

**TREATMENTS WITH OZONATED WATER AGAINST THE
PARASITIC NEMATODES MELOIDOGYNE INCOGNITA IN
TOMATO**

**TRATAMENTE CU APĂ OZONATĂ ÎMPOTRIVA NEMATODELOR
PARAZITE MELOIDOGYNE INCOGNITA LA ROȘII**

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Sumar. Lucrarea „Tratamente cu apă ozonată împotriva nematodelor parazite *Meloidogyne incognita* la roșii” prezintă rezultatul unei serii de experimente în ghivece, în care a fost testată eficacitatea tratamentelor cu apă ozonată, aplicată solului pentru controlul nematodului cu nodozități radiculare. Tratamentul cu apă ozonată (cu potențial de oxidare-reducere – ORP – 800 mV) a fost aplicat pentru 15, 30 și 60 de zile și comparat cu două controale: un control chimic (fenamifos) și un control netratat, fiecare cu zece repetiții. Apa ozonată a fost aplicată în trei regimuri: la transplantare și 15 zile după, timp de 30 de zile, respectiv 60 de zile. Fenamifosul a fost aplicat în sol la transplantare. După două luni, plantele de roșii (soiul Super Marmande) au fost evaluate pentru indicii de nodozități radiculare (RGI) și densitatea populației de nematozi (Pf). Analiza statistică a evidențiat o reducere semnificativă a RGI și Pf în cazul tratamentelor cu apă ozonată față de controlul netratat, deși valorile au rămas mai mari comparativ cu controlul chimic.

Cuvinte-cheie: Apă ozonată, infestare, nodozități radiculare, nematozi.

INTRODUCTION

Plant protection from plant parasitic nematodes are based on control methods at low environmental impact according to the recent European legislation [1]. From 2005 a soil disinfection process based on the use of ozone have been set up by University of Bari (patent N° 05 017 372.3). Either in plastic house and open field conditions, symptoms of corky root on tomato were significantly reduced by the use of ozone treatments as gas or aqueous solutions [2]. Moreover, ozone treatments are effective in seed disinfection against many soil plant pathogens [3]. Information on application times and concentrations of ozonated water as a new eco-friendly nematode control method is rather scarce. Therefore, a tomato pot experiment was undertaken to ascertain the effect of different soil ozonated water treatments, applied for different periods, as a new control measure against the widespread plant parasitic nematode *Meloidogyne incognita*.

MATERIALS AND METHODS

A *Meloidogyne incognita* (Kofoid et White) Chitw. infested soil with an initial population density of 30 eggs and juveniles/mL soil was used to fill clay pots (V=1 L). A one month old tomato seedling (cv. Super Marmande) was transplanted in each pot. Pots were arranged according to a randomized block design in a glasshouse at $25 \pm 2^\circ\text{C}$ with ten replications/treatment. Treatments were: i) ozonated water (OW) applied at transplant and for 15 days later; ii) OW applied for 30 days and iii) OW applied for 2 months.

An untreated and fenamiphos treated soils (62.5 L/ha) were used as controls. Ozonated water was produced *in situ* by an ozone generator until an ORP of 800 mV dissolving the ozone gas in water and then using OW for watering. Two months later plants were uprooted to assess the severity of nematode attack on tomato root according to Bridge and Page's scale [4]. Final nematode population density (Pf) in each pot was determined summing nematodes (eggs and juveniles) extracted from the soil, processing 500 mL soil by the Coolen's method [5], and those extracted from the roots by the

Hussey and Barker's method [6]. Data from the experiment were subjected to analysis of variance and means compared by the Leates Significance Difference's test (LSD's test) at $P=0.05$.

RESULTS AND DISCUSSION

Root gall index (RGI) was significantly reduced in all OW treatments in comparison to the untreated control. However RGI in OW treated plants resulted significantly higher than those observed in plants treated with fenamiphos (Table 1.). Treatment with OW applied at transplant and for 15 days, although effective to reduce RGI, was not sufficient to reduce Pf in comparison to the untreated control. The other two OW treatments applied for 30 and 60 days were significantly effective to reduce final nematode population density and the reproduction factor ($r=Pf/Pi$) (Table 1.) compared to the untreated control. No difference were observed among the last two OW treatments and fenamiphos.

Table 1. Suppressive effect of ozonated water treatments at different application times (15, 30 and 60 days) on *Meloidogyne incognita* infesting tomato plants (cv. Super Marmande)

Treatment	Ozonated water				UC
Application time	At transplant				---
	x 2 weeks	x 1 month	x 2 months	Fen	
RGI (0-10)	3.8* b**	4.2 bc	5.0 c	2.7 a	6.0 d
Eggs + J2/g root (x 1,000)	51 a	40 c	41 bc	22 d	49 ab
Pf/10 mL soil (x 100)	17 a	72 b	77 b	73 b	14 a
Reproduction factor	58 a	25 b	26 b	25 b	49 a

Fen = Fenamiphos (nematicide); UC = Untreated control.

*Each value is an average of ten replications;

**Data flanked in each row by the same letters are not statistically different according to Least Significance's Test ($P=0.05$).

CONCLUSIONS

On the base of obtained results, ozonated water treatments could be considered as a new eco-compatible control method against plant parasitic nematodes considering their no chemical residues and a very low human toxicity.

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