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The Behavior of Some Peach and Nectarine Cultivars to Powdery Mildew (*Sphaerotheca Pannosa*) In Albania

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ABSTRACT: *The susceptibility to diseases is not considered as a key-criterion in peach breeding programs. Even if the turn-over of peach cultivars is important, suitability for organic and low-input systems remains unknown for most of the cultivars. A first program has been carried out from 2014 to 2016 to assess powdery mildew of 4 cultivars in an experimental station. Powdery mildew (Sphaerotheca pannosa) is a widely distributed pathogen in different parts of the world and one of the most important peach pathogens. Powdery mildew management was conducted during 2015 in experimental scheme with four (4) peach and nectarine cultivars in village Marikaj, Vorë, Albania. Experimental scheme is a randomized complete block with three repeat. nalysis of variance (ANOVA) on the assessment of the Index disease (Imc in%) for the four cultivars in the study for 2016 shows that the four cultivars Red Star, Venus, Roajal Black and Gomea have differences statistically to two levels of authentication P = 0.05 and 0.01. The data see the disease index Imc in% Union ranges from 16.331% Roajal Black cultivar and up to 30.77% Red Star cultivar. In terms of classification regarding the level of sustainability of these cultivars are MR (resistant) to the Powdery mildew (Sphaerotheca pannosa).*

Keywords: *Disease severity, powdery mildew, organic control, peach, nectarine.*

I. INTRODUCTION

Peach is an important crop in many parts of the world. World production of peaches and nectarines stood at 21 million metric tons in 2013 (FAO, 2014). Peach and Nectarine are of the most important fruit crops in Albania. Tirana grown fruits, especially peaches, are known for their quality. Peach ranks first in local markets on Tirana. But the weather on Tirana is more moderate, with a temperature range below 2°C in winter and up to 35°C in summer. Temperature and relative humidity are important factors for creating the conditions for peaches and nectarines to be affected by the disease. Under optimum conditions, powdery mildew will be visible 48 hours after infections; new infections produce spores in about 5 days. The presence of young growth on the trees is important for infection (Kyryk M.M.; Belova, L.V. 1970). The causal fungus, *Sphaerotheca pannosa* attacks young shoots, leaves, and fruit of woody ornamentals including peach and other stone fruits and can cause serious economic loss due to collage of infected fruit.

Many stone fruit crops including cherry, apricot, plum, nectarine and peach are susceptible to powdery mildew (Grove 1995; Reuveni et al. 2006; Vajna and Rozsnyay 2006). The disease is associated with infection by *Sphaerotheca pannosa var. persicae (syn Podosphaera pannosa* is a widely distributed pathogen in different parts of the world and one of the most important peach pathogens (Yarwood 1939; Weinhold 1961; Grove 1995; Adaskaveg et al. 2001; Reuveni 2001; Reuveni et al. 2006).

Three powdery mildew species are known to infect stone fruits: cherry powdery mildew (*Podosphaera clandestina*), apple powdery mildew (*Podosphaera leucotricha*, causing peach rusty spot), and peach powdery mildew (*Sphaerotheca pannosa*, the cause of rose powdery mildew).

II. MATERIALS AND METHODS

Locations of experimental scheme: The experiment was set up in conjunction with the organic farm (Hajdar Kuçi) in the her field Vorë, Albania (-41° 22' 09" N, -19° 37' 17" E).

Experimental scheme resulted in a randomized complete block, which was designed as two factorial scheme with three repetitions. Four cultivars, two peaches, two nectarines. A total of 288 trees. Variants with 9 trees were treated. While variants with 6 trees were not treated. The scheme is also surrounded by protective belt with peaches which has undergone normal cultivation treatments.

Plant material: The main factors in the study were: cultivars, total 4 cultivar. The main factor II was, ways of treatment. Treatments were applied at three levels: Level I with organic treatment, Level II with chemical treatment and Level III without treatment.

Plant protection products (PPP's) that were used in the scheme for 2014: At level I (organic treatment) was used preparation Sulphur 800. At level II (chemical treatment) was used triazole with getter preparation difenoconazol * 250gr / L (23.58% p / p). Level III without treatment.

Disease assessments and times assessments: Disease assessments were made 12 days after treatment. For disease assessments, in each version with nine trees only three trees were evaluated. In variants with six trees were assessed two trees.

Visual estimation of disease severity from natural infection by *Podosphaera pannosa (syn.Sphaerotheca pannosa var. persicae)* (Wallr.: Fr.), has been based on SADs (standard area diagrams) the percent of covered leaves and fruits surface occuped by the disease.**(Lebeda and Widrlechner, 2003).**

Table 1: Severity classes for the assessment of powdery mildew symptoms observed on leaves (expressed in percentage of leaf damage in the whole crown)

Infection class	Powdery mildew damaged leaves (%)	IT*
0	0	I
1	0-5	VR
2	5.1-15	R
3	15.1-40	MR
4	40.1-60	MP
5	61-100	P

*** IT = Types of infection I= Immune sustainability;), in% Imc-ja = 0; VR = Very Resistant: Imc-ja in% up to 5%; R = Resistant: Imc-ja in% ranges from 5.1% to 15%; MR = average Resistant: IMC-ja in ranges from 15.1% to 40%%; MP = Moderately susceptible: Imc-ja in going from 40.1%% to 60%; P = susceptible: Imc Y.% amounts to 60.1%.**

Severity and diffusion of infection were obtained by resorting to the McKinney index (**McKinney, 1923**) (modified from **Cooke, 2006**). The McKinney index (Imc) was obtained by using the following formula: where: DI (Imc) **% =** the total degree of infection; n= infection class frequencies; v = the category of infection (0-4); N = total of observed plants; X = highest value of the evaluation scale.

Statistical Date Analysis: Processing of data for the period of study (cultivar x method of treatment for 2014-2016) for all areas of the test: averages, variance and standard deviation were made using analysis of variance (ANOVA) with the statistical program ASSISTS (2016) Version 7.7 - Website http://www.assistat.com By Francisco de AS Silva DEAG-CTRN-UFC

III. RESULTS AND DISCUSSIONS

Results on the behavior of peach cultivars for consistency from the Powdery mildew of peaches (Sphaerotheca pannosa) during the three years of study 2014-2016

The table 2 and figure 1 are brought results of surveys on the disease index from the Powdery mildew of peaches (*Sphaerotheca pannosa*) for four cultivars of study. (Red Star, Venus, Roajal Black and Gomea) in version control where we see the behavior of peach cultivars to the disease in the study. The data in Table 2 and Chart 1 see for the years 2014- 2016 index of disease Imc-ja in% varies from cultivar 16.31 Roajal % in Montenegro and to 30.77% in cultivar Red Star. In terms of classification regarding the level of sustainability of these cultivars are MR (resistant) to the ash of peaches (*Sphaerotheca pannosa*)

Table 2 Results on 4 cultivars of peach behavior from the Powdery mildew of peaches (*Sphaerotheca pannosa*) and compare them to the ranks of multiple Tukey-Kramer testit, s study during the three years 2014 to 2016

Cultivars of peach	**Disease index in% average over the three years 2014-2016**			**Sum**	**Average**	Assessment of disease	
	2014	**2015**	**2016**			**Tukey-Kramer** test*	Level of sustainability**.**
Red Star	30.33	28.33	33.667	92.327	30.77	A	**MR**
Venus	32.33	22.33	25.333	79.993	26.66	AB	**MR**
Roajal i Zi	23.66	12.666	12.667	48.993	16.31	**B**	**MR**
Gomea	28	34	34	96	32	**A**	**MR**
Sum	114.32	97.326	105.667	317.313			
Average	28.58	24.3315	26.41675		26.44275		
Smd	**Smd** =3.20234 per @ 0.05%						

**smd = Significative minimum difference *The Tukey Test at a level of 5% of probability was applied. The averages followed by the same letter do not differ statisticaly between themselves

Tabela 3 . Analysis of variance (ANOVA) on the disease index in% Imc-ja from thePowdery mildew of peaches (Sphaerotheca pannosa) Years 2014 - 2016

Variation Source	Degree of freedom	Square Sum	Mean Square	Statistics of the test		
				F. actual	< F theory >	
					95%	99%
Cultivars	3	189.5833333	63.194	6.4084*	4.7570	9.779538
Treatments	2	68.16666667	34.083	1.4563	2.1432	10.92477
Error	6	59.16666667	9.8611			
Total variation	11	316.9166667				

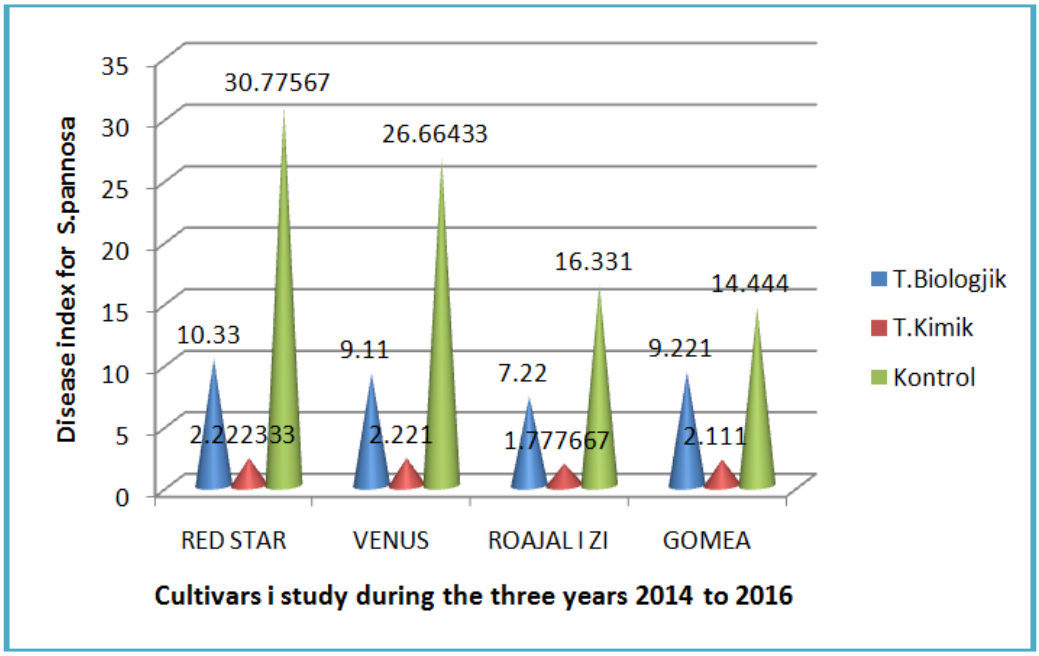
** Significative at a level of 1% of probability (p < .01) * Significative at a level of 5% of probability (.01 =< p < .05) ns Non-significative (p >= .05)

Analysis of variance (ANOVA) Index table 3 assessment of disease (IMC in%) for the four cultivars in the study for the years 2014- 2016 shows that the four cultivars Red Star, Venus, Roajal Black and Gomea have proven statistically changes to two levels of authentication P = 0.05 and 0.01 (6.944 and 18).

This is proved by the values of "F" for cultivars actual -ve the value of "F" een actual results to be greater than the value of "F" according to Fischer-s theoretical table for two levels of authentication and P = 12:05 P = 0,01.

Where "F" factual cultivars IMF = 6.4084 * is greater than "F" th theoretical level of authenticity P = 12:05 (4.7570 and 9.779538). By krahësimi of "F" actual seizures of repetitions to four cultivars in the study (Red Star, Venus, Roajal Black and rubber) with tabular results that repetition does not provide statistically validated changes to two levels of authentication P = 0:05 and P = 0.01 for "F" th actual result to be smaller than "F" - the theory which shows that our experiment is set up in the correct conditions that allow us to proceed further data analysis.

Analysis and comparison of averages index illness IMC in% between cultivars in the study with control using the smallest difference validate DMV = 3.06815 for @ = 12:05 by Tukey-Kramer test, as rank methods of treatment for the four cultivars in the various classes where a higher level of truth present Red Star and Gomea cultivars which appear with the letter A. cultivar cultivar Venus AB and tire B.



Grafiku 1 For 4 results on the behavior of peach cultivars from the Powdery mildew of peach (*Sphaerotheca pannosa*) and krahësimi their ranks with multiple Tukey-Kramer test, s study during the three years 2014 to 2016

Illustration of these changes for each cultivar you have to study (Red Star, Venus, Roajal Black and Gomea) are given in Figure 1 depicting diagram boksploteve (variance, standard deviation and average Imc's in%) of the Powdery mildew of peach (*Sphaerotheca pannosa*)for the three years 2014- 2016 where variability and cultivars that have statistically the probability level P = 0.05 bracelets are blue, are cultivars Roajal Black and Red star Venus and Gomea under the general average = 26.44% for DMV = 3.06815 for @ = 0.05 by Tukey-Kramer test

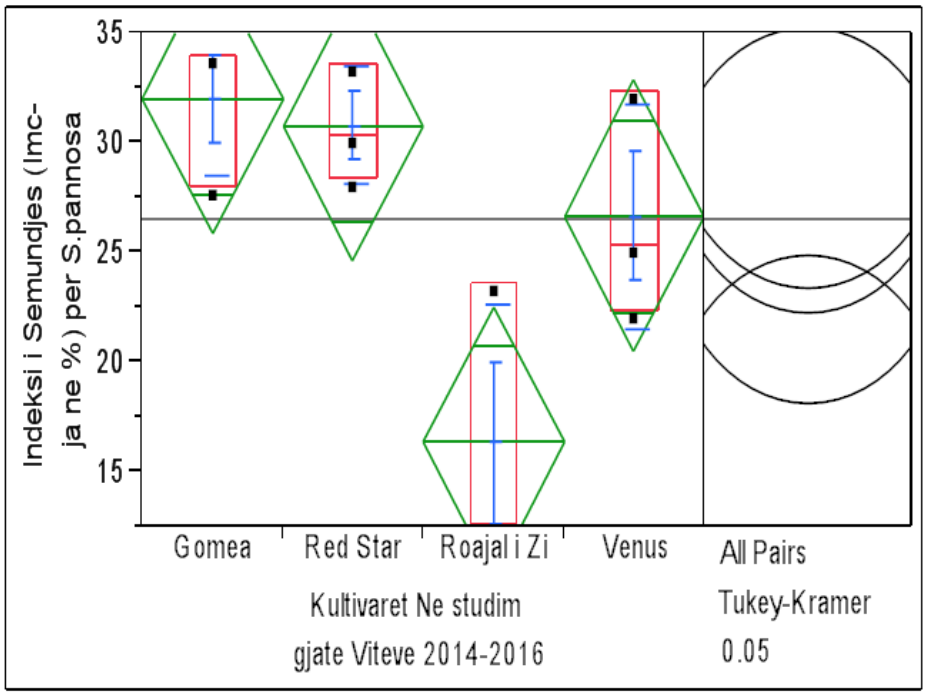


Figura 1 For 4 results on the behavior of peach cultivars from the Powdery mildew of peach (Sphaerotheca pannosa) and krahësimi their ranks with multiple test Dunnett test, s study during the three years 2014 to 2016

IV. CONCLUSION

Analysis of variance (ANOVA) assessment of disease (IMC in%) for the four cultivars in the study for the years 2014- 2016 shows that the four cultivars Red Star, Venus, Roajal Black and Gomea have proven statistically changes to two levels of authentication P = 0.05 and 0.01

Powdery mildew of peach (*Sphaerotheca pannosa*)for the three years 2014- 2016 where variability and cultivars that have statistically the probability level P = 0.05 bracelets are blue, are cultivars Roajal Black and Red star Venus and Gomea under the general average = 26.44% for DMV = 3.06815 for @ = 0.05 by Tukey-Kramer test.

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