

CHLORINE CONTENT OF SOIL TREATED FOR THREE YEARS WITH HALOGENATED FUMIGANTS

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Experiments on the chemical control of *Meloidogyne incognita* (Kofoid et White) Chitwood attacking tobacco (*Nicotiana tabacum* L. cv. Erzegovina) were undertaken in 1969 in the province of Lecce, Southern Italy (Lamberti 1969 and 1971). Out of the 10 chemicals applied as soil treatments, including granular and liquid formulations, only three treatments provided sufficiently high levels of control to be considered economic. These were: Vorlex 201 (methylisothiocyanate 17%, chloropicrin 15%, 1,3 dichloropropene 1,2 dichloropropane 68%) applied at the rate of 300 l/ha; Di-Trapex (methylisothiocyanate 20%, 1,3 dichloropropene 1,2 dichloropropane 80%) applied at 300 l/ha and D-D (1,3 dichloropropene 1,2 dichloropropane 100%) applied at 150 l/ha.

For commercial use it would be helpful and more economic if the nematicides had some residual effect against *Meloidogyne* spp.

This was investigated in a further experiment but Vorlex 201 was omitted because at that time it was still in the experimental stage and had not been approved for commercial use.

Although D-D or Di-Trapex were found to have residual effects persisting for up to three years, it is considered that the greater benefits are obtained by annual applications, but at lower dosage levels than the single application (Lamberti in preparation). However, successive annual application does raise the problem of excessive accumulation of chlorine in the soil to a level which may be phytotoxic to tobacco.

The amount of soluble chlorine salts in the soil following various applications of Di-Trapex or D-D (Table II), was therefore investigated.

Materials and Methods

The soil in which the experiment was carried out was analyzed for particle size, organic matter and pH (Table I). The soil was treated with nematicides as shown in Table II. Treatments were applied by means of an injector gun in April of each year (1970-71-72) and tobacco was planted a month later. In November 1972 soil samples were taken for chlorine analysis, each sample being made up of 3 sub-samples taken to depth of 10-30 cm in each plot (each treatment was replicated eight times).

Extraction of soluble chlorine salts from each sample was done by the method of Chapman and Prat (1961) and quantitative determination using a spectrophotometer following the method of Zall *et al.* (1956).

The data were analyzed by Duncan's multiple range test.

Results and Discussion

In the untreated controls 15 ppm of soluble chlorine was present and this compared with the various treatments which ranged from 13 to 22 ppm.

None of the differences between treatments control was remarkable although statistical differences occurred when the nematicides were applied at the highest doses (Table II).

These amounts compare with the range of 10 to 350 ppm which have been found in various untreated soils (Chapman and Prat, 1961).

Soluble chlorine, according to these Authors, does not become phytotoxic until it reaches 100 to 200 ppm. Applications of Di-Trapex or D-D at the amounts used in this experiment, even when applied for 3 successive years, are therefore most unlikely to present problems of phytotoxicity because of residues of soluble chlorine in light soils.

Table I - Characteristics of soil treated with Di-Trapex and D-D.

Particles > 2 mm in diameter	2.29%
» < 2 » » »	97.71%
<i>Analysis of texture (particles < 2 mm diameter)</i>	
Particles 2 ÷ 0.2 mm	24.5%
» 0.2 ÷ 0.02 mm	60.5%
» 0.02 ÷ 0.002 mm	10.0%
» < 0.002 mm	5.0%
Calcium carbonate	absent
Organic matter	3.20%
Water	1.90%
pH	7

Table II - Soluble chlorine salts in soil following treatments with Di-Trapex or D-D.

T r e a t m e n t	Chlorine salts ppm		
	(by w, referre to dry wheight, (1))		
Di-Trapex, 300 l/ha, year 1	13	d	C
Di-Trapex, 300 l/ha, year 1 and year 3	22	a	A
Di-Trapex, 300 l/ha year 1; 150 l/ha years 2 and 3	20	ab	AB
D-D, 200 l/ha, year 1	18	abc	ABC
D-D, 300 l/ha, year 1	16	bcd	BC
D-D, 400 l/ha, year 1	20	ab	AB
D-D, 200 l/ha year 1; 150 l/ha year 2	19	abc	AB
D-D, 200 l/ha year 1; 100 l/ha year 3	19	abc	AB
D-D, 200 l/ha year 1; 150 l/ha year 3	17	bcd	ABC
D-D, 200 l/ha year 1; 200 l/ha year 3	19	abc	AB
D-D, 200 l/ha year 1; 100 l/ha years 2 and 3	17	bcd	ABC
Control (untreated)	15	cd	BC

(1) Numbers with the same letters are not statistically different: P = 0,05 small letters; P = 0,01 capital letters.

SUMMARY

The amount of soluble chlorine salts in a sandy loam following various applications of Di-Trapex (methylisothiocyanate 20%, 1,3 dichloropropene 1,2 dichloropropane 80%) or D-D (1,3 dichloropropene 1,2 dichloropropane 100%) for three successive years was investigated. In the untreated soil 15 ppm of soluble chlorine was present whereas in the treated plot it ranged from 13 to 22 ppm. None of the differences between treatments and control was remarkable and the soluble chlorine content of the soil was in any case below phytotoxic levels. Therefore applications of Di-Trapex or D-D at the rate of 300 l/ha, even when applied for three successive years, will unlikely raise problems of phytotoxicity because of residues of soluble chlorine.

RIASSUNTO

Contenuto in cloro di un terreno trattato per tre anni con fumiganti alogenati.

È stato determinato il contenuto di sali solubili del cloro presenti in un terreno tendente allo sciolto trattato per tre anni consecutivi con Di-Trapex (metilisotiocianato 20%, 1,3 dicloropropene 1,2 dicloropropano 80%) o D-D (1,3 dicloropropene, 1,2 dicloropropano 100%). Il contenuto medio in cloro solubile è risultato di 15 ppm, in peso riferito a peso secco, nei campioni prelevati nelle parcelle testimoni, mentre in quelle trattate esso variava da un minimo di 13 ppm ad un massimo di 22 ppm. I trattamenti, in nessun caso, hanno elevato il contenuto in cloro a livelli fitotossici. Si pensa, quindi, che somministrazioni di dosi moderate di Di-Trapex o D-D, anche per tre anni consecutivi, non possano, in terreni sciolti, creare problemi di fitotossicità per residui di cloro.

RÉSUMÉ

Contenu en chlore d'un terrain traité, pour trois années, par des fumigants halogénés.

On a déterminé le contenu des sels solubles du chlore dans un terrain léger traité pour trois ans consécutifs par Di-Trapex (méthylisothiocyanate 20% 1,3 dichloropropene 1,2 dichloropropane 80%) ou D-D (1,3 dichloropropene 1,2 dichloropropane 100%). Le contenu moyen en chlore soluble est de 15 ppm, en relations au poids sec, pour les échantillons prélevés dans les parcelles témoins tandis que dans celles traitées il changeait d'un minimum de 13 ppm à un maximum de 22 ppm. Les traitements n'ont pas élevé, toutefois, le contenu en chlore à des niveaux phytotoxiques. On pense que des administrations des doses modérées de Di-Trapex ou D-D aussi pour trois ans consécutifs, ne peuvent pas créer, dans des terrains légers, des problèmes de phytotoxicité par les résidus de chlore.

LITERATURE CITED

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Accepted for publication on 8 March, 1974.