Evaluation of some oilseed-rape cultivars against reniform nematode, *Rotylenchulus reniformis*

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Abstract

Ten imported oilseed-rape Cultivars were evaluated for their relative susceptibility to the reniform nematode, *Rotylenchulus reniformis* under greenhouse conditions. The degree of susceptibility was based on number of females per root system of each cultivar. Accordingly, Candle cultivar was categorized as resistant host against the nematode infection and four Cultivars (Global, Lirasol, Tower and Hanna) were considered as moderately resistant hosts. On the other hand, Duplo cultivar was classified as susceptible host and four Cultivars (Canola 103, Loras, Semu DNK 235/84 and Sedo) were ranked as highly susceptible ones against the reniform nematode infection. Therefore, all tested Cultivars showed great variability in their reaction to the nematode infection according to the host type. Finally, the differences among the Cultivars tested should serve as a good resource for plant breeders and cropping systems to limit the loss due to the nematode infection.

Key words: Cultivars, Egypt, oilseed-rape, reniform nematode, screening, *Rotylenchulus reniformis*.

Introduction

Oil consumption in Egypt has been increased at a very rapid rate in the past decade along with the growing population and higher consumption patterns. To produce the local oil requirements there are different alternatives , one of them is importing new oil crops such as spring types of rapeseed (*Brassica napus* L. and *Brassica campestris*), where , these types are important oilseed crops (Miller *et al*., 1962).

Many research workers had reported that oilseed rape is greatly subjected to attack with the root-knot nematode , *Meloidogyne javanica* (Jain , 1978 and Hassan and Jain , 1985) and the cyst nematode , *Heterodera cruciferea* (Evans , 1984).They found that all tested Cultivars of oilseed rape were susceptible to a varying degree to the infection of these nematode species. However , the information on the reniform nematode , *Rotylenchulus reniformis* relationship with oilseed rape crop is very scanty. Hence, the objective of this research was to evaluate some imported oilseed rape Cultivars for *R. reniformis* resistance.

Materials and methods

Seeds of ten imported Cultivars of oilseed-rape (cv. Candle belongs to *Brassica campestris* while , the rest Cultivars belonged to *B. napus*) were planted separately in 15 cm. clay pots filled with sterilized loamy soil. Ten days after germination , plants were thinned to one vigor seedling / pot For each cultivar , sixteen pots with plants similar in their growth were selected. One week later , eight pots were inoculated with 1000 immature females of *R. reniformis* per pot obtained from a pure stock culture by pipetting the inoculum suspension in holes around the base of the seedling. The other pots with disinfected soil served as check. All pots were arranged in the green-house at 20 ± 5 ċ in complete randomized block design. Six weeks after inoculation , tops of the tested plants were cut off and the roots gently washed from the soil. Then , fresh weights of the root and shoot were recorded. The root system of each infected plant was stained in lactophenol acid fuchsin (Franklin and Goody , 1949) and examined for nematodes. The centrifugal flotation technique (Jenkins , 1964) was used for nematode extraction from soil. The obtained data of fresh weights of roots and shoots were analyzed statistically by using t-test The host susceptibility designation was determined according to Nayak *et al*., 1987 as follow: 1-10 females / plant = resistant ; 11-20 females / plant = moderately resistant ; 21-30 females / plant = susceptible and more than 31 females / plant = highly susceptible. The reproduction factor R (Pf / Pi) was calculated where Pf is the average final population of nematodes and Pi is the initial population used as inoculum (Oostenbrink ,1966).

Results and discussion

Data presented in Table (1) indicated that all tested oilseed-rape cultivars were infected with the reniform nematode , *R. reniformis*. Although , the nematode could develop and reproduce on tested cultivars , it governed differently on them. Therefore , the number of nematode in soil per pot , both number of females and eggmasses in roots , as well as the reproduction factor varied greatly according to the host type. Cultivars , Canola 103 , Loras , Semu DNK 235/84 and Sedo were found to be highly susceptible whereas the number of both females and eggmasses in roots recorded the highest values. Cv. Duplo classified as susceptible host to *R. reniformis* infection. The cultivars , Global , Lirasol , Tower and Hanna were ranked as moderately resistant ones whereas these cultivars sustained the modest values of the number of females in roots. On the other hand , cv. Candle reacted as a resistant cultivars since such parameters were in the lowest values. Present results confirm the findings obtained by Routaray *et al*.,1986 and Nayak *et al*.,1987.

Data presented in Table (2) revealed that plant growth response was clearly influenced greatly according to host type. The cultivars , Canola 103 , Sedo , Loras and Semu DNK 235/84 gave the highest percentage of reduction in both shoot and root fresh weights. The moderate and lower percentage of reduction occurred by Hanna , Global , Tower , Lirasol , Duplo and Candle cultivars. It is also notice from the table that the nematode infection induced significant reduction (1% level) in shoot fresh weight of cv. Loras , cv, Sedo and cv. Canola 103 (5% level) when compared with those of the check. However , a significant reduction in root fresh weight at 5% level was recorded between infected and noninfected cultivars of Semu DNK 235/84 , Loras and Sedu.

Generally , these results are in agreement with Riggs and Winstead , 1959 and Renolds *et al*., 1970 who stated that the juveniles entered both resistant and susceptible plants in approximately the same numbers , then the resistant ones prevent the penetrating individuals to reach the mature stages. Fortunately , five out of ten cultivars are regarded to be important in the defence against the nematode infection which could be safely used by the growers and in breeding programs for developing more resistant cultivars to such nematode species.

Table 1: Development and reproduction of *Rotylenchulus reniformis* as influenced by some imported oilseed-rape Cultivars.

Cultivars	Nematode number per plant*			Reproduction factor (Pf / Pi)	Reaction**
	In soil	On roots			
	Juveniles	Females	Eggmasses		
Candle	646	9	4	0.7	R
Hanna	1274	16	28	1.3	MR
Semu DNK235/84	870	41	55	1.0	HS
Tower	944	20	13	1.0	MR
Duplo	936	23	41	1.0	S
Lirasol	520	19	34	0.6	MR
Loras	608	43	52	0.7	HS
Sedo	2110	39	46	2.2	HS
Global	592	20	27	0.6	MR
Canola 103	1600	43	65	1.7	HS

*Average number of eight replicates.

** R (resistant) 1-10 females / plant ; MR (moderately resistant) 11-20 females / plant ; S (susceptible) 21-30 females / plant ; HS (highly susceptible) 31+ females / plant (Nayak *et al*.,1987).

Table 2: Plant growth response of some oilseed rape cultivars as influenced by the infection of *Rotylenchulus reniformis*.

Cultivars	Shoot fresh weight(g)1		Reduction %	Root fresh weight(g)1		Reduction %
	Infected	Non-Infected		Infected	Non-Infected	
Candle	6.8	7.2	5.6	8.2	8.5	3.5
Hanna	9.3	11.3	17.7	11.3	12.2	7.4
SemuDNK235/84	7.3	8.7	16.1	10.7	15.6*	31.7
Tower	5.8	6.7	13.4	9.7	10.5	7.6
Duplo	5.8	6.3	7.9	11.8	13.0	9.2
Lirasol	3.8	4.2	9.5	9.0	10.7	15.9
Loras	8.0	11.5**	30.4	14.0	19.6*	29.5
Sedo	8.7	15.0*	41.8	11.3	18.2*	37.9
Global	5.3	6.2	14.5	8.8	9.7	9.3
Canola 103	5.7	10.5*	46.0	7.2	10.7	32.8

1: Average number of eight replicates.

* , ** Significant at the 0.05 and 0.01 probability levels, respectively.

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