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Reaction of the native Greek tomato varieties 'Chondrokatsari Messinias' and 'Katsari Santorinis' to *Fusarium oxysporum* f. sp. *lycopersici* and *Rhizoctonia solani* infection

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Summary Plants have to cope with a number of biotic stresses among which, infectious diseases. The present study was conducted to investigate the reaction of two native Greek tomato vars, 'Chondrokatsari Messinias' and 'Katsari Santorinis', to infection by *Fusarium oxysporum* f. sp. *lycopersici* and *Rhizoctonia solani*. Disease symptoms, disease incidence and severity were recorded and the effects of infection on the number of flowers, the biomass production (fresh and dry weight), CO_2 assimilation, stomatal conductance and transpiration were also evaluated. Both tomato varieties were susceptible to *F. oxysporum* f. sp. *lycopersici* and *R. solani* infection. However, 'Chondrokatsari Messinias' was found to be less susceptible to *F. oxysporum* f. sp. *lycopersici* compared to 'Katsari Santorinis'. Both pathogens negatively affected biomass production of var. 'Chondrokatsari Messinias' but not that of 'Katsari Santorinis'. The number of flowers produced by 'Chondrokatsari Messinias' was negatively affected by *R. solani* but not by *F. oxysporum* f. sp. *lycopersici*. Infection of both varieties by *R. solani* also caused reduction in the CO_2 assimilation, stomatal conductance and transpiration.

Additional Keywords: dry weight, Fusarium wilt, native tomato varieties, photosynthesis, stem canker, transpiration

Introduction

Native plant varieties have been extensively examined throughout the modern human history (Teshome *et al.,* 1997; Zeven, 1998). Such plant material is usually selected and maintained by traditional farmers as part of their social, economic, cultural and ecological history. Louette *et al.* (1997) described a native variety as a farmer's variety which has not been improved by any formal breeding programme. Native varieties contain much more genetic diversity than modern cultivars or hybrids (Zeven, 1998; Terzopoulos and Bebeli, 2008; Terzopoulos and Bebeli, 2010). Therefore, they are among the most important sources of genetic variation for breeders. So far, a large number of native varieties grown in the Mediterranean region have been morphologically and genetically studied (Terzopoulos and Bebeli, 2008; Mazzucato *et al.,* 2010; Cebolla-Cornejo *et al.,* 2013; Corrado *et al.,* 2014). For example, seven out of 33 native Greek tomato varieties comprise 27 different morphotypes (Terzopoulos and Bebeli, 2008). However, most of them have not yet been genetically classified or morphologically described.

Plants have to cope with a number of biotic and abiotic stresses during their growth and development (Kai *et al.,* 2007). Fusarium wilt diseases, caused by the pathogenic soil-inhabiting fungus *Fusarium oxysporum* Schlectend.:Fr., can cause severe losses in a wide range of cultivated and non-cultivated plants (Larkin *et al.,* 1998). On tomato, two forms of the pathogen, *F. oxysporum* f. sp. *lycopersici* W.C. Snyder & H.N. Hans. and *F. oxysporum* f. sp. *radicis-lycopersici* W.R. Jarvis & Shoemaker, cause two symptomatologically distinct diseases, i.e. vascular wilt and crown and root rot, respectively. *F. oxysporum* f. sp. *lycopersici* invades the vascular system of the plant through natural openings or damaged tissue of the roots (Bishop and Cooper, 1983; Agrios, 1997; Di Pietro *et al.,*

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2003). Initial symptoms of Fusarium wilt are described as vein clearing of the younger leaves and leaf epinasty, followed by stunting, yellowing of the lower leaves, progressive wilting of leaves and stem, defoliation and finally plant death. In cross-sections of the stem, a brown ring is evident in the area of the vascular bundles (Bishop and Cooper, 1983; Di Pietro *et al.,* 2003).

The soil-borne pathogen *Rhizoctonia solani* Kühn [teleomorph: *Thanatephorus cucumeris* (A.B. Frank) Donk] causes serious damage to many economically important horticultural crops (Baker, 1970; Anderson, 1982; Sneh *et al.,* 1996). In the past few years, the importance of the disease caused by this pathogen has increased dramatically in Europe (Grosch *et al.,* 2005). *R. solani* strains occur ubiquitously and are either saprophytic or pathogenic to more than 500 plant species. Damping-off diseases caused by *R. solani* in greenhouse-grown vegetables are commonly encountered (Lumsden and Locke, 1989). Symptoms develop as dark brown to black cankers on the base of the plant, which increase in size over time resulting in plant collapse (Baker, 1970; Agrios, 1997).

No information is available in the literature with respect to the reaction of the native Greek tomato varieties 'Chondrokatsari Messinias' and 'Katsari Santorinis' to the infection by soil-borne fungal pathogens or on the effects of infection on plant growth and development. The objectives of the present study were to investigate *F. oxysporum* f. sp. *lycopersici* and *R. solani* infection process on the native tomato vars 'Chondrokatsari Messinias' and 'Katsari Santorinis', record the symptomatology of the diseases and correlate disease intensity (incidence and severity) with plant growth decline after infection.

Materials and Methods

Plant material, cultivation practices and experimental design

Untreated tomato (*Lycopersicon esculentum* L.) seeds of vars 'Chondrokatsari Messinias' and 'Katsari Santorinis' obtained from local growers were sown in 60 × 20 cm plastic trays (INA plastics, Athens, Greece) filled with sterile white peat moss (TS2 Klasmann-Deilmann, Geeste, Germany; pH 6.0). Tomato seedlings were grown inside a non-heated greenhouse located at the premises of the Technological Educational Institute of Peloponnese (lat. 37° 20′ 20′′N, long. 22° 60′ 51′′E) for 35 d and until they reached the 4-true-leaf stage (approx. 30 cm in height). The young plants were then transplanted individually into 5 lt plastic pots filled with a mixture of white peat moss (TS2 Klasmann-Deilmann, Geeste, Germany; pH 6.0) and perlite (Perloflor, Isocon SA, Athens, Greece) at 1:1 (v/v). The pots were then placed on aluminium benches (0.2 m width x 15 m length x 0.5 m height) in a non-heated greenhouse in a completely randomised design. Standard cultivation practices, such as plant tie-up, irrigation and fertilization, were applied to all plants. The nutrient solution used for the fertilization of the plants consisted of (in mmol/lt) 5.10 Ca^{2+}, 2.40 Mg^{2+}, 7.00 K^{+}, 1.50 NH_4^+, 3.60 SO_4^{2}, 14.30 NO_3^-, 1.50 $H_2PO_4^-$ and (in µmol/lt) 20 Fe 10 Mn, 5 Zn, 0.80 Cu, 35 B and 0.5 Mo. Electrical conductivity (EC) and pH of the nutrient solution ranged between 2.4-2.5 mS/cm and 5.8-6.0, respectively. Three hundred ml of the nutrient solution was provided to the plants every two days during the experimental period.

Two individual experiments, Experiment 1 and Experiment 2, were conducted starting out at the end of February 2015 and finishing 95 d later. In Experiment 1, tomato plants of vars 'Chondrokatsari Messinias' and 'Katsari Santorinis' were challenged with *F. oxysporum* f. sp. *lycopersici,* whereas in Experiment 2, the same varieties were challenged with *R. solani*. In each experiment, six plants per variety and time of assessment [i.e. 40 or 60 days post inoculation (dpi)] were used as replicates.

Pathogen isolates, inoculum preparation and plant inoculation

For the inoculation of experimental plants, strain BPIC2550 of *F. oxysporum* f. sp. *lycopersici* isolated from tomato plants (*Lyc-*

opersicon esculentum L.) and strain BPIC2531 of *R. solani* isolated from potato plants (*Solanum tuberosum* L.) were used. Both strains were provided by the Benaki Phytopathological Institute (Kifissia, Athens, Greece).

Tomato plants at the stage of 4 true leaves (approx. 30 cm in height) were inoculated with *F. oxysporum* f. sp. *lycopersici* by applying a conidial suspension at the basal stem-end of each plant (Dhingra and Sinclair 1995; Akköprü and Demir, 2005). The fungal inoculum was prepared as follows: initially the fungus was cultured on potato dextrose agar (PDA, Oxoid Ltd., Basingstoke, Hampshire, UK) medium in Petri plates at 26°C in the dark for 12 d. The conidial suspension, which consisted of both micro- and macroconidia, was prepared by pouring 20 ml of sterile distilled water containing 0.01% Tween 80 (Sigma, St. Louis, USA) in each plate. The conidia were dislodged by gently rubbing the fungal colony surface with a sterile razor blade. The suspension was filtered through two layers of fine, nylon, sterile cheesecloth to remove mycelia. The final conidial concentration was adjusted to 4.5 x 10^6 conidia/ml using a haemocytometer. Twenty ml of the conidial suspension were applied to each plant approx. 3 cm below the surface of the growing substrate and at a contact with the stem base using a 5 ml plastic syringe (i.e. 4 applications around the plant stem) without wounding the roots (Akköprü and Demir, 2005). Control plants were treated with 20 ml of sterile distilled water.

Tomato plants at the stage of 4 true leaves (approx. 30 cm in height) were inoculated with *R. solani* using mycelium plugs (Dhingra and Sinclair, 1995). Initially, *R. solani* cultures were prepared by placing mycelium plugs cut from the edges of 12-d-old cultures at the centre of PDA (Oxoid Ltd., Basingstoke, Hampshire, UK) plates. The inoculated plates were incubated at 25°C for 12 d in the dark. Mycelium plugs, 5 mm in diameter, were then cut from the edges of the growing colonies using a cork borer. Inoculation of tomato plants was carried out by placing three, 5 mm in diameter, mycelium plugs 3 cm below the surface of the growing substrate and at a distance of approximately 1 cm from the stem base. Control plants were treated with non-inoculated PDA plugs.

Disease assessments

In both experiments, disease symptoms were recorded 40 and 60 dpi. In Experiment 1, disease severity index (DSI) and disease incidence (DI) on tomato plants inoculated with *F. oxysporum* f. sp. *lycopersici* were assessed on the root system and stem base. DSI was determined using the arbitrary scale of: 0: no symptoms, 1: 1% of roots with symptoms, 2: >1-5% of roots with symptoms, 3: 6-10% of roots with symptoms, and 4: >10% of roots with symptoms. DI was calculated according to the following formula:
Disease incidence (DI) = (number of symptomatic plants/total number of inoculated plants) x 100 (1)

In Experiment 2, DI, number of cankers (CN) and average canker diameter (ACD) were recorded. DI was calculated according to formula (1) above. Canker diameter was measured in cm using a digital micrometer (Stock No. 600-880, Mitutoyo, Japan).

Biomass production, number of flowers and physiological parameters of tomato plants

Plant biomass production was recorded 40 and 60 dpi. Prior to assessment, the growing substrate was completely removed by gentle washing the root system of the plants under running tap water. Biomass was determined by measuring the fresh weight (FW; gr) of the aerial plant parts (i.e. stems, leaves and inflorescences) and the root system using a digital balance (Kern & Sohn GmbH, Balingen, Germany). Then, the same plant parts were dried separately in an oven (Daihan Labtech Co. Ltd, Gagok-ri, Korea) at 75°C for 72 h and the dry weights (DW; gr) were also measured. The number of flowers was recorded once every week (total of eight counts over the 60 dpi period).

The physiological parameters of CO_2 assimilation (A_s; µmol $CO_2/m^2/s$), stomatal conductance (g_s; mmol/m^2/s) and transpiration (E; mmol/m^2/s) were recorded 16 and 27 dpi

at anthesis and fruit set, respectively. A_s, g_s and *E* were measured using a LC*pro*+ portable photosynthesis system (ADC BioScientific Ltd. Great Amwell, Herts, UK). Recordings were made between 10:00 and 12:00 a.m on fully expanded young leaves of similar size. Photosynthetic photon flux density (PPFD) in the leaf chamber was set at 1100 μmol/m^2/sec with a halogen lamp at 25°C, while CO_2 reference ranged between 380 and 437 ppm.

Statistical analysis

Both experiments were factorial with variety and time of assessment (i.e. dpi) as the main factors. Experimental data were subjected to one-way ANOVA and means were separated using the Duncan's multiple range test at $P = 0.05$. Prior to analysis, DI percentage data were transformed to logarithmic values (i.e. Log_{10}) to highlight significant differences between means, although, the untransformed data are presented in the tables. Scale data of DSI were analysed using the Kruskal-Wallis non-parametric test. Statistical analysis was performed with SPSS for Windows, Version 12.0 (Chicago, SPSS Inc., USA).

Results and Discussion

Disease symptoms

F. oxysporum f. sp. *lycopersici* infected the root and the vascular system of tomato vars 'Chondrokatsari Messinias' and 'Katsari Santorinis' (Figure 1). No visual symptoms were observed on the experimental plants 40 dpi. However, tomato plants of 'Chondrokatsari Messinias' and, to a lesser extent, 'Katsari Santorinis' showed a limited degree of leaf epinasty and leaf yellowing 60 dpi. Di Pietro *et al.* (2003) described the symptoms caused on tomato plants infected by *F. oxysporum* as leaf epinasty, followed by stunting, yellowing of the lower leaves, progressive wilting, defoliation and finally plant death. In the present study, symptoms were also observed on the surface of the roots as dark brown to black, necrotic, circular or irregular lesions (Figure 1A). According to Olivain and Alabouvette (1999), *F. oxysporum* f. sp. *lycopersici* was able to perform a vascular infection of tomato root tissue producing lesions on the roots. However, these lesions had limited expansion probably due to intense defense reactions occurring in the superficial cell layers (Olivain and Alabouvette, 1999). Brown discoloration of the vascular system of the plants was also observed in the present study indicating colonization of xylem vessels by the pathogen (Figure 1B). This is considered a typical symptom of infection of tomato plants by *F. oxysporum* f. sp. *lycopersici* following root tissue penetration and colonization of the vascular system by the pathogen (Bishop and Cooper, 1983; Agrios, 1997; Olivain and Alabouvette, 1999).

R. solani infected the plants of both varieties at the stem base (Figure 2). Symptoms were recorded as volcano-like cankers of various sizes, with a brown centre and dark brown to black margin (Figure 2A). Cankers increased in size with time resulting in plant collapse 40 dpi (Figure 2B). Usually, *R. solani* infection progresses quickly, especially when conditions are favourable (i.e. low temperatures and increased soil humidity) (Baker, 1970; Agrios, 1997).

Disease assessments

DSI on tomato plants of vars 'Chondrokatsari Messinias' and 'Katsari Santorinis' inoculated with *F. oxysporum* f. sp. *lycopersici* was low and ranged between 0.5 and 2.5 (on a 0-4 scale). In general, DSI and DI did not significantly ($P < 0.05$) increase with time (from 40 to 60 dpi) with the exception of DSI on var. Katsari Santorinis (Table 1). More specifically, DSI on 'Katsari Santorinis' increased by 5-fold from 40 to 60 dpi (Table 1).

In general, CN, ACD and DI on 'Chondrokatsari Messinias' and 'Katsari Santorinis' tomato plants inoculated with *R. solani* significantly ($P < 0.05$) increased with time (from 40 to 60 dpi) with the exception of CN on 'Katsari Santorinis' (Table 2). More specifically, CN, ACD and DI on 'Chondrokatsari Messinias' increased with time by 7-, 23- and 67%, respectively (Table 2). ACD on var. 'Katsari Santorinis' increased by 4-fold from

40 to 60 dpi. Nevertheless, 40 dpi, all experimental plants of var. 'Katsari Santorinis' showed disease symptoms (DI=100%) (Table 2).

Based on the above-mentioned results, var. 'Katsari Santorinis' was found to be more susceptible to *F. oxysporum* f. sp. *lycopersici* infection compared to 'Chondrokatsari Messinias', as the former showed significantly ($P < 0.05$) higher disease levels 60 dpi compared to the latter (Table 1). The results of the present study also showed that, 60 dpi, vars 'Chondrokatsari Messinias' and 'Katsari Santorinis' showed similar susceptibility to infection by *R. solani* (Table 2).

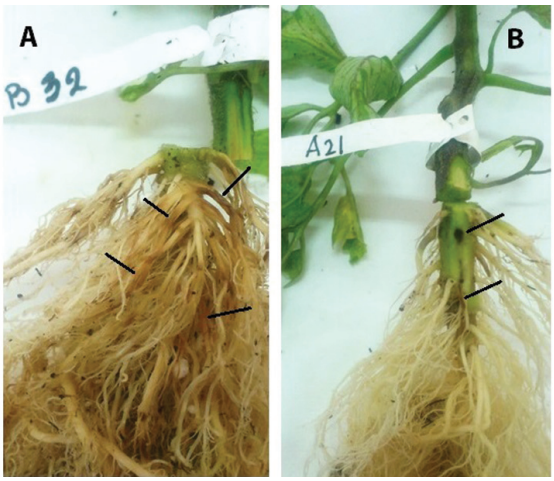

Figure 1. Light to dark brown lesions (arrows) on roots of 'Katsari Santorinis' tomato plants (A) and discoloration (arrows) of the vascular system of 'Chondrokatsari Messinias' tomato plants (B) inoculated with *Fusarium oxysporum* f. sp. *lycopersici* 60 dpi.

Effects of *F. oxysporum* f. sp. *lycopersici* infection of tomato plants on biomass production, number of flowers A_s, g_s and *E*

The results of the present study showed that FW and DW of the aerial parts of var. 'Chondrokatsari Messinias' inoculated with *F. oxysporum* f. sp. *lycopersici* were significantly ($P < 0.05$) lower compared to those of the control plants 60 dpi (Figure 3). However, FW

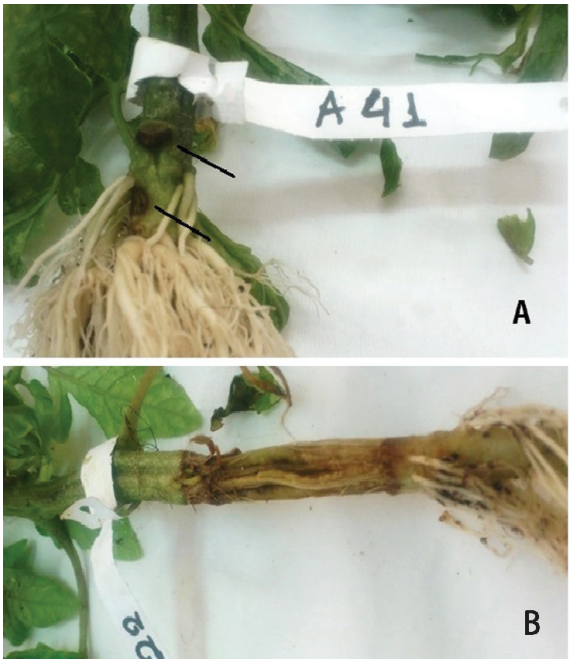

Figure 2. Dark brown cankers (arrows) on the stem base of 'Chondrokatsari Messinias' tomato plants as a result of their infection by *Rhizoctonia solani* (A) 60 dpi. Collar rot symptoms on 'Katsari Santorinis' tomato plants inoculated with *R. solani* (B).

Table 1. Disease severity index (DSI; scale 0–4) and disease incidence (DI; % plants with symptoms) on tomato plants of vars 'Chondrokatsari Messinias' and 'Katsari Santorinis' inoculated with *Fusarium oxysporum* f. sp. *lycopersici.* DSI and DI are means of six replicates and were recorded 40 and 60 days post- inoculation (dpi). Means followed by different letters are statistically different according to the Duncan's Multiple Range test ($P = 0.05$)).

Variety	Treatment	DSI (scale 0–4)		DI (%)	
		dpi			
		40	60	40	60
'Chondrokatsari Messinias'	Control	0	0	0	0
	F. oxysporum f. sp. *lycopersici*	0.67 a	1.00 a	33 a	50 a
'Katsari Santorinis'	Control	0	0	0	0
	F. oxysporum f. sp. *lycopersici*	0.50 a	2.50 b	67 ab	100 b

Table 2. Number of cankers (CN), average canker diameter (ACD; cm) and disease incidence (DI; % plants with symptoms), on tomato plants of vars 'Chondrokatsari Messinias' and 'Katsari Santorinis' inoculated with *Rhizoctonia solani*. CN, ACD and DI are means of six replicates and were recorded 40 and 60 days post inoculation (dpi). Means followed by different letters are statistically different according to the Duncan's Multiple Range test ($P = 0.05$).

Variety	Treatment	CN		ACD (cm)		DI (%)	
		dpi					
		40	60	40	60	40	60
'Chondrokatsari Messinias'	Control	0	0	0	0	0	0
	R. solani	0.67 a	4.67 b	0.13 a	3.00 bc	33 a	100 b
'Katsari Santorinis'	Control	0	0	0	0	0	0
	R. solani	3.00 b	4.50 b	1.00 ab	4.00 c	100 b	100 b

and DW of the root system of 'Chondrokatsari Messinias' were not significantly affected by the infection of the pathogen. Infection of var. 'Katsari Santorinis' by *F. oxysporum* f. sp. *lycopersici* did not significantly ($P < 0.05$) affect FW and DW of the aerial parts and the root system of the experimental plants (Figure 3).

The number of flowers of 'Katsari Santorinis' plants inoculated with *F. oxysporum* f. sp. *lycopersici* was significantly ($P < 0.05$) lower compared to that of the control plants (Table 3). However, *F. oxysporum* f. sp. *lycopersici* did not significantly affect the number of flowers of var. 'Chondrokatsari Messinias' (Table 3).

A_s, g_s and E of both tomato varieties were not significantly ($P < 0.05$) affected by *F. oxysporum* f. sp. *lycopersici* infection (Table 3). Pshibytko *et al.* (2006) showed that Fusarium wilt led to suppression of the photosynthetic activity of 4- to 6-month-old tomato plants of var. Kunera. Although, only in the case of a slowly developed pathogen could damage the photosystem. Significant differences in A_s, g_s and E between tomato plants inoculated with *F. oxysporum* f. sp. *lycopersici* and the non-inoculated controls were reported by Lorenzini *et al.* (1997). A_s, g_s and E, were negatively affected by *F. oxysporum* f. sp. *lycopersici* infection and correlations were made between the time post-inoculation (i.e. dpi) and the values of A_s, g_s and E. As dpi increased, A_s, g_s and E were reduced (Lorenzini *et al.,* 1997). In the present study, A_s, g_s and E were measured earlier (i.e. 16 and 27 dpi) than DS and DI (i.e. 40 and 60 dpi). Even at 40 dpi, DSI and DI on both varieties were very low (Table 1) which may explain the insignificant effect of *F. oxysporum* f. sp. *lycopersici* infection on A_s, g_s and E.

Effects of *R. solani* infection of tomato plants on biomass production, number of flowers A_s, g_s and E

FW and DW of the aerial parts of var. 'Chondrokatsari Messinias' inoculated with *R. solani* were significantly ($P < 0.05$) lower compared to those of the control plants 60 dpi (Figure 4). However, *R. solani* did not significantly affect FW and DW of the aerial parts of var. 'Katsari Santorinis' even 60 dpi (Figure 4). No significant ($P < 0.05$) differences in FW and DW of roots were observed 60 dpi between the inoculated plants of both varieties and the controls (Figure 4).

The number of flowers of var. 'Chondrokatsari Messinias' inoculated with *R. solani* was significantly ($P < 0.05$) lower compared to the controls (Table 4). However, tomato plants of var. 'Katsari Santorinis' inoculated with *R. solani* produced significantly ($P < 0.05$) more flowers than the control plants (Table 4).

A_s, g_s and E of both tomato varieties inoculated with *R. solani* were significantly ($P < 0.05$) lower than those of the control plants (Table 4).

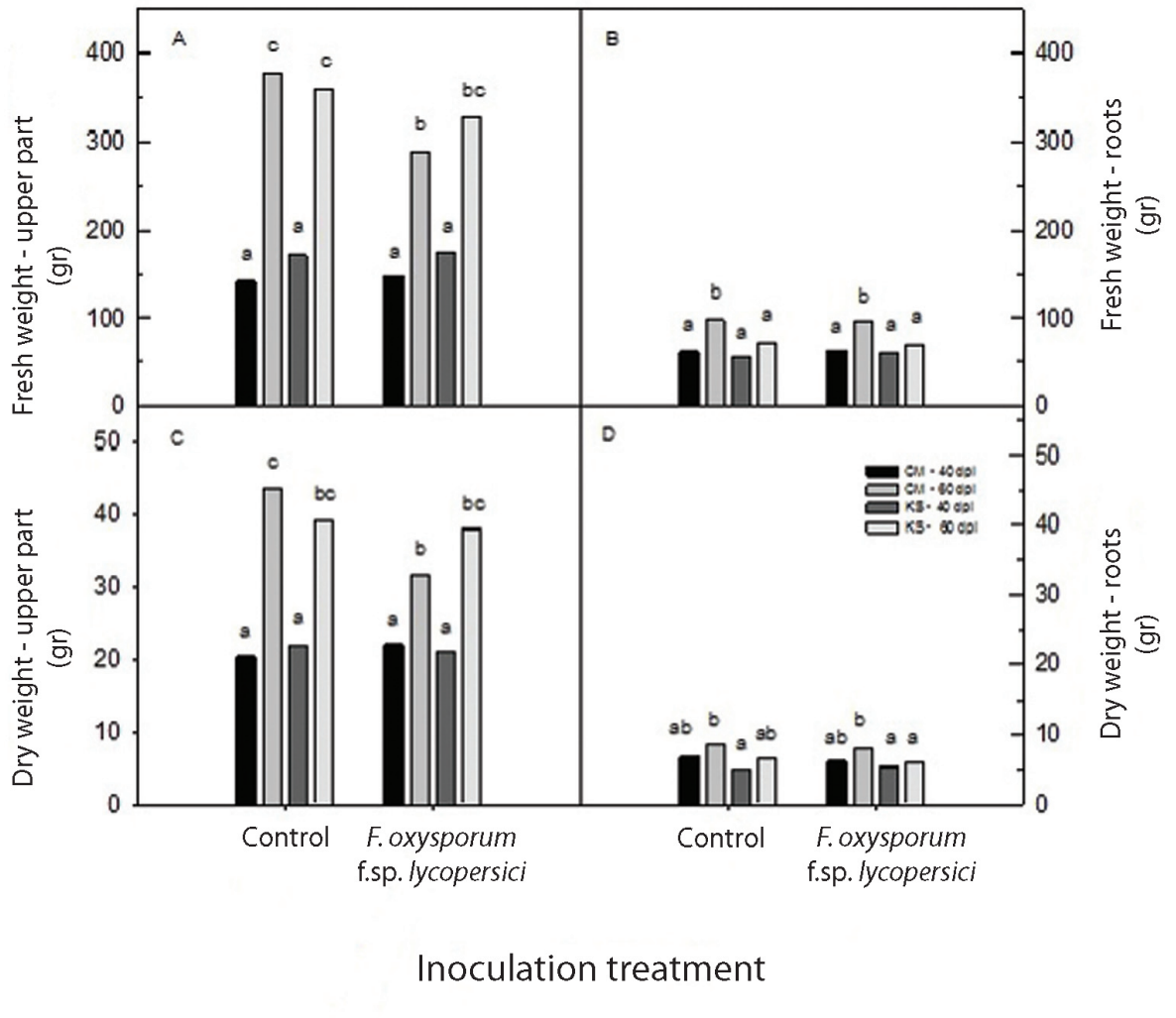

Figure 3. Fresh weight (FW) and dry weight (DW) of the aerial parts (A, C) and the root system (B, D) of 'Chondrokatsari Messinias' (A, B) and 'Katsari Santorinis' (C, D) tomato plants inoculated with *Fusarium oxysporum* f. sp. *lycopersici*. Data are means of six replicates. FW and DW were measured 40 and 60 dpi. Columns followed by different letters are statistically different according to the Duncan's Multiple Range test ($P = 0.05$).

Table 3. Effect of *Fusarium oxysporum* f. sp. *lycopersici* on the number of flowers, CO_2 assimilation (A_s), stomatal conductance (g_s) and transpiration (E) of tomato plants of vars 'Chondrokatsari Messinias' and 'Katsari Santorinis'. Data are means of six replicates and were recorded 16 and 27 dpi. Means followed by different letters are statistically different according to the Duncan's Multiple Range test ($P = 0.05$).

Variety	Treatment	Variables			
		Number of flowers	A_s (μmol CO_2/m²/s)	g_s (mmol /m²/s)	E (mmol /m²/s)
'Chondrokatsari Messinias'	Control	0.65 a	9.60 a	0.23 ab	2.58 ab
	F. oxysporum f. sp. *lycopersici*	1.68 a	8.84 a	0.21 a	2.36 a
'Katsari Santorinis'	Control	8.85 c	10.43 a	0.32 b	2.98 b
	F. oxysporum f. sp. *lycopersici*	5.00 b	9.89 a	0.30 b	3.32 b

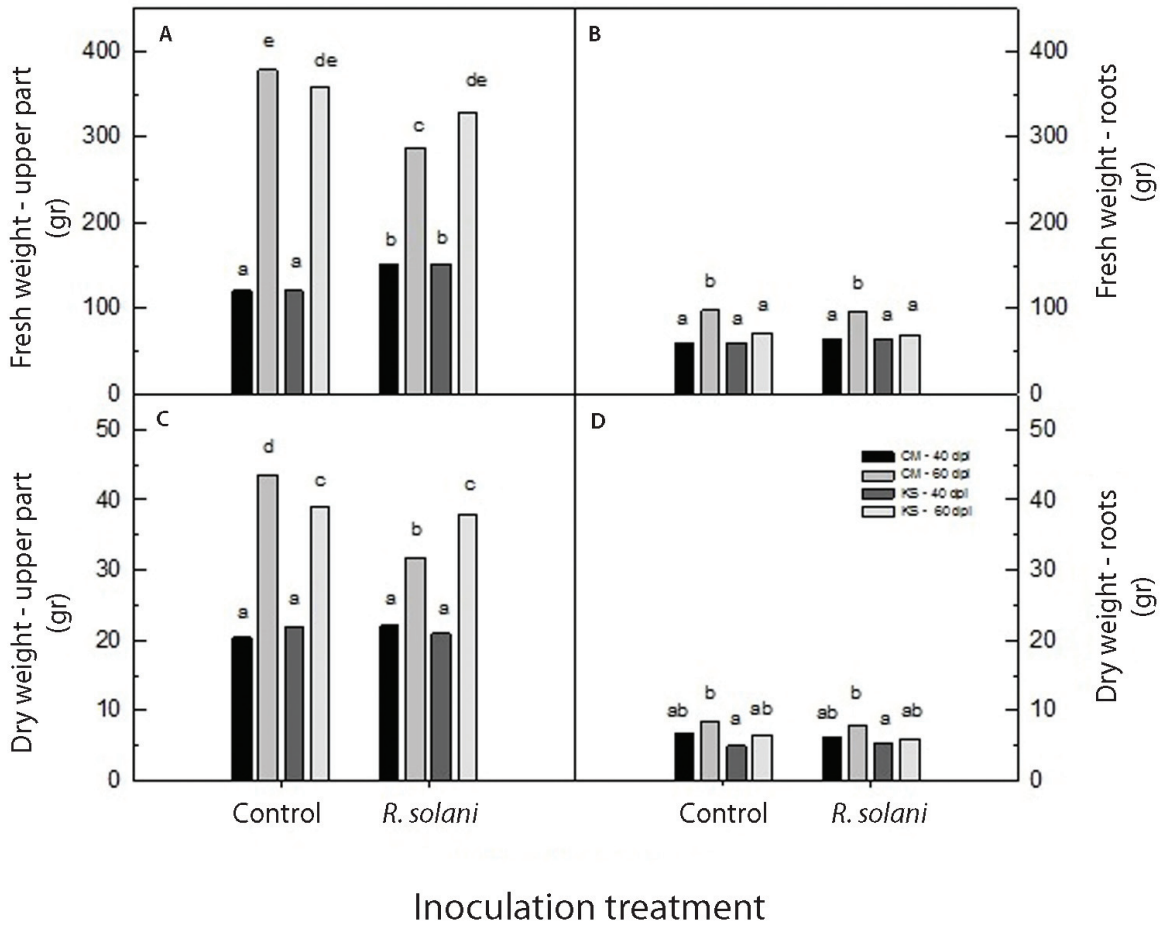

Figure 4. Fresh weight (FW) and dry weight (DW) of the aerial parts (A, C) and the root system (B, D) of 'Chondrokatsari Messinias' (A, B) and 'Katsari Santorinis' (C, D) tomato plants inoculated with *Rhizoctonia solani*. Data are means of six replicates. FW and DW were measured 40 and 60 dpi. Columns followed by different letters are statistically different according to the Duncan's Multiple Range test ($P = 0.05$).

Table 4. Effect of *Rhizoctonia solani* on the number of flowers, CO_2 assimilation (A_s), stomatal conductance (g_s) and transpiration (E) of tomato plants of vars 'Chondrokatsari Messinias' and 'Katsari Santorinis'. Data are means of six replicates and were recorded 16 and 27 dpi. Means followed by different letters are statistically different according to the Duncan's Multiple Range test ($P = 0.05$).

Variety	Treatment	Variables			
		Number of flowers	A_s (μmol CO_2/m²/s)	g_s (mmol/m²/s)	E (mmol/m²/s)
'Chondrokatsari Messinias'	Control	2.40 b	9.08 b	0.19 bc	2.77 b
	R. solani	1.55 a	7.80 a	0.15 a	2.30 a
'Katsari Santorinis'	Control	7.95 c	11.01 c	0.23 c	3.01 c
	R. solani	8.80 d	8.35 ab	0.18 ab	2.50 ab

Conclusions

The present study was the first attempt to investigate the reaction of two native Greek tomato varieties, 'Chondrokatsari Messinias' and 'Katsari Santorinis', to infection by *F. oxysporum* f. sp. *lycopersici* and *R. solani*. Results showed that both tomato varieties were susceptible to *F. oxysporum* f. sp. *lycopersici* and *R. solani* infection. However, 'Chondrokatsari Messinias' was found to be less susceptible to *F. oxysporum* f. sp. *lycopersici* compared to 'Katsari Santorinis'. Both of the pathogens negatively affected biomass production of var. 'Chondrokatsari Messinias' but not that of 'Katsari Santorinis'. The number of flowers produced by 'Chondrokatsari Messinias' was negatively affected by *R. solani* but not by *F. oxysporum* f. sp. *lycopersici*. Infection of both tomato varieties by *R. solani* also caused reduction in the CO_2 assimilation, stomatal conductance and transpiration.

Additional work is required on the interaction between the two native Greek tomato vars 'Chondrokatsari Messinias' and 'Katsari Santorinis' and the soil-borne fungi *F. oxysporum* f. sp. *lycopersici* and *R. solani* as well as on the management of the diseases caused by these pathogens.

The Benaki Phytopathological Institute is gratefully acknowledged for providing the strains of Fusarium oxysporum f. sp. lycopersici (BPIC2550) and Rhizoctonia solani (BPIC2531) used in the present study.

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Προσβολή φυτών τομάτας των Ελληνικών παραδοσιακών ποικιλιών 'Χοντροκατσαρή Μεσσηνίας' και 'Κατσαρή Σαντορίνης' από τους μύκητες *Fusarium oxysporum* f. sp. *lycopersici* και *Rhizoctonia solani*

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Περίληψη Τα φυτά συχνά πρέπει να αντιμετωπίσουν καταπονήσεις που οφείλονται σε βιοτικούς παράγοντες μεταξύ των οποίων είναι και οι ασθένειες. Η παρούσα μελέτη πραγματοποιήθηκε με σκοπό να εξετάσει την αντίδραση δύο Ελληνικών παραδοσιακών ποικιλιών τομάτας, της 'Χοντροκατσαρής Μεσσηνίας' και της 'Κατσαρής Σαντορίνης', στην προσβολή από τους μύκητες *Fusarium oxysporum* f. sp. *lycopersici* και *Rhizoctonia solani*. Καταγράφηκαν τα συμπτώματα και η ένταση κάθε ασθένειας και εκτιμήθηκε η επίδραση των προσβολών στην παραγωγή βιομάζας, στον αριθμό των ανθέων, στη φωτοσυνθετική δραστηριότητα, στη στοματική αγωγιμότητα και στη διαπνοή των φυτών. Και οι δύο ποικιλίες ήταν ευπαθείς στη μόλυνση από τους μύκητες *F. oxysporum* f. sp. *lycopersici* και *R. solani.* Εντούτοις η ποικ. 'Χοντροκατσαρή Μεσσηνίας' ήταν λιγότερο ευπαθής στην προσβολή από το μύκητα *F. oxysporum* f. sp. *lycopersici* σε σχέση με την 'Κατσαρή Σαντορίνης'. Και τα δύο παθογόνα επηρέασαν αρνητικά την παραγωγή βιομάζας των φυτών της ποικ. 'Χοντροκατσαρή Μεσσηνίας' αλλά όχι της ποικ. 'Κατσαρή Σαντορίνης'. Ο αριθμός των ανθέων της ποικ. 'Χοντροκατσαρή Μεσσηνίας' επηρεάστηκε αρνητικά από την προσβολή από το μύκητα *R. solani* αλλά όχι από τον *F. oxysporum* f. sp. *lycopersici*. Η προσβολή από το μύκητα *R. solani* είχε ως αποτέλεσμα τη μείωση της φωτοσυνθετικής δραστηριότητας, της στοματικής αγωγιμότητας και της διαπνοής των φυτών και των δύο ποικιλιών.

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