# FIELD TESTING OF VARIOUS SUBSURFACE DRIPPERLINES FOR USE WITH COTTON ON A VERY SANDY SOIL

W.R. DeTar and L.F. Elliott

OBJECTIVES: To evaluate various subsurface dripperlines for use with cotton on a very sandy soil, by measuring uniformity of emergence, plant growth characteristics, yields, and changes in flow rates.

PROCEDURES: Table 1 shows the various combinations of tubing types, depth of placement, emitter spacing, discharge rate, and wall thickness for some of the companies that felt that their product was suitable for subsurface drip irrigation of cotton. Dripperlines from five different were used. This experiment was started in the Spring of 1989 on an extremely sandy, but uniform, soil (loamy sand). All the dripperlines were placed in the plant row, and all row spacings were 0.76 m. Most of the dripperlines were placed at a depth of 0.20 m below grade, but one treatment had a depth of 0.30 m, and another had a depth of 0.46 m. Altogether there were 13 treatments, each consisting of one plot of four 88-m rows of cotton. Emitter spacings were either 0.30 m, 0.60 m, or continuous (two dripperlines were porous tubing). Each plot was equipped with a battery-operated water-timer, a flow meter, and a pressure gage. In both 1989 and 1990, Acala SJ-2 cotton was planted as an indicator crop.

RESULTS: Table 2 shows the percent of the seed that emerged for each treatment in 1989 and 1990. Almost no plants emerged in 1989 from treatment D6, where the dripperline was buried 0.45-m deep. The soil was loose and dry, a result of the recent installation. But in 1990, emergence was reasonably good in this treatment, starting very slowly, but with a good final stand. The soil had had a chance to settle, and there was some residual moisture near the surface from winter rains. Emergence from the 0.30-m depth, in treatment D5 was slow both years, and final count was a little low. The uniformity and speed of emergence was a lot better with the 0.30-m emitter spacing than with the 0.60-m spacing, but the final stand and yield seem not to be affected by emitter spacing. A 10-m section of one row of treatment D8 (porous tubing), did not support plant growth and was bare at the end of the first season. Lack of good control in manufacture was suspected. This section was replaced in 1990, and the new tubing seemed to discharge (initially) an excessively high flow rate.

In 1989 the cotton was planted about a month late (May 5). By July 5, stunting due to nematodes was evident, and by August 2, plants began dying from Fusarium wilt. It had been hoped that the uniformity of plant growth would be a major criteria in comparing treatments. Insufficient flow from clogged or partially clogged emitters would have been obvious. However, the problem with the Fusarium-nematode complex completely masked out the use of the plants as an indicator of how well the drip system was working. In 1990, the cotton was planted on time (April 4), but the plants started dying almost immediately from Fusarium wilt. There were almost no plants left at the end of the season, and no yield data was taken.

Pressure vs. flow rate data was taken periodically throughout both seasons, and in general, no change was noted. Treatment D2, with a wall thickness of only 4 mil, developed leaks at 2 locations, apparently from insect damage.

Figure 1 shows the yields and percent of area affected by Fusarium wilt for 1989. The correlation indicates that the yield would have been only about 996 Kg/ha (1.8 ba/ac) without the Fusarium wilt. This is a very low yield. The nematodes may have had some direct effect, but the low yield could also be due to the late planting.

FUTURE PLANS: The experiment will be repeated at least one more season using a cotton variety that is resistant to nematodes.

**Table 1. Description of dripperlines used in test.**

| Treatment number | Name of tubing | Wall thickness (mil) | Discharge rate (L/h) | Emitter spacing (m) | Depth of placement (m) |
|---|---|---|---|---|---|
| D1 | T-Tape | 8 | 1.0 | 0.30 | 0.20 |
| D2 | T-Tape | 4 | 1.0 | 0.30 | 0.20 |
| D3 | T-Tape | 15 | 0.5 | 0.30 | 0.20 |
| D4 | T-Tape | 15 | 1.0 | 0.60 | 0.20 |
| D5 | T-Tape | 15 | 1.0 | 0.30 | 0.30 |
| D6 | T-Tape | 15 | 1.0 | 0.30 | 0.45 |
| D7 | L.Pipe | 1/4* | 0.6/m | cont. | 0.20 |
| D8 | L.Pipe | 3/8* | 0.1/m | cont. | 0.20 |
| D9 | Biwall | 15 | 1.5 | 0.30 | 0.20 |
| D10 | Biwall | 7 | 1.5 | 0.30 | 0.20 |
| D11 | Typhoon | 20 | 1.5 | 0.30 | 0.20 |
| D12 | Typhoon | 16 | 1.5 | 0.60 | 0.20 |
| D13 | Turbo C. | 15 | 1.4 | 0.60 | 0.20 |

*Nominal I.D. of porous tubing, in inches

**Table 2. Seedling Emergence.**

| | 1989 | | | | | | | 1990 | |
|---|---|---|---|---|---|---|---|---|---|
| Date= | 8May | 9May | 10May | 11May | 12May | 22May | 31May | 11Apr | 16Apr |
| Day= | 3 | 4 | 5 | 6 | 7 | 17 | 26 | 7 | 12 |
| Heat units= | 58 | 75 | 81 | 81 | 83 | 162 | 217 | 30 | 74 |
| Treatment number | | | | | | | | | |
| D1 | 0 | 30 | 61 | 66 | 68 | 70 | | 57 | 100 |
| D2 | 0 | 28 | 57 | 60 | 63 | 63 | | 63 | 86 |
| D3 | 0 | 43 | 63 | 68 | 70 | 70 | | 14 | 88 |
| D4 | 0 | 17 | 50 | 60 | 63 | 68 | | 40 | 89 |
| D5 | 0 | 13 | 30 | 35 | 38 | 56 | 56 | 19 | 89 |
| D6 | 0 | 0 | 0 | 0 | 0 | 5 | 6 | 1 | 87 |
| D7 | 0 | 12 | 21 | 22 | 23 | 52 | 50 | 22 | 88 |
| D8 | 0 | 15 | 53 | 60 | 69 | 71 | | 45 | 93 |
| D9 | 1 | 22 | 60 | 65 | 67 | 69 | | 52 | 86 |
| D10 | 0 | 25 | 65 | 68 | 71 | 74 | | 55 | 95 |
| D11 | 0 | 19 | 56 | 65 | 67 | 68 | | 31 | 55 |
| D12 | 0 | 9 | 40 | 45 | 47 | 73 | | 12 | 35 |
| D13 | 0 | 11 | 44 | 51 | 54 | 64 | | 30 | 78 |

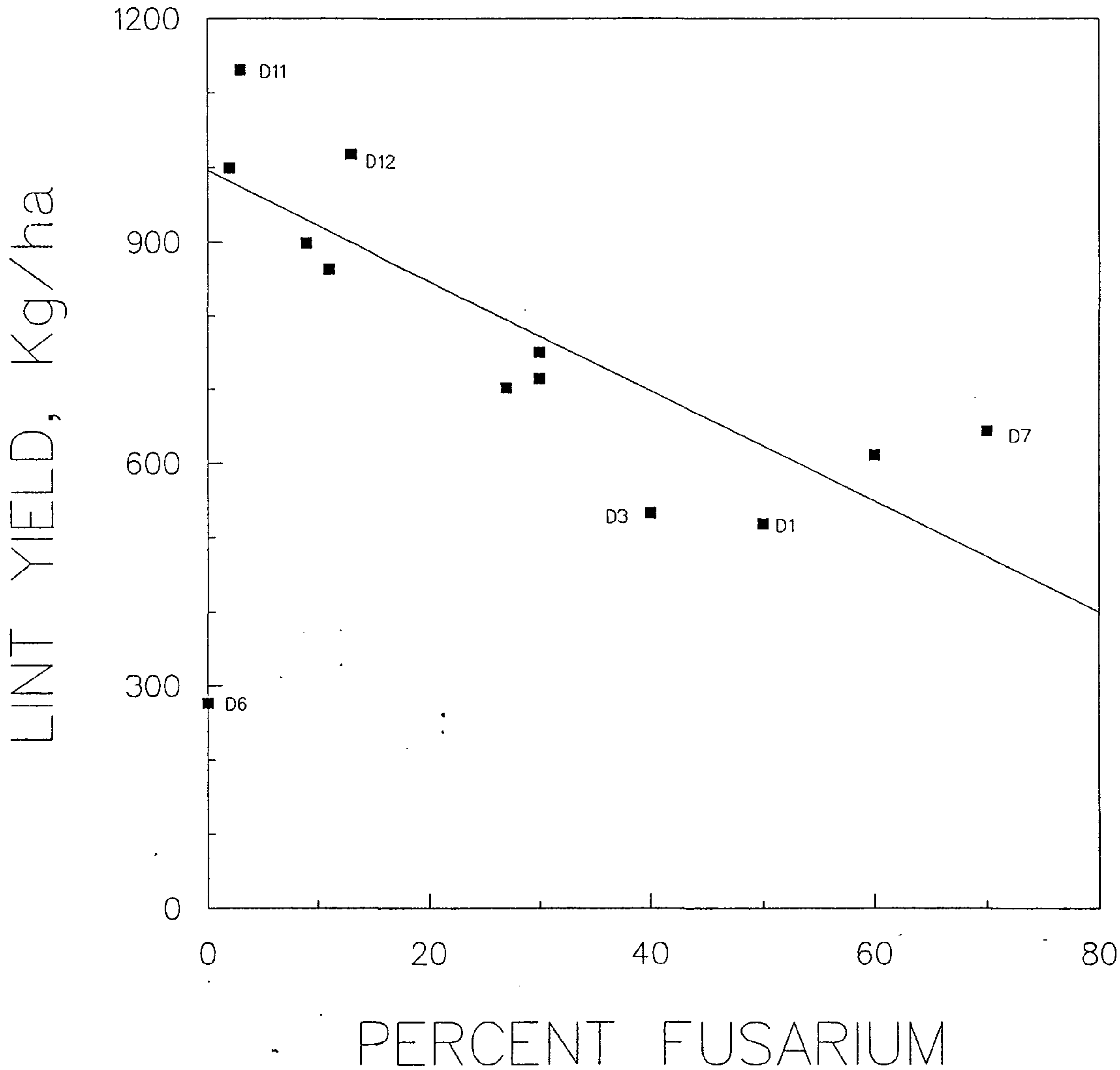


Figure 1. Lint yield as affected by the percent of the plot area that was damaged by Fusarium wilt.