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Determination of fungal root and stem rot agents of melons grown in Kumluca/Antalya

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ABSTRACT

Kumluca has an important place in terms of greenhouse vegetable cultivation. Melon is among one of the main vegetables grown in the district on about 3200 decare of land. Various diseases cause decrease in the yield and quality of melons grown undercover in Türkiye. Among them, Fusarium wilt and gummy stem blight diseases especially have caused significant losses in recent years. In this research, the incidence and severity of the root and stem rot disease in Kumluca were determined by surveys made in 72 melon greenhouses in this area. Plant and soil samples were taken to the laboratory and isolations were made. As a result, *Fusarium oxysporum* and *Didymella bryoniae* were the most frequently isolated pathogens from the plant samples, followed by other *Fusarium* species. Fungi with the highest isolation frequency from the soil samples were *Fusarium* spp., *Rhizoctonia solani* and *Macrophomina phaseolina*. In the pathogenicity test, *F. oxysporum*, *F. solani*, *F. verticillioides*, *M. phaseolina* and *R. solani* isolates caused severe symptoms on melon seedlings. Virulence of the *F. oxysporum* isolates on different cucurbit species was also investigated and it was determined that they caused severe wilting on melon and watermelon seedlings, while symptoms on squash and cucumber were moderate or slight. Additionally, reactions of five melon cultivars (Yusufbey, Çıtırex, Niovi, Ferdevs and Memory) commonly grown in the region against *D. bryoniae* were investigated using randomly selected four pathogen isolates. All the cultivars were susceptible to the disease.

1. Introduction

Melon (*Cucumis melo* L.) is one of the most popular fruit vegetable crops, belonging to the *Cucurbitaceae* family. It is thought to have originated from Africa, but today it is cultivated all over the world. It is known to have many health benefits, such as skin beauty, regulation of blood flow, recovery from diarrhea, etc. (Goutam et al. 2020). Türkiye is the largest melon producer in Europe and the second largest producer in the world after China, with 1724860 tonnes production on 76129 hectares of land (FAO 2020). Melon cultivation is performed in Central Anatolia, Aegean, Southeastern Anatolia, Mediterranean, Marmara, Eastern Anatolia and Black Sea regions (Ünlü et al. 2017). The Kumluca district of Antalya province is an important area in terms of vegetable production and many types of vegetables are grown. Melon cultivation is third after pepper and tomato, on approximately 3260 decare of land (Anonymous 2021). Fungal pathogens are especially important among the factors causing losses in melon production. *Didymella bryoniae*, *Fusarium* spp., *Macrophomina phaseolina*, *Monosporascus cannonballus*, *Podosphaera xanthii*, *Pythium* spp., *Rhizoctonia solani* and *Verticillium dahliae* are among the most common fungal pathogens isolated from melons (Reuveni et al. 1982; Aegerter et al. 2000; Santos et al. 2017).

In this study, surveys were performed in the melon growing areas of the Kumluca district of Antalya province and plant and soil samples were collected. Fungal agents causing root and stem rot on melon plants were isolated from the samples identified according to their cultural and morphological features. Virulence of the isolates on melon and other cucurbit seedlings were determined by pathogenicity tests. In addition, reactions of commonly grown melon cultivars against *D. bryoniae* which was the most common pathogen in the region, were determined.

2. Materials and Methods

2.1. Survey studies

During surveys made in the melon growing areas in Kumluca, in the 2019-2020 and 2020-2021 vegetation periods, 73 randomly selected melon greenhouses were investigated for root and stem rot symptoms and isolations were made from the plant and soil samples. In the greenhouses, 100 randomly selected melon plants were examined among approximately 2500 plants in each greenhouse with 1 decare of land, to determine disease incidence and severity rates (%). Disease severity on melon plants was scored by using 0-4 scale modified from Santos et al. (2017), where; 0: no visible symptoms, 1: <1 cm diameter soaked lesion on the plant stem or slight wilting, 2: >1 cm diameter soaked lesion on the plant stem or moderate wilting, 3: partially necrotic lesion on the plant stem, with severe wilting of the plant, and 4: complete necrosis with total

wilting and plant death. Disease severity rates were calculated with the Townsend and Heuberger (1943) formula. Mean rate and severity of the disease in the melon production areas were also calculated (Bora and Karaca 1970).

2.2. Isolation and identification of the pathogens

Isolations were made by transferring small plant samples including healthy and symptomatic tissues to Petri dishes with water agar (WA) or potato dextrose agar (PDA, Biolife-Italy), after surface disinfection with 1% NaOCl solution. Cultures with plant samples were incubated in a climatic chamber with 22±2ºC temperature and a photoperiod of 12 hours light-dark. Baiting technique was used for the isolations made from the soil samples. Sterile wild oat stem pieces of about 2 cm long were buried into soil samples in plastic pots and incubated for two days at room temperature, under plastic cover in order not to become dry. After incubation, oat stem pieces were surface sterilized and transferred to 1.5% WA amended with 10% lactic acid (3 ml l^{-1}). Growing hyphal tips were transferred to PDA to obtain pure cultures (Erper et al. 2008). Fungi were identified according to their cultural and morphological features (Watanabe 2002; Keinath et al. 1995).

Synthetic nutrient agar (SNA) and potato sucrose agar (PSA) were used for the identification of *Fusarium* species (Booth 1971). To verify the identification of *F. oxysporum* isolates, one isolate (KUM8-1) used in the pathogenicity test was sent to the Centre for Implementation and Research of Plant Health Clinic, Hatay Mustafa Kemal University, for molecular identification. Special primers for translation elongation factor 1-alpha (EF) gene region were used and sequences were compared with those in the GeneBank. Later the isolate was tested by qPCR, using specific primers for *F. oxysporum* f. sp. *melonis*, in the Molecular Biology Laboratory of Plant Protection Department, Faculty of Agriculture, Isparta Applied Sciences University.

2.3. Determination of the virulence of the isolates

The virulence of the selected *Fusarium* isolates on melon seedlings was determined by pot trials. In the pathogenicity trial, 16 *F. oxysporum*, 1 *F. solani*, 1 *F. semitectum*, 3 *F. equiseti*, 2 *F. verticillioides* isolates were used. Isolates were grown on SNA for seven days and spore suspensions with 10^6 conidia/ml were prepared. Melon seedlings (cv. Çıtırex) were inoculated with the isolates by the root dipping method. Disease severity was determined 7, 14 and 21 days after inoculations, by using a 0-4 scale, where 0 means healthy plant and 4 totally wilted or dead plant (Zhao et al. 2014). To determine the virulence of *M. phaseolina* and *R. solani* isolates, wheat seed inoculum of the pathogens were used. A hundred grams of wheat seeds autoclaved with 200 ml water were inoculated with 8 mm diameter agar discs taken from the 4 days old pathogen cultures. After 30 days incubation, the seeds were transferred into the soil around the roots of seedlings (Zhang et al. 2014).

2.4. Determination of the virulence of Fusarium oxysporum isolates on cucurbits

The virulence of the *F. oxysporum* isolates on melon (cv. Niovi), watermelon (cv. Crimson Sweet), squash (cv. Amelthee) and cucumber (cv. PTK 40) plants were determined by the root dipping method, using 32 isolates. Disease severity was determined 7, 14 and 21 days after inoculation by using a 0-4 scale as mentioned above (Zhao et al. 2014).

2.5. Determination of the reactions of some melon cultivars against Didymella bryoniae

Reactions of 5 commercial melon cultivars commonly grown in the region (Yusufbey, Çıtırex, Niovi, Ferdevs ve Memory), against 4 randomly selected *D. bryoniae* isolates (HV7-2, KUM6-2, SAR4-1-1, SAR2-2-3) were investigated. Melon seedlings used in the experiment were transferred to plastic pots with a sterile soil mixture. Agar pieces with pathogen mycelia taken from the growing cultures were placed on the stem of the melon seedlings near cotyledones with sterile toothpicks. Plants were kept in a moisture chamber for 72 hours and disease severity evaluations were made 7, 14 and 21 days after inoculations using a 0-4 scale (Santos et al. 2017).

2.6. Statistical analyses

All data were subjected to analyses of variance using SPSS 23® (IBM Corp., Armonk, NY, ABD) program and means were compared by Tukey's test ($P \leq 0.05$).

3. Results and Discussion

3.1. Incidence and severity of root and stem rot disease in Kumluca district

During surveys performed in the randomly selected 73 melon greenhouses in the Kumluca district, typical symptoms of the gummy stem blight and wilt diseases were observed, and it was determined that the mean incidence and severity rates of the disease were 15.76% and 11.87%, respectively. The highest incidence and severity of the disease were in Sarıcasu location, while those were lower in Beşikçi location where melon production is also less (Table1). This difference among the locations may be because of the decreased inoculum levels in some greenhouses, depending on the regular measures such as soil solarization or fungicide applications.

Table 1. Surveyed areas and numbers of melon greenhouses in Kumluca district and root and stem rot disease incidence and severity rates

Locations	Area of greenhouses surveyed (da)	Number of greenhouses surveyed	Disease incidence (%)	Disease severity (%)
Adrasan	3.5	1	20.00	13.21
Beşikçi	7.0	2	4.43	6.64
Beykonak	56.9	12	12.09	8.64
Erentepe	10	2	8.60	7.85
Güzören	7.0	2	30.00	21.00
Hacıveliler	5.0	10	21.68	16.96
Hızırkahya	23.8	4	14.78	9.35
Kavak	11.5	2	25.70	23.21
Mavikent	43.5	10	10.50	6.80
Merkez	29.1	14	9.31	6.44
Salur	15.3	6	21.24	18.84
Sarıcasu	13.1	8	48.09	35.97
Total	**225.7**	**73**	-	-
Mean		-	**15.76**	**11.87**

3.2. Fungi isolated from the plant and soil samples taken from the melon greenhouses

A total of 913 fungal isolates were obtained from the plant and soil samples. From the plant samples, *D. bryoniae* and *F. oxysporum* were the most frequently isolated pathogens. Since they were generally isolated together from the same samples, it was thought that they had combined effects on disease symptoms. Other *Fusarium* species followed these pathogens. *F. oxysporum*, *R. solani* and *M. phaseolina* were the most common fungi isolated from the soil samples. *F. equiseti*, *F. semitectum*, *F. solani* and *F. verticillioides* were the other *Fusarium* species isolated from the samples (Table 2). These *Fusarium* species were previously isolated from melon cultivation areas in Türkiye (Sağır 1988; Erzurum 2000a; Boyraz and Baştaş 2005). Fusarium wilt is among the first diseases detected on melon plants. Different species were isolated from the diseased melon plants, while *F. oxysporum* f. sp. *melonis* and *F. solani* f. sp. *cucurbitae* were mentioned as the pathogens responsible from the serious losses in melon production (Latin and Snell 1986). *F. oxysporum* f. sp. *melonis* is common in almost all melon areas of the world, including Türkiye and known as the most important pathogen causing Fusarium wilt on melons (Kurt et al. 2002; Chikh-Rouhou et al. 2021). Selected virulent *F. oxysporum* isolates, identified according to their cultural and morphological features and confirmed by molecular techniques, were tested by qPCR using Fom specific primers and determined as *F. oxysporum* f. sp. *melonis*. *D. bryoniae*, causing gummy stem blight disease, which is known as an important pathogen of cucurbits all over the world, causing economical losses especially on melon, watermelon and cucumber especially under hot and humid conditions (Gasparotto et al. 2011; Babu et al. 2015). In Türkiye, the pathogen was first reported with a prevalence of 10.79% and disease severity of 20.02% on cucumbers grown in Elazığ province (Mutlu et al. 2015). Later, it was isolated from watermelon plants in Antalya province and determined by pathogenicity experiments that the isolates can cause disease symptoms on melon, cucumber and zucchini plants, besides watermelons (Basım et al. 2016). *M. phaseolina* and *R. solani* are the other pathogens commonly isolated from melon plants. Drying symptom caused by *M. phaseolina* is known as charcoal rot and melon plants are among the host plants damaged by the pathogen (Reuveni et al. 1982; Boyraz and Karaca 1991). *R. solani* was previously reported from Italy, USA and Brasil, as an important agent causing root rot and wilting on melons (Corazza et al. 1992; Aegerter et al. 2000; Andrade et al. 2005). This pathogen was also isolated from the melon plants showing wilting symptoms in Türkiye (Sağır 1988; Tezcan and Yıldız 1991; Erzurum 2000a; Boyraz and Baştaş 2005; Duran and Özgönen-Özkaya 2016). AG 4 HG-II strain of the pathogen was recently reported to cause damping off on melon seedlings in Kyrgyzstan (Erper et al. 2022).

Table 2. Number of fungal isolates obtained from plant and soil samples taken from the melon greenhouses in Kumluca district

Fungus species	Plant samples	Soil samples
Didymella bryoniae	182	-
Fusarium equiseti	-	4
Fusarium oxysporum	314	174
Fusarium semitectum	3	1
Fusarium solani	15	1
Fusarium verticillioides	3	-
Macrophomina phaseolina	-	16
Rhizoctonia solani	-	130
Others	-	70
Total	**517**	**396**

The fungi represented by the small numbers of isolates from the soil samples were *Aspergillus* spp., *Chaetomium* spp., *Cladosporium* spp., *Clonostachys rosea*, *Mucor* spp., *Penicillium* spp., *Rhizopus stolonifer* and *Stachybotrys chartarum*.

3.3. Virulence of the fungi obtained from melon greenhouses

In the first observation made 7 days after inoculations, the virulence of *F. verticillioides* and *R. solani* isolates were rather high. Some *F. oxysporum* and *M. phaseolina* isolates also caused severe symptoms (Table 3). The virulence of most of the *Fusarium* isolates increased after 14 days, while the disease severity values caused by *D. bryoniae* isolates increased in the last observation made on the 21st day. It was determined that the virulence of the *Fusarium* isolates randomly selected for the pathogenicity test were different from each other. Most of the *F. oxysporum* isolates with *F. solani* and *F. verticillioides* isolates caused severe symptoms, while the virulence of *F. semitectum* was lower (Figure 1). There are various reports on the virulence of *Fusarium* species on melon plants. In a study made in Korea, it was found that the virulence of *F. oxysporum* isolates was high, while that of *F. equiseti* was lower (Seo and Kim 2017). *F. semitectum* was isolated from melons in Konya in low rates, but nothing was mentioned about its virulence (Boyraz and Baştaş 2005). It is known as a post-harvest rot agent of melon fruits in Brazil (Oliveira et al. 2014). In a recent study made in Türkiye, the virulence of *F. solani*, *F. oxysporum* and *F. equiseti* isolates obtained from melon areas was investigated, and *F. oxysporum* was found to be the most virulent isolate with 68.6% disease severity. This pathogen also caused decrease on plant fresh and dry weights and root lengths of melon plants. *F. equiseti* caused 46.3% severity but it did not significantly change plant growth parameters, whereas *F. solani* decreased root lengths of the plants with 53% severity (Teniz and Demirer Durak 2023). In this study, *M. phaseolina* and *R. solani* isolates also caused severe disease on melon seedlings. Our results are coherent with previous studies. It was reported that the virulence of 19 *M. phaseolina* isolates obtained from melon roots was high (Tezcan and Yıldız 1991). In a similar study on the comparison of the virulence of 26 *M. phaseolina* isolates selected among 51 isolates from different provinces in Central Anatolia, the isolates caused disease severity rates between 3.5 and 82% (Erzurum 2000b). Regarding *R. solani*, it was mentioned that the pathogen can cause severe disease especially in high inoculum rates (Andrade et al. 2005; Silva et al. 2020).

3.4. Virulence of Fusarium oxysporum isolates on different cucurbit species

Evaluations made 3 weeks after the inoculation of *F. oxysporum* isolates showed that the virulence of the isolates on melon and watermelon plants were rather high, while they caused moderate or slight wilting symptoms on squash and cucumber plants. Nine isolates did not cause any symptoms on cucumber plants (Table 4). Previous studies showed that the virulence of the isolates obtained from different plants varied. Watermelon and cucumber isolates of the pathogen caused disease only on original host plants (McMillon 1986). Similarly,

Table 3. Virulence of the fungal isolates obtained from the plant and soil samples taken from the melon greenhouses in Kumluca district

Pathogens	Isolate code	7. Day		14. Day		21. Day	
		Mean scale value	Disease severity (%)	Mean scale value	Disease severity (%)	Mean scale value	Disease severity (%)
Didymella bryoniae	HV7-2	0.0*c**	0	0.2 b	10	2.8 a	70
	KUM6-2	0.0 c	0	0.8 b	20	2.8 a	70
	SAR4-1-1	0.0 c	0	1.2 ab	35	3.4 a	85
	SAR2-2-3	0.0 c	0	0.2 b	10	0.4 b	15
Fusarium equiseti	TSA 6-1-4	2.4 ab	60	3.6 a	90	4.0 a	100
	TS8-3-2	1.4 ab	35	3.6 a	90	4.0 a	100
	TS8-3-1	1.8 ab	45	2.6 a	65	3.4 a	85
F. oxysporum	TB9-1-3	2.2 ab	55	4.0 a	100	4.0 a	100
	THV6-2-3	3.6 a	90	4.0 a	100	4.0 a	100
	TS8-2-2	2.8 a	70	3.4 a	85	4.0 a	100
	TSA4-3-2	3.6 a	85	4.0 a	100	4.0 a	100
	TS2-2-1	0.0 c	0	0.2 b	20	0.8 b	40
	TSA5-1-2	0.6 bc	25	2.6 a	70	3.2 a	80
	TG2-3-1	3.0 a	75	4.0 a	100	4.0 a	100
	TG1-4-3	3.4 a	85	4.0 a	100	4.0 a	100
	TG1-3-1	1.6 a-c	40	4.0 a	100	4.0 a	100
	TSA6-1-1	1.6 a-c	40	4.0 a	100	4.0 a	100
	SAR2-1	2.6 ab	65	3.8 a	95	4.0 a	100
	HAC2-1	3.4 a	85	4.0 a	100	4.0 a	100
	MA2-1	2.0 ab	50	3.6 a	90	4.0 a	100
	BEY6-1	1.0 a-c	25	3.0 a	75	4.0 a	100
	KUM8-1	3.4 a	85	4.0 a	100	4.0 a	100
F. semitectum	TM4-2-1	0.0 c	20	0.8 b	20	1.2 b	20
F. solani	TK11-1-3	0.0 c	0	0.0 b	0	0.8 b	80
F. verticillioides	SAR6-1	3.8 a	95	4.0 a	100	4.0 a	100
	SAR6-2	4.0 a	100	4.0 a	-	4.0 a	100
Macrophomina phaseolina	TK12-2-3	3.6 a	85	4.0 a	100	4.0 a	100
	TKa1-2-1	4.0 a	100	4.0 a	-	4.0 a	100
	TE1-2-3	3.8 a	95	4.0 a	100	4.0 a	100
	TB8-1-1	1.6 b	40	2.2 b	55	3.2 a	80
Rhizoctonia solani	TSa5-2-3	4.0 a	100	4.0 a	-	4.0 a	100
	TSa4-2-4	3.6 a	90	4.0 a	100	4.0 a	100
	TS8-1-1	3.2 a	80	4.0 a	100	4.0 a	100
	TG2-2-3	3.8 a	95	4.0 a	100	4.0 a	100
	TK12-1-2	3.6 a	90	4.0 a	100	4.0 a	100

* √+1 transformation was applied to the scale values before statistical analyses, real values were given in the table.
**There were no statistically significant differences among the means in the same column followed by the same letters, according to Tukey test ($P \leq 0.05$).

the virulence of the cucumber and melon isolates of the pathogen was high on cucumber, melon and watermelon plants but the virulence was lower on squash cultivars (Najafinia and Sharma 2009). Coherent with our results, in a study made in Korea, melon and watermelon plants were found more susceptible than cucumber (Seo and Kim 2017).

3.5. Susceptibility of melon cultivars against Didymella bryoniae

As a result of inoculations of 4 randomly selected *D. bryoniae* isolates on 5 melon cultivars, severe symptoms occurred on all tested cultivars 21 days after inoculations. The disease became more severe at an early stage on Yusufbey cultivar (Table 5). Since it is the most effective control method, research on the development of resistant genotypes have been ongoing (Virtuoso et al. 2022).

4. Conclusion

This research showed that *D. bryoniae* and *F. oxysporum* were the main pathogens of melons grown in the Kumluca district. *M. phaseolina* and *R. solani*, isolated from the soil samples, were also potential pathogens that may cause significant losses. After the ban of methyl bromide, systemic fungicides have generally been used against soil-borne plant pathogens. However, after continuous use they may lose their effectiveness because of the resistant pathogen strains. Therefore, sustainable control strategies should be developed. In this context, application of better control methods such as solarization, use of resistant varieties and biocontrol agents are gaining importance. Emphasis should be given on the determination of biological control agents effective against the pathogens causing losses in melon cultivation areas. Integrated management strategy will provide environmentally friendly control of soil borne pathogens.

Figure 1. Wilting symptoms on melon plants caused by *Fusarium oxysporum* (on the left) and *F. semitectum* isolates.

Table 4. Virulence of selected *Fusarium oxysporum* isolates on cucurbit plants three weeks after the inoculations

Origin	Isolate code	Mean scale values			
		Cucumber	Squash	Watermelon	Melon
Plant	BEY6-1	0.00*b** C	0.60 d-h B	3.80 a A	3.40 ab A
	BEY6-4	0.00 b D	0.80 b-h C	4.00 a A	2.40 b-d B
	BEY11-1	0.00 b B	0.00 h B	2.00 ab A	3.00 b-d A
	GUZ1-3	1.60 ab A	1.60 a-g A	2.20 ab A	3.60 a A
	GUZ2-1	0.40 ab B	2.60 a-d A	3.40 ab A	3.80 a A
	GUZ2-6	1.20 ab B	3.20 a-c A	4.00 a A	3.80 a A
	HAC2-1	1.80 ab A	3.00 a-c A	3.00 ab A	4.00 a A
	HAC3-1	2.20 ab A	3.40 a-c A	3.80 a A	3.80 a A
	HV8-3	0.00 b B	0.20 gh B	3.80 a A	3.20 a-c A
	HV8-5	0.00 b D	1.00 a-h C	3.80 a A	3.00 a-d B
	KUM8-1	2.00 ab A	3.40 ab A	4.00 a A	3.80 a A
	KUM9-3	1.20 ab B	1.40 a-g B	4.00 a A	4.00 a A
	KUM13-1	0.00 b B	0.20 gh B	3.40 ab A	2.40 b-d A
	MA2-1	0.00 b B	0.20 gh B	3.40 ab A	2.00 d A
	MA8-5	0.00 b C	0.40 e-h C	4.00 a A	2.20 cd B
	MA9-6	0.00 b B	0.60 f-h B	3.80 a A	3.60 a-c A
	MA10-4	0.20 ab C	1.40 a-g B	3.60 a A	3.40 ab A
	SA3-2	1.20 ab B	1.80 a-g AB	4.00 a A	3.40 ab A
	SA4-2	3.20 a A	3.00 a-c A	4.00 a A	3.80 a A
	SA6-3	1.40 ab B	2.20 a-e AB	3.80 a A	3.40 ab A
	SAR2-1	1.60 ab B	1.00a-h AB	3.00 ab AB	3.80 a A
	SAR5-3	1.80 ab A	1.40 a-g A	4.00 a A	3.80 a A
	SAR8-3	0.60 ab B	1.00 c-h B	4.00 a A	3.80 a A
Soil	TB9-1-3	2.20 ab B	3.20 a-c AB	3.60 a AB	4.00 a A
	TG1-1-1	1.00 ab B	2.60 a-d AB	1.80 ab AB	4.00 a A
	TG2-3-1	1.80 ab B	1.80 a-f AB	4.00 a A	3.40 ab AB
	TG2-3-4	0.80 ab B	3.20 a-c A	3.40 ab A	4.00 a A
	TSA4-3-5	2.40 ab A	2.60 a-d A	3.40 ab A	3.60 a A
	TSA6-1-1	0.40 ab B	2.60 a-e A	4.00 a A	3.60 a A
	TSA6-2-1	2.20 ab B	2.60 a-d AB	3.80 a A	3.60 a AB
	TSA6-3-2	3.00 a A	3.80 a A	1.40 b B	4.00 a A
	TSA6-3-3	2.20 ab A	1.60 a-f A	4.00 a A	4.00 a A

* √+1 transformation was applied to the scale values before statistical analyses, real values were given in the table.
**There were no statistically significant differences among the means in the same column shown by the same lower case letters, and in the same row shown by the same upper case letters, according to Tukey test ($P \leq 0.05$).

Table 5. Disease severity rates (%) on melon cultivars caused by four selected *Didymella bryoniae* isolates

Melon cultivars	HV7-2			KUM6-2			SAR2-2-3			SAR4-1-1		
	Disease severity (%)											
	7. day	14. day	21. day	7. day	14. day	21. day	7. day	14. day	21. day	7. day	14. day	21. day
Çıtırex	0	10	70	0	20	70	0	10	15	0	35	85
Ferdevs	5	45	100	10	60	100	10	10	25	5	70	100
Memory	5	65	100	10	100	100	5	10	60	10	80	100
Niovi	0	25	80	0	40	95	0	20	55	0	20	80
Yusufbey	55	100	100	20	90	100	15	80	80	50	85	100

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