

Integrated management of root-knot nematode *Meloidogyne javanica* (Treub) Chitwood in fennel (*Foeniculum vulgare* Mill.)

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Abstract

Evaluation of organic cakes and nematicides for the management of root-knot nematode (*Meloidogyne javanica*) on fennel (*Foeniculum vulgare*) at Kapadvanj (Gujarat) indicated that all the treatments including organic amendments and nematicide either alone or in combination significantly reduced root-knot disease and increased the grain yield over control. Maximum grain yield (2762 kg ha⁻¹) was obtained with the treatment neem cake 1000 kg ha⁻¹ + phorate 1 kg ha⁻¹, which was on par with Neemguard 20 kg ha⁻¹ + phorate 1 kg ha⁻¹ (2566 kg ha⁻¹). Minimum root-knot index (1.64) was recorded in the combined treatment of neem cake 1000 kg ha⁻¹ + phorate 1 kg ha⁻¹, which was on par with castor cake 1000 kg ha⁻¹ + phorate 1 kg ha⁻¹. Maximum net returns (Rs. 22,775 ha⁻¹) was obtained in the treatment neem cake 1000 kg ha⁻¹ + phorate 1 kg ha⁻¹.

Key words: fennel, *Foeniculum vulgare*, management, *Meloidogyne javanica*, root-knot.

Fennel (*Foeniculum vulgare* Mill.) is severely attacked by root-knot nematode (*Meloidogyne javanica* Treub (Chitwood)) particularly when grown in light soils of Kapadvanj area of Kheda District in Gujarat causing 28% loss in seed yield (Patel *et al.* 1995). The infected plants exhibit stunted growth with pale yellow patches in the foliage with heavy root galling. These plants produce thrifless slightly yellowish seeds. In the nursery, soil solarization with 25µ LDPE film and rabbing with castor husk @ 7 kg m⁻² were most effective for improving seedling growth and reducing root-knot disease and weeds (Patel *et al.* 2002). The present study was undertaken at Anand Agricultural University, Anand (Gujarat) to find out cost effective in-

tegrated practices for the management of root-knot nematodes on fennel.

The experiment was conducted in a field infested with *M. javanica* pathotype 2 having initial nematode population of 258 J₂/200 cm³ soil at Telnar village in Kapadvanj area of Kheda District (Gujarat) during *kharif* 1999–2001. Eight treatments comprising of castor cake @ 1000 kg ha⁻¹ (CC), neem cake @ 1000 kg ha⁻¹ (NC), Neemguard (neem based formulation) @ 20 kg ha⁻¹ (NG), phorate @ 1 kg ha⁻¹ (PHO), CC @ 1000 kg ha⁻¹ + PHO @ 1 kg ha⁻¹, NC @ 1000 kg ha⁻¹ + PHO @ 1 kg ha⁻¹ and NG @ 20 kg ha⁻¹ + PHO @ 1 kg ha⁻¹ were imposed along with control (CON, without treatment) in a Randomized Block

Design replicated three times with plot size of 7 m x 5 m. The soil of the site was with low nitrogen, medium phosphorus and high potassium status with a pH of 7.6. The crop was raised under irrigated condition. CC and NC were applied 1 week earlier while NG and PHO were applied at the time of seeding along the rows. A root-knot susceptible fennel cv. GF 1 was transplanted at a spacing of 100 cm x 10 cm. All agronomical practices were adopted during the experimentation. Observations on plant stand, dry grain yield and root-knot index (1–5 scale) at harvest were recorded. Data were analysed using appropriate statistical methods and economics was worked out.

The results pooled for two years (1999–2001) indicated non-significant differences for plant stand. All the treatments including organic amendments and nematicide alone or in combinations significantly reduced root-knot disease and thereby enhanced the grain yield over control (Table 1). Maximum yield (2762 kg ha⁻¹) was obtained in the combined treatment of NC 1000 kg ha⁻¹ + PHO 1 kg ha⁻¹ which was at par with NG 20 kg ha⁻¹ + PHO 1 kg ha⁻¹ (2566 kg ha⁻¹). Minimum root-knot index (1.64) was recorded in the combined treatment of NC 1000 kg ha⁻¹ + PHO 1 kg ha⁻¹ (1.72) and NG 20 kg ha⁻¹ + PHO 1 kg ha⁻¹ (1.90) treatments. Maximum net return was obtained in the treatment NC + PHO (Rs. 22,775/-) followed by NG + PHO (Rs. 20,875/-) treatment with incremental cost : benefit ratio of 1:5.95 and 1:14.05, respectively.

References

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Table 1. Integrated management of root-knot nematode *Meloidogyne javanica* pt.2

Treatment	Plant stand m ⁻¹	Yield (kg ha ⁻¹)	Root-knot index (1–5)*	Gross income (Rs ha ⁻¹)	Additional income over control (Rs ha ⁻¹)	Cost of treatment including labour (Rs ha ⁻¹)	Net returns (Rs ha ⁻¹)	Incremental cost : benefit ratio
Castor cake 1000 kg ha ⁻¹	9	2038 (+22.3)	2.41 (-50.6)	50,950	9,275	3,500	5,775	1:2.65
Neem cake 1000 kg ha ⁻¹	8	2357 (+41.4)	2.18 (-66.5)	58,925	17,250	4,000	13,250	1:4.31
Neemguard 1000 kg ha ⁻¹	9	2171 (+30.2)	2.42 (-50.0)	54,275	12,600	1,000	11,600	1:12.60
Phorate 1 kg ha ⁻¹	9	2191 (+31.4)	2.17 (-67.3)	54,775	13,100	600	12,500	1:21.83
Castor cake 1000 kg ha ⁻¹ + Phorate 1 kg ha ⁻¹	8	2409 (+44.5)	1.72 (-111.0)	60,225	18,550	4,100	14,450	1:4.52
Neem cake 1000 kg ha ⁻¹ + Phorate 1 kg ha ⁻¹	9	2762 (+65.7)	1.64 (-121.3)	69,050	27,375	4,600	22,775	1:5.95
Neemguard 20 kg ha ⁻¹ + Phorate 1 kg ha ⁻¹	9	2566 (+53.9)	1.90 (-91.1)	64,150	22,475	1,600	20,875	1:14.05
Control	8	1667	3.63	41,675	-	-	-	-
SEm ±	1	82	0.21	-	-	-	-	-
CD (P=0.05)	NS	250	0.62	-	-	-	-	-
CV %	13.1	6.3	15.8	-	-	-	-	-

* 1=Free, 5=Maximum disease intensity; Values in parentheses indicate per cent yield increase (+) or disease decrease (-) over control
Selling rate of fennel: Rs. 25 kg⁻¹; Cost of labour: Rs. 50 day⁻¹

Meloidogyne javanica Pathotype 2 in fennel nursery. In: Proceedings of National Symposium on Biodiversity and Management of Nematodes in Cropping Systems for Sustainable Agriculture, 11–13 November 2002 (pp. 128–130).

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