

# Effectiveness of Nematon® EC (Pedaliaceae Oil Formulation) for the Control of the Root-Knot Nematode *Meloidogyne Incognita* on Greenhouse Tomato

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## ABSTRACT

Combined soil and seedling root dip treatments with commercial liquid formulations of neem, quillay and Pedaliaceae oil (Nematon® EC) were evaluated for their effect on the root-knot nematode *Meloidogyne incognita* on greenhouse tomato. Treatments with Pedaliaceae oil significantly reduced soil population densities of *M. incognita* and gall formation on tomato roots compared to nontreated control and quillay product. Tomato yield parameters were significantly improved, compared to non-treated soil, by treatments with Pedaliaceae oil or fenamiphos, but not by neem and quillay products. Nematon® EC may be a valuable tool for sustainable root-knot nematode control strategies.

## MATERIALS AND METHODS

The experiment was undertaken at Leverano (Lecce, Apulia region) in a plastic greenhouse heavily infested by the root-knot nematode *M. incognita* (18 eggs and juveniles ml<sup>-1</sup> soil). The experimental area was divided into 8 m<sup>2</sup> (2x4) plots arranged in a randomized block design with four replicates for each treatment. Plant-derived commercial formulates were applied as seedling pre-plant root dip solutions (5 ml l<sup>-1</sup>) and soil treatments, according to rates and time schedule reported in Table 1. Soil pre-plant treatments were applied on 17 August 2009 and tomato seedlings were immersed in dipping solutions one day later, the night before transplanting. The emulsifiable formulation of fenamiphos applied at 43 l ha<sup>-1</sup> one week before transplanting, and nontreated soil were used as controls.

One month old seedlings of tomato cv Naxos F1 (Nunhems) were transplanted in soil on 20 August 2009, according to a density of 20 plants per plot. All plots received weed control, fertilizer application, irrigation at rates typical for commercial greenhouse tomato production in the area.

At the end of tomato cycle (end of January), number of setted fruits, number of fruits per cluster and average yield of the fifth cluster were measured on eight plants from each plot.

Moreover, gall formation caused by *M. incognita* was evaluated on the roots of the same plants, according to a 0 – 5 scale (Taylor and Sasser, 1978). Soil density of *M. incognita* was determined on 500 cm<sup>3</sup> soil aliquots of composite 40-core soil samples (Coolen, 1979), collected from each plot before treatments (10 August 2009) and at the end of crop cycle (17 February 2010).

All data were subjected to a one-way analysis of variance and treatment means were compared using Fisher's LSD (least significant difference) pairwise procedure at P<0.05.



Formulate	Root dip (ml l <sup>-1</sup> water)	Treatments to soil (l ha <sup>-1</sup> )	
		At transplant	Post-transplant*
Pedaliaceae oil	5	10	2.5 x 4
Pedaliaceae oil	5	15	2.5 x 4
Pedaliaceae oil	5	20	2.5 x 4
Quillay	5	20	2.5 x 4
Neem	5	6	2.5 x 4
Fenamiphos	-	43	-
Nontreated	-	-	-

\*Applied at 15 dd intervals

Table 1. Treatments of the trial.



Nontreated plant roots



Plant roots treated with  
Pedaliaceae oil

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## RESULTS AND DISCUSSION

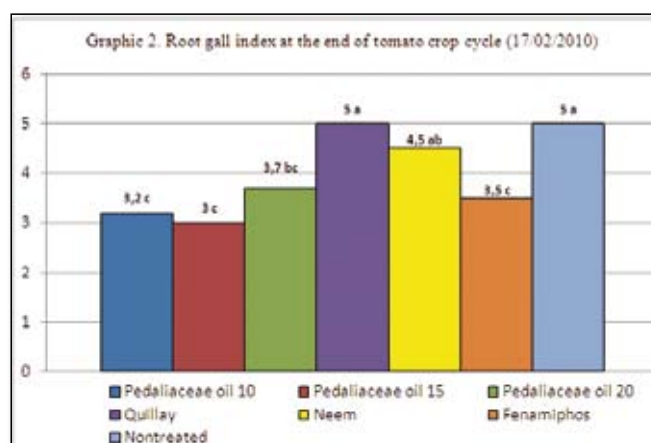
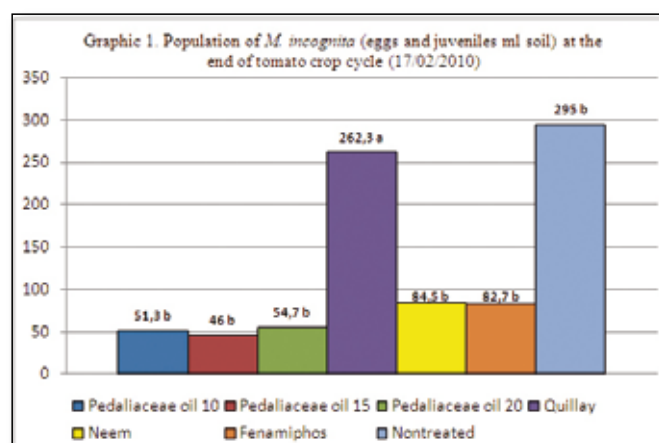
Treatments with Pedaliaceae oil significantly reduced *M. incognita* population, compared to the nontreated soil and treatment with quillay formulate, without significant differences among the three different rates (Graphic 1). Moreover, nematode population in soil treated with Pedaliaceae oil was also lower, though not significantly, than in soil treated with neem formulate or fenamiphos.

Gall formation on tomato roots was significantly lower in soil treated with Pedaliaceae oil than in control plots and in soil treated with the neem or quillay formulates and not different from the fenamiphos treatment (Graphic 2).

Fifth cluster yield in plots treated with Pedaliaceae oil was significantly higher than in nontreated and neem or quillay-treated soil (Table 2).

The 10 l ha<sup>-1</sup> rate of Pedaliaceae oil formulate provided a yield statistically higher than other two rates and also fenamiphos. Adversely, plots treated with neem or quillay formulates resulted in tomato yields statistically not different from control. Significantly higher number of fruits per cluster and larger fruit size in soil treated with Pedaliaceae oil formulate give account of the higher tomato yield (Table 2).

In conclusion, Pedaliaceae oil formulate (**Nematon® EC**) seems to be a further valuable tool for sustainable root-knot nematode control strategies, in consideration of its strong nematode level reduction and effects on plant growth and crop yield. Application of this product can be particularly useful in organic agriculture systems, and could be profitably extended to conventional crops, either alone in short-cycle crops or combined with a pre-plant chemical treatment or a nonchemical technique (soil solarization, organic amendments) in long-cycle crops as tomato.



Formulate	Root dip (ml l <sup>-1</sup> water)	Treatments to soil (l ha <sup>-1</sup> )		Average yield parameters per plant					
		At transplant	Post-transplant*	Yield of the fifth cluster (g)		N° setted fruits		N° fruits per cluster	
Pedaliaceae oil	5	10	2.5 x 4	229	bc	93	bc	2.9	cd
Pedaliaceae oil	5	15	2.5 x 4	406	e	124	c	3.8	d
Pedaliaceae oil	5	20	2.5 x 4	270	c	86	b	2.7	bc
Quillay	5	20	2.5 x 4	145	ab	43	a	1.3	a
Neem	5	6	2.5 x 4	135	ab	51	a	1.6	ab
Fenamiphos	-	43	-	298	cd	94	bc	3.0	cd
Nontreated	-	-	-	95	a	43	a	1.3	a

\*Applied at 15 dd intervals. Data followed by the same letters on the same row are not significantly different according to Least Significant Difference Test (P<0.05)

Table 2. Effect of different treatments with plant-derived commercial formulates on tomato yield parameters at the end of crop cycle in greenhouse at Leverano (Lecce, Italy).