Technical Notes

STUDIES ON ROOT-KNOT NEMATODE CONTROL IN GINGER

In Queensland, ginger (*Zingiber officinale* Rosc.) is grown commercially in the Eumundi-Eudlo-Buderim area in the south-east. Root-knot nematodes, *Meloidogyne javanica* (Treub) and *M. incognita* (Kofoid and White), are commonly found infesting roots and rhizomes.

Although root-knot of ginger was first reported by Nagakura in 1930, there are no published data concerning the effects of nematodes on yield and quality.

A field trial was carried out at Palmwoods in the 1959–60 season to determine the effect of "seed" infestation on yield. Planting material was obtained from two sources. A sample of 40 pieces from each source was assessed for root-knot nematode infestation by peeling to a depth of 1–2 mm and counting the number of discrete infection sites exposed. The mean numbers of infection sites were 6·0 and 1·3. These are referred to as "heavily infested" and "lightly infested" respectively.

The trial was set out as a split plot design with four replications. The five whole-plot treatments were as set out in Table 1, and the two subplot treatments were concerned with "seed" infestation, viz. "heavily infested" and "lightly infested." Subplots measured 7 ft x 7 ft 6 in.

Fumigants were applied by hand injector at a depth of 6 in. in holes 1 ft apart on August 18, 1959, 10 days prior to planting. There were 24 datum plants in each subplot.

Root-knot ratings (0,1,2,3,4 corresponding to increasing severity of galling) of 20 plants per plot and plot yields were taken on March 18, 1960. Root-knot indices (0 – 100) were calculated from the ratings (after Smith and Taylor 1947).

Results are presented in Tables 1 and 2.

Plants from heavily infested "seed" developed more galls on the roots and yields were lower than those from lightly infested "seed."

A field trial was carried out at Palmwoods in the 1960-61 season to determine the effect of soil fumigation before planting on the yield of ginger. The layout was a 6 x 4 randomized block with the treatments listed in Table 3.

Plot size was 16 ft x 9 ft, with 75 datum plants per plot. The number of root-knot nematode larvae in the soil prior to treatment was 15 per 400 ml. Many of the larvae were parasitized by sporozoans.

TABLE 1

1959–60 TRIAL: ROOT-KNOT INDICES

Treatment	Heavily Infested Seed	Lightly Infested Seed	Means
Untreated	55·9	56·0	56·0
EDB* (12½% v/v) 20 gal/ac	26·4	7·9	17·2
EDB* (12½% v/v) 30 gal/ac	27·0	13·6	20·3
EDB* (12½% v/v) 40 gal/ac	18·0	6·9	12·4
DBCP† 2 gal/ac	28·3	26·6	27·4
Means	31·1	22·2	26·6

	Necessary differences for significance	
	5%	1%
Soil treatments	13·9	19·5
" Seed " infestation	5·6	7·7

* Ethylene dibromide (sp. gr. 25/25 2.17) in power kerosine.

† A liquid containing 97 per cent. by weight of 1,2-dibromo-3-chloropropane. Sp. gr. 2.08. Impurities mainly related hydrocarbons; inert compounds not exceeding 1 per cent. by weight.

TABLE 2

1959–60 TRIAL: YIELDS OF " CHOICE " GINGER

Treatment	Mean Plot Yield (oz)		
	Heavily Infested Seed	Lightly Infested Seed	Means
Untreated	76·7	93·3	85·0
EDB (12½% v/v) 20 gal/ac	73·0	89·7	81·3
EDB (12½% v/v) 30 gal/ac	70·3	98·3	84·3
EDB (12½% v/v) 40 gal/ac	62·3	88·3	75·3
DBCP 2 gal/ac	52·3	65·7	59·0
Means	66·9	87·1	77·0

	Necessary differences for significance	
	5%	1%
Soil treatments	31·4	46·4
" Seed " infestation	7·9	11·4

Fumigants were applied by hand injector on September 6, 1960, at a depth of 6 in. in holes 1 ft apart. "Seed" ranging in weight from 2 to 3 oz was planted on September 20. The crop was dug on March 16, 1961, and the weight of "choice" ginger from each plot was recorded. Root-knot ratings of 12 plants per plot were made immediately after digging. Results are presented in Table 3.

TABLE 3

1960–61 TRIAL: ROOT-KNOT INDICES AND YIELDS

Treatment		Root-knot Index	Yield (lb)
Untreated		67·3	31·5
DD 20 gal/ac		20·2	55·2
EDB (12½% v/v) 20 gal/ac		10·4	46·1
EDB (12½% v/v) 30 gal/ac		16·7	45·8
EDB (12½% v/v) 40 gal/ac		27·1	41·8
DBCP 2 gal/ac*		36·6	36·9
Necessary differences for significance	5%	15·2	13·9
	1%	21·1	19·2

*An emulsifiable concentrate containing 85·9 per cent. 1,2-dibromo–3–chloropropane by volume.

Root-knot was controlled by DD, EDB and DBCP at all rates. Yields were increased by DD and EDB (20 and 30 gal/ac). Plants in plots treated with DD were strikingly superior in vigour and colour to those in the other plots and this is reflected in the higher yields. This difference is not due to a higher level of nematode control, and a phytostatic effect of EDB and DBCP on the ginger plant is suggested.

Although the roots of the ginger plants in the untreated plots were severely galled at the time of harvest, infestations within the rhizomes were not visible to the naked eye, but developed during storage as light-brown watersoaked areas.

Based on the results of these trials and field experience, this author (1961) recommended the use of nematode-free planting material and soil fumigation with DD prior to planting.

REFERENCES

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