

THE SUSCEPTIBILITY OF TWELVE GRAPE CULTIVARS TO MELOIDOGYNE

INCOGNITA ACRITA , ROTYLENCHULUS RENIFORMIS AND TYLENCHULUS SEMIPENETRANS

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المخلص

أجريت الدراسة على خمسة أصناف أمريكية (ديليت ، فييستا ، فريدم ، هارموني ، روبي) وأربعة أصناف فلسطينية (زيني ، زيني اسود ، بيتوني ، شامي) وثلاثة أصناف مصرية (بلدي ، فيومي ، بز العنزة) . أخذت البيانات بعد ٩٠ يوما من اضافة العدوى . اشتملت البيانات المأخوذة على عدد الاناث البالغة وغير البالغة ومتوسط عدد البراعم الخضرية .

دلت نتائج الدراسة أن الصنف الامريكى هارموني مقاوم للاصابة بالأنواع الثلاث من النيماتودا ، كما أن صنف فريدم منيع للاصابة بنيماتودا تعقد الجذور ، وشديد المقاومة للاصابة بنيماتودا الموالمح والنيماتودا الكلوية ، وأن صنف فييستا مقاوم للاصابة بنيماتودا تعقد الجذور فقط وقابل للاصابة بالانواع الأخرى .

وتشير نتائج الدراسة ان زراعة أدناف مقاومة للآفات النيماتودية المذكوره وكذلك استمرارية تربية أصناف مقاومة أخرى جديدة بحيث تتناسب وظروف الانتاج المحلية لآمر جدير بالاهتمام .

ABSTRACT

In this study the susceptibility of 5 American cultivars (Delight , Fiesta , Freedom , Harmony and Ruby) , 3 Egyptian cultivars (Baladi , Bez – Alanza , and Fayumi) and 4 palestinian cultivars (Al-Zeiny , Black-Zeiny , Beitony and Chamey) were tested for the three nematode species .

The results indicated that , the twelve grape cultivars were different in their susceptibility to each nematode species . Black-Zeiny and Ruby sustained the highest population densities of all these nematode species , whereas freedom and Harmony cultivars supported the lowest number of all nematode species . Chamey and Zeiny were good hosts of M. incognita ; Delight and Fiesta were good for both R. reniformis and T. semipenetrans . Beitony was a good host for both M. incognita and T. semipenetrans but a poor host for R. reniformis . Baladi , Bez-Alanza and Fayumi were moderate hosts for all the three nematode species .

The results also indicated that some of these cultivars could be considered resistant to all three nematode species (c.v Harmony) , or immune to M. incognita but resistant to others (c.v. Freedom) or resistant to M. incognita only c.v.Fiesta) .

INTRODUCTION

Previous studies on grapes associated nematodes indicated that all grape cultivars (Vitis vinifera . L) and most of the common grape rootstocks are susceptible to several species of plant parasitic nematodes (6,8,10) . It was recently found that the citrus nematode T. Semipenetrans Cobb , the reniform nematode R. reniformis Linford et Oliveira and the root-knot nematode M. incognita Kofoid & White , were the most important species causing vineyard decline (1,2,4,9,15,16) . As most nematocides are costly and usually involve special cultural operations (5,14) , the use of resistant varieties is more practical and would offer an effective means of resistance (2,3,4,11) . This work was carried out in order to investigate the resistance of twelve cultivars of grapes to the above nematode species .

MATERIALS AND METHODS

Hard wood cuttings of twelve grape cultivars , 5 American (Delight , Fiesta , Freedom and Ruby) ; 3 Egyptian (Baladi , Bez-Alanza and Fayumi) ; and 4 Palestinian (AL-Zeiny , Black-Zeiny , Beitony and Chamy) , were planted (February 1981¹ at Ain Shams University Faculty of Agriculture) in clay pots each 15 cm in diameter at the top containing sterilized sandy loam soil (83.3% sand , 6.2% silt and 7.3% clay) and kept in a green house .

Tap water was used for watering the pots when ever necessary . When the succulent growth (shoots) emerged from the vegetation buds, the nematode inoculum of each nematode species was added separately to pots at the rate of 2000 larvae of M. incognita acrita and 4000 larvae for each of R. reniformis and T. semipenetrans. Each treatment was replicated three times and maintained 90 days following the addition of nematodes . The nematode inoculum was taken from identified cultures grown on Black-Zeiny grape roots . The number of immature and mature females and the number of vegetation buds were recorded after ninety days following the addition of nematodes . The data were analyzed by using analysis of variance and least significant differences.

RESULTS

Based on the number of nematode stages within the roots , the results (Table 1) indicated that all the tested grape cultivars were infected with all the three nematode species , except Freedom which was exclusively free from M. incognita acrita stages . On the other hand , it was infected with a negligible number of immature stages of both R. reniformis and T. semipenetrans , where , the number of immature stages of R. reniformis and T. semipenetrans were 90 and 128 for both nematodes respectively . Although , immature and mature stages of the nematodes were detected in less number in the roots of Harmony Cultivar .

It was also found (Table 2) that the number of vegetation buds of all the tested grape cultivars decreased significantly as compared with those in the healthy plants , except Freedom , Harmony and Baladi cultivars , where as , the number of their vegetation buds did not differ significantly than those in healthy plants . Generally , the results indicated that the tested grape cultivars were statistically different in their susceptibility for each of the three nematode species . These

cultivars are arranged statistically in a decreasing susceptibility order (Table 3). Freedom and Harmony cultivars were considered unsusceptible hosts for the three nematode species. Otherwise, Fiesta cultivar was considered an unsusceptible host for M. incognita acrita but more susceptible host for both R. reniformis and T. semipenetrans whereas , the number of nematode stages found within the roots of fiesta cultivar were 147,3441, and 3625 for each of the three nematode species respectively .

The results also indicated that , chamey cultivar was the most susceptible host for M. incognita acrita , i.e., its roots infected with the significantly highest nematode population as compared with other cultivars , but less susceptible host for the other two nematodes . In contrast Black-Zeiny cultivar was the most susceptible host for both R. reniformis and T. semipenetrans, but less susceptible host for M. incognita acrita than chamey . Ruby cultivar had the same susceptibility as Black-Zeiny for T. semipenetrans but more susceptible host for M. incognita acrita and less susceptible host for R. reniformis than Black-Zeiny. Delight cultivar was more susceptible host for both R. reniformis and T. semipenetrans than for M. incognita acrita. The other cultivars , AL-Zeiny , Baladi, Bez-Alanza, Beitony and Fayumi occupied intermediate status of susceptibility to all the three nematode species infections.

TABLE 1

Average number of immature(Imm)and mature (Mat) females of *Meloidogene incognita acrita* , *Rotylenchulus reniformis* and *T. semipetrans* in roots of twelve grape cultivars after 90 days from inoculation .

Grape Cultivars	<i>M. incognita acrita</i>			<i>R. reniformis</i>			<i>T. semipetrans</i>		
	Imm	Mat	Total	Imm	Mat	Total	Imm	Mat	Total
Delight	361	338	699 ⁹	1078	1743	2821 ^e	1041	2756	3797 ^b
Fiesta	68	79	147 ^h	1675	1766	3441 ^b	2234	1391	3625 ^c
Freedom	0	0	0 ^h	94	0	94 ^k	127	0	127 ^h
Harmony	22	41	63 ^h	333	305	638 ^l	104	96	200 ^h
Ruby	1351	1512	2863 ^a	2048	1257	3305 ^b	2093	2323	4416 ^a
Al-Zeiny	1225	1489	2714 ^b	1414	1351	2765 ^d	1228	1366	2594 ^e
Black-Zeiny	1378	1384	2762 ^b	1436	2276	3712 ^a	2190	2238	4428 ^a
Beltony	951	1081	2032 ^d	768	859	1627 ^h	1446	1483	2929 ^d
Chamey	1127	1740	2867 ^d	723	1121	1844 ⁹	1071	676	1747 ^f
Baladi	452	840	1292 ^f	363	809	1172 ⁱ	772	851	1623 ⁹
Bez-Alanza	1081	1134	2215 ^c	1569	862	2431 ^e	1630	873	2503 ^e
Fayumi	646	1082	1728 ^e	1283	893	2176 ^f	857	821	1678 ^f

Values in vertical columns not followed by the same letter differ significantly from one another (P = 0.05).

TABLE 2

Number of Vegetation buds of grape of cultivars after 90 days from inoculation with M. incognita acrita (Mi), R. reniformis (Rr) and T. semipenetrans (Ts)

Grape Cultivars	Number of vegetation buds / Plant			
	control	Mi	Rr	T _s
Delight	30 ^a	29 ^a	22 ^b	17 ^c
Fiesta	29 ^a	27 ^a	18 ^b	18 ^b
Freedom	27 ^a	28 ^a	27 ^a	28 ^a
Harmony	28 ^a	29 ^a	26 ^a	27 ^a
Raby	30 ^a	21 ^b	19 ^b	16 ^{cb}
Al-Zeiny	32 ^a	22 ^b	22 ^b	20 ^b
Black-Zeiny	34 ^a	20 ^b	18 ^b	16 ^{cb}
Beitony	31 ^a	22 ^b	25 ^b	21 ^b
Chamey	32 ^a	25 ^b	27 ^b	25 ^b
Baladi	30 ^a	27 ^a	26 ^a	26 ^a
Bez-Alanza	31 ^a	23 ^b	22 ^b	21 ^b
Fayumi	31 ^a	25 ^b	23 ^b	24 ^b

Values in horizontal columns not followed by the same letter differ significantly from one another ($p = 0.05$).

TABLE 3

Twelve grape cultivars recorded in order of a decreasing susceptibility to three nematode species infection .

Grape cultivars

<u>M. incognita acrita</u>		<u>R. reniformis</u>		<u>T. semipenetrans</u>	
Chamey	(a)	Black-Zeiny		Black-Zeiny	(a)
Ruby	(a)	Fiesta	(b)	Ruby	(a)
Black-Zeiny	(b)	Ruby	(b)	Delight	(b)
Zeiny	(b)	Delight	(c)	Fiesta	(c)
Bez-Alanza	(c)	Al-Zeiny	(d)	Beitony	(d)
Beitony	(d)	Bez-Alanza	(e)	Bez-Alanza	(e)
Fayumi	(e)	Fayumi	(f)	Al-Zeiny	(e)
Baladi	(f)	Chamey	(g)	Fayumi	(f)
Delight	(g)	Beitony	(h)	Chamey	(f)
Fiesta	(h)	Baladi	(i)	Baladi	(g)
Harmony	(h)	Harmony	(j)	Harmony	(h)
Freedom	(h)	Freedom	(k)	Freedom	(h)

In each vertical column , cultivars not followed by the same letter , in parentheses , differ significantly from one another (P = 0.05) .

DISCUSSION

In the resistant rootstock a few number of nematodes enter their root system (2,3,4). On the other hand, Geible (3) stated , in general, a plant resistant to nematode resists attack or exhibits little damage and reduce nematode populations. However , the results of this study concure with those finiding by (2,3,4) and indicates that some grape cultivars could be considered resistant to the three nematode species (cv. Harmony and Freedom) or one nematode species (cv. Fiesta) since the roots of these cultivars supported a few number of nematode stages (2,4) . On the other hand , the absence of M. incognita acrita stages in the roots of cv. Freedom may account for its immunity to this nematode (11) , while it is considered resistant to R. reniformis and T. semipenetrans , since it's roots infected with a few number of immature stages. Although , these immature stages failed to reach maturity during ninety days following the addition of nematode inoculum .

Finally, it is noteworthy to mention that introduction of the more susceptible cultivars may be disappointing , furtunately , the use of resistant rootstocks is aviable alternativé and should be considered in soils where nematodes may be a constraint to production of certain cultivars (2,4) , therefore , planting grape cultivars resistant to these nematode species , e.g., Freedom and Harmony (Table 3) is necessary for establishing new vineyards .

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