

Control of root-knot nematode in grapes

by

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Die Bekämpfung von Wurzelgallennematoden bei Reben

Zusammenfassung. — In einem mit *Meloidogyne incognita* verseuchten Weinberg wurde durch Anwendung von Aldicarb (2 g a.W./Rebe), DBCP (1,2 ml/m²) und Carbofuran (0,6 g a.W./Rebe) nach dem Rebschnitt die Befallsdichte der Wurzelgallennematoden stark verringert. Durch Behandlung mit Aldicarb, DBCP und Carbofuran sowie Zwischenpflanzung von *Tagetes* wurde, mit abnehmender Wirkung in der Reihenfolge der Aufzählung, eine signifikante Steigerung der Traubenzahl und des Traubenertrages erzielt.

Introduction

The damage caused by plant parasitic nematodes to grapevine (*Vitis vinifera*) is very serious, distributed throughout the cultivating areas of the world (RASKI *et al.* 1965 and PINOCHET *et al.* 1976). According to RASKI *et al.* (1965) several species of root-knot nematodes, *Meloidogyne* spp., parasitize grape and differ in importance depending upon the geographical location. In California, *M. incognita*, *M. javanica* and *M. thamesi* occur on grape, *M. incognita* being the most common and important one. Grapevine in Australia is infested exclusively by *M. javanica* (MEAGHER 1969). TERLIDOU (1974) indicated that the nematode induces gall production in young rootlets, and heavy infection may completely destroy the root system of young plants.

MEAGHER (1969) proved that application of DBCP (composition below) at 28 l/ha to Sultana vine increased the yield of fruits. RASKI *et al.* (1965) demonstrated that the application of DBCP in irrigation water at 22.5 l/ha increased the yield in grapevines.

This study was conducted to demonstrate the effectiveness of Aldicarb (2-methyl-2-(methylthio)propionaldehyde 0-(methylcarbamoyl)oxime), a 10 % systemic granular pesticide, DBCP (Nemagon, 1,2-dibromo-3-chloropropane), a volatile liquid soil fumigant, Carbofuran (2,3-dihydro-2,2-dimethyl-7-benzofuranyl-methyl-carbamate), a 3 % systemic granular nematicide, and *Tagetes* interplanting on the control of root-knot nematode at established vineyards.

Materials and methods

The experiment was conducted in a 4-year-old vineyard at Anamalai of Coimbatore District. The vines of *Vitis vinifera* var. Muscat Hamburg growing in the selected site showed poor development and decline in fruit production. The analysis of root samples indicated a severe root-knot infection.

The plantation was divided into 25 plots of 4 vines each and randomized block design containing 5 treatments, each replicated 5 times, was adopted. The plot size was 5×3 m with a spacing of 2 m between the rows and 1.5 m between the vines. The treatments were, besides an untreated control, Aldicarb (10 % granular formulation) applied at the rate of 2 g a.i.¹⁾ per vine (5 kg/ha), Carbofuran (3 % granular formulation) at the rate of 0.6 g a.i. per vine (1.5 kg/ha), DBCP (60 % emulsifiable concentrate formulation; Tata product) at the rate of 1.2 ml/m² (12 l/ha) and marigold (*Tagetes erecta* var. Orange) seedling interplanting (74000 plants/ha). The granules were applied around the base of the plant on the root zone 30 cm away from the main vine as a circular band 7–8 cm wide, removing 10 cm top soil to expose the roots, covered after application and irrigated. Nemagon was mixed with the irrigation water as it flew into a bed surrounded by ridges 10 cm high, so that the water that ultimately stagnated contained a homogenous mixture of the chemical. The marigold seedlings of 40 d were interplanted at 30×15 cm apart. All treatments were given during the same day of pruning of vines.

Root samples of 10 g were drawn from each plot before applying the treatment and at harvest (3 months after treatment). Nematode gall density (number of galls per g of roots) was assessed. At harvest, weight of bunches and number of bunches per plot were recorded and analysed statistically.

Effect of treatments on gall density of *M. incognita* and on yield of grapes
Einfluß der Behandlung auf die Dichte der Gallen von *M. incognita* sowie auf den Trauben-
ertrag

Treatments	Means of 5 replications		Bunches/ plot (n)	Yield/ plot (kg)	Calculated yield (t/ha)	Increase of yield (%)
	Galls/g of roots (n)					
	Before treatment	At harvest				
Aldicarb	51.0	37.0	125.2	27.8	18.5	96.4
Carbofuran	49.0	37.6	80.8	22.6	15.0	70.8
DBCP	49.8	34.8	122.0	25.4	17.9	72.6
<i>Tagetes</i> inter- planting	48.8	57.0	79.0	18.0	11.9	25.3
Untreated	51.6	60.2	55.2	14.4	9.5	
LSD (P = 0.01)	N.S.	12.26	21.93	2.1		

Results

Examination of the roots revealed the presence of *M. incognita*. The root gall density before application of chemicals was high and uniform and there was no significant difference between treatments. The gall density at harvest showed a significant reduction ($P = 0.01$) in the treatments Aldicarb, Carbofuran and DBCP. Plants treated with Aldicarb, DBCP and Carbofuran showed a significant increase ($P = 0.01$) in the number of bunches and in fruit weight. *Tagetes* interplanting has also given an increase in the fruit yield (Table).

¹⁾ active ingredient.

Discussion

Systemic granular nematicides are known to control *M. incognita* and to increase yield in banana (VALLE-LAMBOY and AYALA 1976). RASKI *et al.* (1965) have found that in grapes yield is increased by Nemagon application. Reduction in root-knot gall density in tomato and cotton was reported by RODRIGUEZ-KABANA and PEGGY (1976) due to systemic granular nematicides. Similar results were obtained in the present studies. In field experiments *Tagetes* spp. increased the yield of most crops on sandy and peaty soils by 10–40 % by decreasing *Pratylenchus* and *Meloidogyne* populations, (WEBSTER 1972). A similar result was obtained in the present experiment and this may be attributed to the fewer number of adult females in galls.

Summary

In a nematode infested vineyard, application of Aldicarb 2 g a.i. per vine, DBCP 1.2 ml/m² and Carbofuran 0.6 g a.i. per vine after pruning brought down the root-knot nematode. A significant increase in number of bunches and yield of fruits was obtained in Aldicarb treatment followed by DBCP, Carbofuran and *Tagetes* inter-planting.

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