Economics of Root-knot Nematode Control on Cotton by DBCP Fumigant on the Texas High Plains[1]

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Present estimates of total U.S. nematicide costs average $86/hectare ($35/acre) (8). Nematode control on cotton with DBCP (1,2-dibromo-3-chloropropane) following label recommendations is about 20% of this amount. Costs of nematicidal treatments are especially important on lower profit crops and in areas where wind, hail and rain frequently cause replanting of the crop which results in the loss of the fumigant. The use of the lowest effective rates is a method of minimizing costs (1, 3, 4, 5). The main purpose of the tests reported here was to explore the feasibility of reducing costs of nematode control on cotton by row-placement of low rates of DBCP using one chisel/row rather than two chisels/row, which is a common practice in this area.

Experimental plots were located in seven West Texas counties on Amarillo or Brownfield loamy fine sand soils that had light-to-moderate infestations of the cotton root-knot nematode,

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TABLE 1. Summary of 50 tests comparing cotton lint value and fumigation costs for several rates of DBCP applied as a row treatment with one and two chisels/row.

DBCP/row kg/ha[a]	Lint yield kg/ha	Control kg/ha	Increase over control kg/ha	% increase over control	Lint[b] value/ha	Cost of[c] treatment/ha	Value over cost/ha
One chisel/row							
0.72	444	404	40	10	17.60	2.33	15.27
1.45	498	418	80	19	35.20	3.66	31.54
2.9	537	387	150	39	66.00	6.32	59.68
4.07	575	405	170	42	74.80	8.45	66.35
8.14	443	284	159	56	69.96	15.90	54.06
Two chisels/row							
1.45	531	472	59	12	25.96	3.66	22.30
2.9	532	455	77	17	33.88	6.32	27.56
5.8	630	488	142	29	62.48	11.64	50.84
8.14	671	497	174	35	76.56	15.90	60.66
16.28	498	343	155	45	68.20	30.80	37.40

[a]ha = hectare.
[b]Lint value estimated at $0.44/kg.
[c]DBCP cost calculated at $1.82/kg plus $1.00/ha estimated for cost of application.

Meloidogyne incognita acrita (Chitwood and Oteifa, 1952).

DBCP was applied with a pressurized applicator developed at the Texas A&M University Agricultural Research and Extension Center, Lubbock. Liquid flow was metered by stainless steel micrometer dial needle valves and transported into the soil behind the point of the chisel through 0.317 cm (outside diameter) polyethylene tubing. Changes in rates were made by adjusting the micrometer dials. The coefficient of variation was approximately 5% among eight micrometer dial needle valves.

Chisels used in tests after 1967 were lateral-bed injection knives (6). The injection knife is a more efficient tool for conserving moisture and for leaving the bed in a better planting condition than a straight anhydrous ammonia type chisel used before 1967 (7).

Experiments were conducted from 1965-1970 inclusive, comparing rates of DBCP to determine the lowest effective dosage (2). The chemical was applied as a row treatment in rows spaced 101.6 cm (40 inches) apart. When two chisels/row were used, the chisels were 30.5 cm (12 inches) apart. Over a 6-year period involving 20 tests at all indicated rates of DBCP, the average lint yield from all plots treated with one chisel/row was 155.8 kg/hectare (139 lb/acre) or 38% more than from untreated control plots. When two chisels/row were used in 30 tests, lint yield averaged 153.5 kg/hectare (137 pound/acre) or 33% more than untreated control plots.

The greatest difference in lint yield over control, percent increase over the control and value over cost was noted at the 2.9 kg/hectare DBCP rate (Table 1). Further increases occurred at higher DBCP concentrations, but at a more gradual rate of increase. Yield results were low and erratic at the 0.72 and 1.45 kg/hectare DBCP rates. The optimum economic usage of DBCP, according to these data, appears to be in the range of 2.9-4.07 kg/hectare applied with one chisel/row.

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