***INT. J. BIOL. BIOTECH.*, 4 (2-3): 237-240, 2007.**

EFFICACY OF FERTINEMAKIL AND CARBOFURAN AGAINST NEMATODE POPULATIONS AND GROWTH AND YIELD PARAMETERS OF TWO WHEAT VARIETIES

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ABSTRACT

The effect of Fertinemakil (a pesticide combination of neem cake and a fungicide) and Carbofuran on the control of nematode populations and yield of two wheat varieties TD-1 and Inquilab was investigated in microplots. Nematode populations were reduced in both the varieties, while only in var. Inquilab root-length was significantly increased in both the treatments as compared to control ($P < 0.05$).

Keywords: Wheat, Fertinemakil, Carbofuran, nematodes.

INTRODUCTION

Wheat (*Triticum aestivum* L.) being a major cereal occupies an eminent place in the economy for our country, provides about 60% of the calories and 50% of the protein to the human race (Chowdhry *et al.*, 1998; Wittwer, 1980). It harbours a large number of nematodes (Kamal and Mugal, 1968; Maqbool, 1986), which eventually decrease its yield (Carneiro and Carneiro, 1983).

A number of approaches have been made to manage nematodes with wheat using organic amendments (Khan, 1992; Khan and Shaukat, 1993; Khan, *et al.*, 1994; 1997) or chemical nematicides (Khan *et al.*, 1991; Khan and Shaukat, 1991).

This paper describes work conducted to assess the control of commonly associated nematodes with two wheat varieties TD-1 and Inquilab.

MATERIALS AND METHODS

The experiment design was a randomized complete block with four replications per treatment located at Crop Diseases Research Institute, PARC, Karachi University Campus. The initial population was 139.75 ± 15.1 *Meloidogyne incognita* larvae; 72 ± 3.6 *Pratylenchus thornei;* 44.75 ± 5.93 *Helicotylenchus indicus* per 200 ml of soil respectively, these three nematodes constituted 85% of the total population.

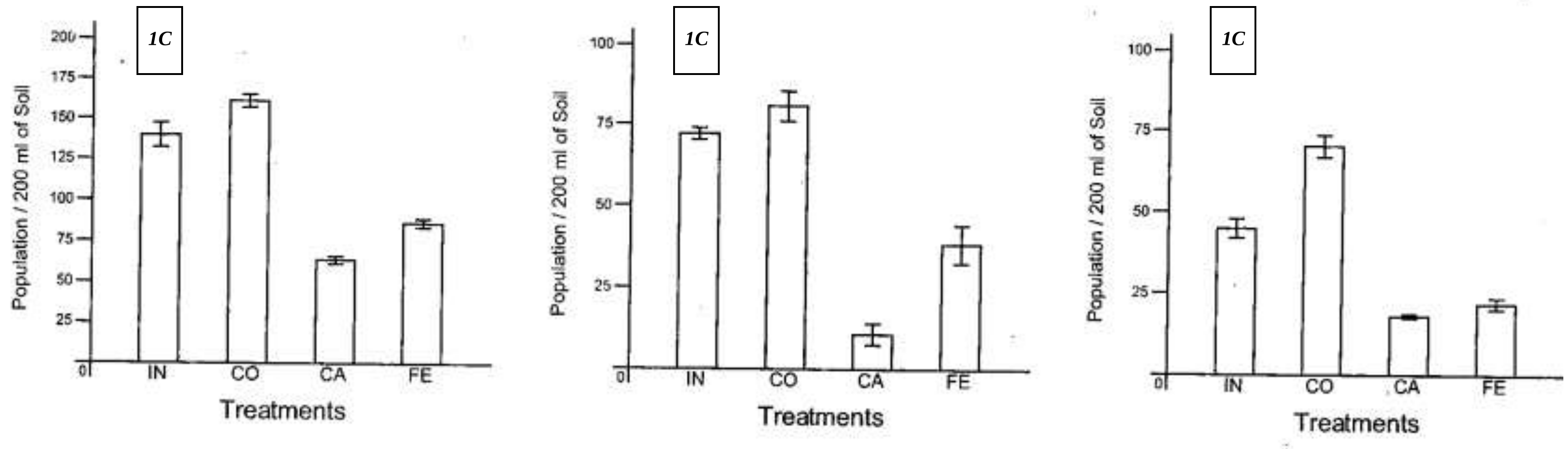
The soil was tilled three times within two weeks before applying the treatments so as to facilitate the release of any residual fumigant left of any prior experiment. The amendments were incorporated three days before sowing to a depth of 5-10 cm in microplot measuring $1m^2$. The varieties tested were Inquilab and TD-1. Treatments applied in this study included (i) control (no treatment), (ii) Carbofuran 3G (2-3 dihydro-2, 2-dimethyl benzofuran-7-nyl methyl carbamate) @ 15g/microplot, (iii) Fertinemakil @ 70 gm/microplot.

The soil was irrigated twice a month and urea fertilizer at a rate of 100 kg/ha was applied only once during the experiment. Weeds were regularly removed. Final population of nematode was recorded at the time of harvest. Baermann funnel technique was used to determine the population using 200 ml composite sample from each plot. At harvest plant growth and yield parameters including fresh root and shoot weight, fresh root and shoot length, number of tillers and spikes and 1000-grain weight was determined.

Data on growth parameters and population of nematodes were subjected to analysis of variance (ANOVA) followed by least significant difference (LSD) following Zar (1994).

RESULTS AND DISCUSSION

Although both treatments viz. Carbofuran and Fertinemakil reduced nematode population as compared to control. In wheat variety TD-1, Carbofuran was most effective in reducing the population of all the three nematodes namely *M. incognita* larvae; *P. thornei* and *H. indicus* as compared to Fertinemakil (Fig. 1).



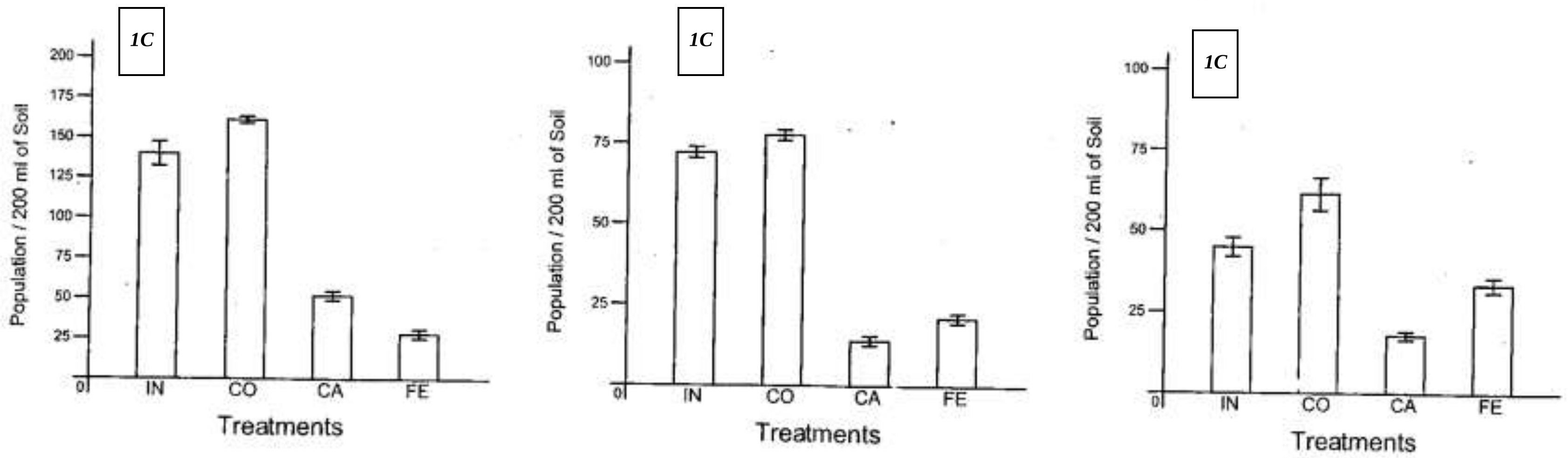


Fig. 1A-C. Population *of Meloidogyne incognita* larvae in different treatments associated with wheat var. Inquilab (IN = Initial; CO = Control; CA = Carbofuran; FE = Fertinemakil).

Fig. 2A-C. Population of *Meloidogyne incognita* in different treatments associated with wheat var. TD-1.

In wheat variety Inquilab Fertinemakil was more effective in controlling *M. incognita* larvae as compared to Carbofuran while *P. thornei* and *H. indicus* populations were more abated by Carbofuran (Fig. 2).

Table 1 provides the growth and yield parameters of two varieties as influenced by treatments. Growth parameters in var. TD-1 were non-significant in Carbofuran and Fertinemakil as compared to control ($P < 0.05$). The 1000 grains weight although non-significant, there was a slight variation among treatments. The 1000 grains weight varied in the order Control < Fertinemakil < Carbofuran.

While in var. Inquilab the growth parameters were non-significant in Carbofuran and Fertinemakil as compared to control except root-length, which was significantly increased in both treatments as compared to control ($P < 0.05$). Although the 1000 grain weight was non-significant, there was a considerable variation among treatments. The 1000 grains weight varied in the order Control < Carbofuran < Fertinemakil.

It has been observed that Carbofuran provides an effective control of nematode populations (Khan *et al*., 2004) but it is a chemical nematicide with high residual activity. Therefore efforts must be made to select natural nematicide providing increased yield of wheat. Fertinemakil is a useful pesticide product of PCSIR Laboratories and CDRI, PARC, Karachi that contains a fungicide, nutrients and nematicide (neem cake). Neem is well known for its insecticidal and nematicidal properties. It contains a variety of nematicidal principles including thionemone, nimbidin, azadirachtin, nimbidic acid, kaemferol and quercetin (Alam, 1990). These compounds are known to inhibit penetration of larvae into roots, hatching and cause juvenile and adult mortality of nematodes. It is therefore suggested that more trials on control should be carried using organic amendments, which have no residual effect and are not toxic to environment.

Table 1. Effect of Carbofuran and Fertinemakil on growth and yield parameters of two wheat varieties.
(Mean followed by ± standard error).

Variety	Treatments	Root length (cm)	Shoot length (cm)	Root weight (g)	Shoot weight (gm)	Number of tillers	Number of spikes	1000 grain weight
Inquilab	Control	14.48 ± 0.29	83.6 ± 0.31	45.77 ± 1.16	98 ± 0.93	11.25 ± 0.75	11 ± 0.9	36.18 ± 1.57
	Carbofuran	16.55 ± 0.25	84.16 ± 0.39	45.73 ± 1.23	46.92 ± 5.34	11.75 ± 0.47	11.75 ± 0.47	40.25 ± 1.92
	Fertinemakil	16.11 ± 0.40	84.86 ± 0.21	45.81 ± 0.99	49.1 ± 3.34	11.75 ± 1.10	11.5 ± 0.86	41.08 ± 0.3
TD-1	Control	15.36 ± 0.39	79.71 ± 1.45	43.32 ± 3.37	88.58 ± 0.27	12.25 ± 0.25	12.25 ± 0.25	40.10 ± 0.26
	Carbofuran	15.61 ± 0.31	81.9 ± 0.73	49.29 ± 0.45	88.84 ± 0.35	12.5 ± 0.5	12.5 ± 0.5	40.46 ± 0.28
	Fertinemakil	15.47 ± 0.16	80.8 ± 0.51	44.13 ± 2.29	94.58 ± 3.36	12.75 ± 0.47	12.75 ± 0.47	40.19 ± 0.49

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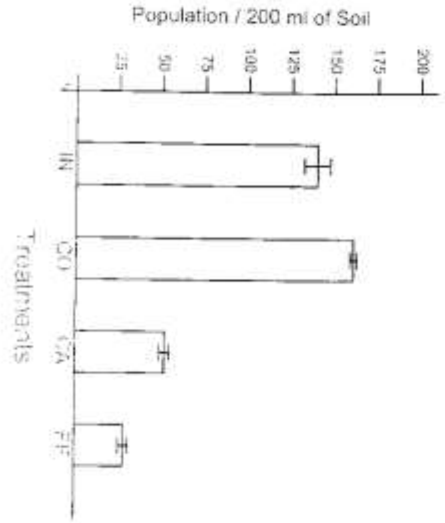
(*Accepted for publication June 2007*)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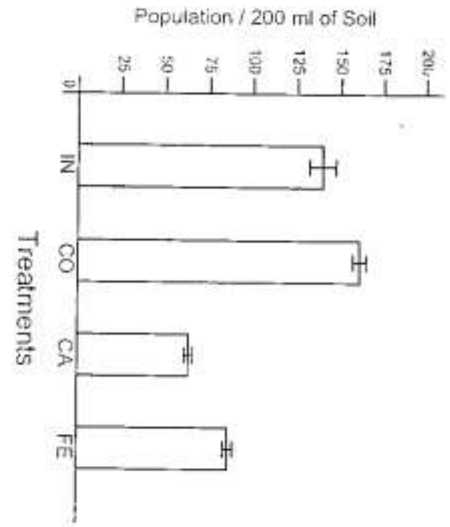
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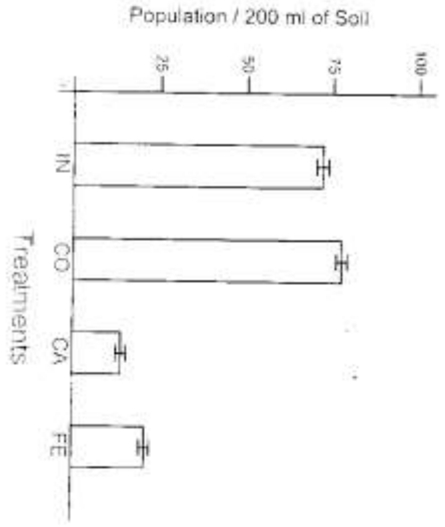
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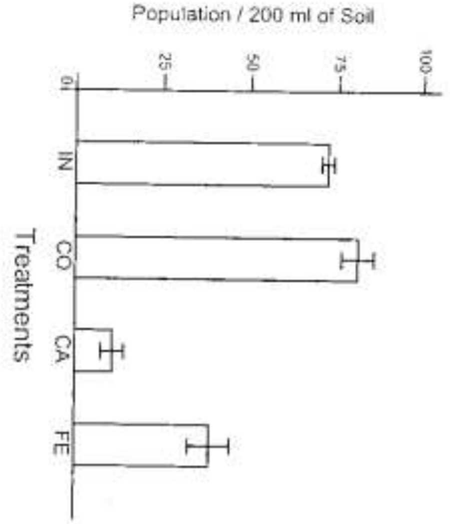
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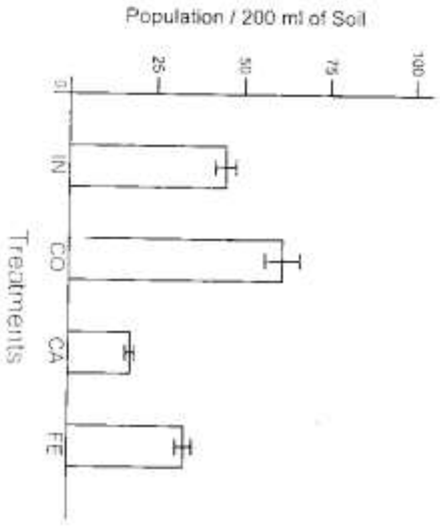
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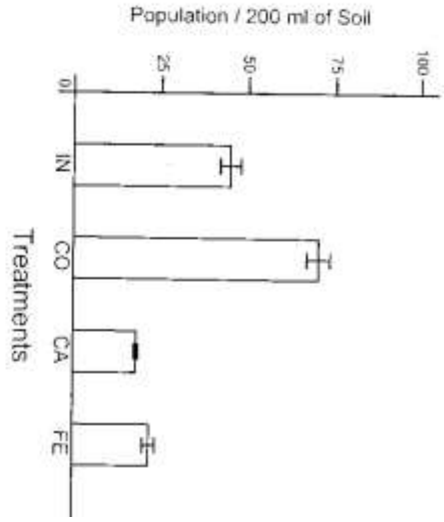
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