

**PRELIMINARY RESULTS: EFFECTS OF ULTRADEEP  
FUMIGATION ON THE RENIFORM NEMATODE**

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**Abstract**

Ongoing surveys examining the spacial distribution of the reniform nematode in cotton fields across the U.S. cotton belt have indicated that in half of a dozen fields sampled so far, the reniform nematode occurs at highest population densities at depths of 45 to 120 cm, in contrast to other plant parasitic and free living nematodes, which are restricted to the top 30 cm or so of soil. As a result, most of the reniform nematodes in the soil profile in these fields cannot be killed by standard nematicide practices. A trial was conducted in a reniform nematode-infested cotton field with uniform sandy clay loam soil at Weslaco, Texas to examine the consequences of fumigating soil down to 92 cm in relation to nematode kill, subsequent nematode population development, cotton root growth, and cotton lint yield. Deep fumigation was achieved in late November 1999 by digging post holes 90 cm deep and placing 2 ml of Telone II (1,3-dichloropropene) at depths of 90, 60, and 30 cm as each hole was refilled. Holes were dug on 51-cm centers along the top of the bed the same day that beds were formed and along the adjacent furrow 51 cm to one side, for a distance of 3 meters. An identical set of control holes with no fumigant applied was dug next to the treated area. On the same day and in the same part of the field, a replicated chisel fumigation experiment was installed to compare results obtained by manual deep fumigation to those achievable with tractor-drawn chisel fumigation. Telone II was applied to three randomly selected 4.5-m-long by four-row-wide plots at 180 L/ha, 43 cm deep with parabolic shanks spaced on 51-cm centers, parallel to the row direction before bedding. Controls included three plots that were chiseled but not fumigated and three plots that were neither chiseled nor fumigated. Soil samples for nematode analysis were collected at cotton planting time in March of 2000 at depths of 0-15, 15-30, 30-45, 45-60, 60-75, 75-90, and 90-105 cm. Samples from the fumigated area were collected in three series of 13 or 9 holes 105 cm deep on 25-cm centers along the top of the bed or across the rows, in such a way that each series crossed the edge of the manually fumigated area. A fourth series of 13 holes was taken in the area where holes had been dug in November but no fumigant had been applied. Vertical samples to 105 cm were collected also in each of the nine plots of the chisel fumigation experiment, and at 10 additional evenly spaced points within the surrounding field. The cotton cultivar Delta and Pine Land 50 was planted in March 2000 and harvested in mid-July. Graduated vertical soil samples in 15-cm increments were taken for nematode and in certain cases root density analysis at harvest from each plot and at various points in the surrounding field. Nematode counts obtained in March 2000 indicated that deep manual fumigation killed most reniform nematodes within the soil profile down to 105 cm as well as 50-100 cm laterally in all directions from the point of placement. Chisel fumigation, by comparison, killed appreciable numbers of nematodes no deeper than 60 cm. Disrupting soil by digging post holes or chiseling without fumigant had no obvious effect on nematode population density. At harvest, root density was highest

near the surface and more or less uniform from 30 to 105 cm deep. Fumigation did not alter root architecture appreciably. The most striking difference between fumigant treatments was continued nematode population control observed at harvest at all depths following deep fumigation, compared with complete recovery of nematode populations in chisel-fumigated plots. Fumigation doubled yields in both cases.