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Reaction of Some Peach (*Prunus persica*) Varieties to the Leaf Curl Disease Caused by *Taphrina deformans* in Arid District of Turkey

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Abstract: Leaf curl disease, caused by *Taphrina deformans* (Berk.) Tul., was screened on peach trees located in arid district of Turkey. Different degrees of infection was displayed by ten peach variety at orchard stands in Şanlıurfa district. Assessments were made on upper five leaves of four reverse shoots per tree and ten trees were monitored for each variety during two years. Reaction degrees of varieties were grouped according to infected leaf rates displayed after results were tested with the variance analyse. The most resistant variety was IN and displayed this disease at 26 and 31% infection rates with scale value 2 in 2000 and 2001, respectively. The most susceptible variety was CH and exhibited the leaf curl at the 98 and 100% infection rates with scale value 4 in 2000 and 2001, respectively.

Key words: Peach leaf curl, *Taphrina deformans*, peach variety, reaction

INTRODUCTION

The peach leaf curl, caused by *Taphrina deformans* (Berk.) Tul., is an important disease causing quantitative and qualitative yield losses on peach tree (*Prunus persica*). This is a biotrophic phytoparasitic fungus^[1] and very widespread in all peach growing areas around the world^[2]. To be controlled of the leaf curl on peach is mandatory in orchards particularly grown in cold and rainy climate^[3,4]. Symptoms of this disease can change importantly depending on the plant organ in which the infection occurs. Yellow to reddish areas on young developing leaves appear in spring. These areas progressively thicken causing the leaf to curl. Infected leaves fall prematurely or sometimes remain attached and gradually turn dark brown on severely infected trees. Fruit number on infected trees may be severely decreased. Due to disease effect green shoots can also be damaged becoming thickened and distorted. Lesser infection observe on fruits with irregular raised, wrinkled and reddish symptoms. Weakened trees produce fewer fruit in the following season and yield may be further reduced when blossoms and young fruit become diseased and drop. Disease severity depends on cultivar susceptibility^[5], on the inoculum density and climatic conditions affecting both overwintering and infection. Prolonged rainy periods at orchard level favour the severe outbreaks of peach leaf curl disease^[1]. The susceptibility in trees also increase under same conditions. The first beginning of the disease can be estimated to some extent beforehand using some forecasting models based on daily rainfall and temperatures^[6,7].

Compared to other regions of Turkey, the south eastern Anatolia district has the lowest peach trees. Though this district has the very suitable climate for peach plantation, this plant has not been adopted sufficiently by the growers until last decade. Insufficient water sources appear the first main factor that limited the cultivation of peach tree in region. Since a several years, thousands hectare farmlands of district have been irrigated and it will be increased depend on the GAP project completed. Therefore it is expected that this fruit tree will be planted mostly in district in future. In district, various peach varieties have been treated from earlier years with orchard stands. The aim of this study was to investigate the reaction of ten peach variety to leaf curl disease in Şanlıurfa district.

MATERIALS AND METHODS

To determine the reaction of ten peach variety to *T. deformans*, assessments were conducted on limited peach trees at orchard stands in Şanlıurfa district. Evaluations were made in same orchards having 10 variety with average 50 tree number per variety. Trees were 7, 8 years old and evaluations were made at 15-16 May in 2000 and 20-27 May in 2001. After these periods the climate is not suitable generally for new infections of this disease in district. The identification of leaf curl was made to its microscopic and macroscopic properties^[8]. Typical symptoms of leaf curl was screened on upper leaves of shoots and any leaf bearing macroscopic symptoms accepted as infected leaf. Ten trees per variety which also accepted ten repetition for each variety was

chosen randomly in orchards. Four shoots randomised from reverse four side (east, west, south and north) of a tree were determined and the infected leaf numbers for each shoot were counted on the upper five leaves. The average of infected leaf number of four shoots for each tree were transformed into single number using arithmetic mean. Separate variance analyses were performed on repetition and variety and results were grouped after tested. The reaction degrees of each variety was then stated as percent after transformation was performed. Based on the infection percent displayed, 1- 4 scale was formed as follow: 0-25%=1, 26-50%=2, 51-75%=3, 76-100%=4 and reaction levels of varieties were recognised. Scale values were like following: 1=resistant, 2=mean resistant, 3=mean susceptible and 4=susceptible

The district where this study was conducted has an arid climate. Summer is hot and dry and winter is generally warm, with some days quite cold. Most of the rainfall occurs between November and mid-April with the highest rainfall in January (Table 1). According to the 40 year averages, the annual precipitation is about 463.1 mm^[9].

RESULTS AND DISCUSSION

Ten peach varieties displayed different reactions to leaf curl disease in both years. Any variety without symptoms were not observed within varieties investigated

Table 1: Temperature and rainfall data affecting development period of *T. deformans*, Şanlıurfa, Turkey 2000, 2001

2000	January	February	March	April	May	June
Min. temp. (°C)	-2.4	-1.5	-0.6	6.1	10.6	18.5
Max. temp. (°C)	19.6	16.6	25.5	29.6	35.3	40.0
Mean temp. (°C)	4.8	6.2	9.5	17.2	23.1	28.3
Total rain (mm)	127.2	42.8	31.5	18.3	23.3	0.0
2001	January	February	March	April	May	June
Min. temp. (°C)	0.0	-3.3	6.3	7.4	9.3	17.2
Max. temp. (°C)	17.4	20.4	25.2	31.6	35.8	40.4
Mean temp. (°C)	7.9	8.1	14.6	17.2	20.1	29.2
Total rain (mm)	14.0	92.1	66.9	59.9	50.6	0.0

Records were obtained from the Şanlıurfa meteorological station

Table 2: Infection rates and scale values of peach varieties on sampled leaves

Varieties	2000		2001		Average infection and scale value
	Reaction degrees of variety	Percent infection and scale value	Reaction degrees of variety	Percent infection and scale value	
IN	5.20±0.80a	26-2	6.20±0.80a	31-2	29- 2
Rh	5.20±1.02a	26-2	6.60±0.81a	33-2	30- 2
X	7.20±1.02ab	36-2	9.00±1.00ab	45-2	41- 2
N	14.80±1.02bc	74-3	16.20±0.73c	81-4	78- 4
Mor	6.00±1.41a	30-2	7.40±1.50a	37-2	34- 2
Mon	18.40±0.74c	92-4	19.40±0.40cd	97-4	95- 4
CH	19.60±0.40c	98-4	20.00±0.00cd	100-4	99- 4
RG	16.00±0.89bc	80-4	16.80±0.86c	84-4	82- 4
W	11.20±1.02b	56-3	12.60±1.21b	63-3	60- 3
ER	19.20±0.49c	96-4	19.60±0.24cd	98-4	97- 4

in this study. Infection rates changed dependent on years. According to infection rate and its scale value, IN, RH, X and Mor were the most resistant, while N, Mon, CH, RG and ER were the most susceptible varieties. The variety W also was mean susceptible (Table 2). Compared to the first year, infection rates were higher on all varieties in the second year. Climatic factors, namely monthly total rainfall and to some extent mean temperatures, were seemed as the possible reasons that increased this infection in the second year (Table 1). It has been reported that rain is necessary for infection and prolonged rainy periods favour severe outbreaks of peach leaf curl at orchard level^[1], although it has been pointed out that the fungus can start to grow at 95% relative humidity^[10].

In district bud openings of peach trees are generally begin in March and monthly rainfall decrease in the progressing time period. Therefore, compared to the other regions of Turkey, this district has the lowest risk related to peach leaf curl. Since suitable climate is shorter, it is considered that infection can generally be located in the first opening shoots. Trees also obtain the resistance to this disease in time dependent on the fully expanded leaves as reported by Jeay^[11]. However, higher rates of infection can happen on varieties in some years particularly when rainy period prolongs with the suitable temperature after bud openings. It is recommend that resistant varieties with other measures should be considered in peach orchards before planted.

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