between irrigated and rainfed treatments. Cotton root observations and soil strength measurements during that experiment indicated that considerable soil compaction occurred at very shallow soil depths (< 2 in.), which restricted root growth, and probably limited the efficacy of subsurface drip irrigation (12 in. deep).

With the objectives of developing strategies to reduce soil strength and obtaining optimum no-tillage crop production, an experiment was conducted during 1998-99 to determine the effectiveness of shallow minimum tillage in reducing shallow soil compaction and increasing cotton lint yield with subsurface drip irrigation at two lateral spacings (38 and 76 in.). Three tillage treatments included two shallow (6 in.) tillage methods, an in-row subsoiler (Beasley) and a stubble mulch plow, and the standard no-tillage, which had no tillage, surface or subsurface. There were no differences in cotton lint yield among the three tillage methods or between the two subsurface drip lateral spacings. Mean lint yield for the irrigated treatments across the two years was greater than that for the rainfed treatments. Lint yields in 1999 were much less for all treatments than in 1998, probably because of cool spring temperatures. Soil strength measurements in both years reflected only slight differences among the tillage treatments and were similar for the two years. These results indicate that these two shallow tillage methods were not effective in improving irrigation water distribution to the shallow root zone or in increasing cotton lint yield. Consequently, it appears that strategies to reduce soil strength must be developed before optimum no-tillage crop production can be obtained on these soils with subsurface drip irrigation.