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Effect of Different Pruning Severity on Vegetative Growth in Peach (*Prunus persica*)

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Abstract

In this study, the effect of vegetative growth of branches was investigated by using six different pruning severity on eight-year-old 'Redhaven' and 'Dixired' peach trees was investigated. The pruning severity applied on the branches were as follows: 1) Non pruning (control), 2) Tipping (1-2cm), 3) Pruning of 1/3 of the branch, 4) Pruning of 1/2 of the branch, 5) Pruning of 2/3 of the branch, 6) Pruning above 3-6cm of the branch. Pruning of branches was performed between end of January and beginning of February during three years. After one year form each pruning, the length, diameter and bud amount of 2-year-old branches, and the length, diameter and bud amount of 1-year-old shoots grown from 2-year-old branches were determined and analysed.

Keywords: Peach, pruning severity, vegetative growth

Şeftalide (*Prunus persica*) Farklı Budama Şiddetlerinin Vegetatif Büyüme Üzerine Etkisi

Özet

Bu çalışmada; sekiz yaşlı 'Red Haven' ve 'Dixired' şeftali çeşidi ağaçlarında, seçilen dallara altı farklı şiddette kesim uygulanarak, budama şiddetinin dalların vegetatif büyümesi üzerine etkisi araştırılmıştır. Dallara uygulanan kesim şiddetleri şöyledir: 1) Hiç budanmamış (kontrol), 2) Uç alma (1-2cm), 3) Dalın 1/3'ünün kesilmesi, 4) Dalın 1/2'sinin kesilmesi, 5) Dalın 2/3'ünün kesilmesi, 6) Dalın 3-6cm'den kesilmesi. Üç yıl süreyle Ocak sonu Şubat başı arasında dallar üzerinde kesimler yapılmış, bir yıl sonra iki yaşlı dal uzunluğu, çapı ve göz sayısı, bu dallardan oluşan yeni sürgünlerin sayısı, uzunluğu, çapı ve içerdikleri göz sayısı belirlenmiş ve elde edilen veriler analiz edilerek değerlendirilmiştir.

Anahtar Kelimeler: Şeftali, budama şiddeti, vegetatif büyüme

Introduction

Pruning of bearing trees is applied in peach trees harder than other fruit trees. Locations where glazed frost, frost, or drought danger are observed, pruning should be applied more slightly in bearing trees. Besides this, cultivar characteristics should be taken to account during pruning (Andersen, 1984, Özçağıran et al., 2011). Effects of pruning on peach tree growth and development have been extensively studied in field experiments (Hassan, 1990, Kappel and Bouthillier, 1994, Genard et al., 1998, Miller and Byers, 2000, Mediene et al., 2002, Siham et al., 2005, Ikinci, 2014). Pruning applied different severity is caused different amount of decrease at auxin levels of shoots. Reduced auxin level removes inhibition on root development. Shoot growth can be strongly promoted by roots as such. Young fruit trees respond to severe shoot growth even after little pruning application. Because shoot apex amount which synthesizes auxin is low and auxin amount sent to roots relatively reduced in these young trees (Suare, 1981).

The aim of this research is to investigate the effect of different pruning severity on vegetative shoot growth in peach trees.

Materials and Methods

In this study, the effect of vegetative growth of branches was investigated by using six different pruning severity on eight-year-old 'Redhaven' and 'Dixired' peach trees located in the Faculty of Agriculture, Adnan Menderes University in Aydin, Turkey. Six different pruning severity were applied to three main branches containing three replicates in different directions belong to two peach cultivars. Pruning was performed above from the outward-

looking bud. The effect of pruning severities applied on vegetative the growth of was investigated. The pruning severity levels on the branches were as follows: 1) Non-pruning (control), 2) Tipping (1-2 cm), 3) Pruning of 1/3 of the branch, 4) Pruning of 1/2 of the branch, 5) Pruning of 2/3 of the branch, 6) Pruning above 3-6 cm of the branch. Pruning of branches was performed between end of January and beginning of February during three years in Aydin ecological conditions. After one year form each pruning, the length, diameter and bud amount of 2-year-old branches, and the length, diameter and bud amount of 1-year-old shoots grown from 2-year-old branches were determined and analysed.

Data obtained were analized in completely randomized design (n=6) with TARIST statistical computer program (Aegean Forestry Research Institute, Karşıyaka, İzmir-Aegean University Faculty of Agricuture Department of Field Crops, Bornova, İzmir, Turkey, version 4.0). The differences among means were determined by LSD test (P=<0.05).

Results

Different pruning severity was a significant effect on the number of annual shoots and annual total shoot length in the 2nd year and the number of annual shoots only in the 3rd year in 'Redhaven' (Table 1). According to the number of annual shoots, the highest number was obtained from tipping and control in the 2nd year; and control, tipping, and 1/3 pruning in the 3rd year. The annual total shoot length was highest only in tipping and control in the 2nd year. The effect of pruning severity was not significantly different on the mean diameter and total bud number of one-year-old shoots during three-year period.

Different pruning severity was a significant effect on the number of annual shoots in the 1st year; the number of annual shoots, annual total shoot length and diameter in the 2nd year; and the number of annual shoots and the number of buds/annual shoot in the 3rd year in 'Dixired' (Table 2).

Table 1. Effect of different pruning types on vegetative shoot growth in 'Redhaven' cultivar

Year	Pruning	No. of Annual Shoots	Annual Total Shoot Length (cm)	Annual Shoot Diameter (mm)	No. of Buds/Annual Shoot	2-Year-Shoot Length (cm)	2-Year-Shoot Diameter (mm)	No. of Buds/2-Year-Shoot
1	Control	4.000	137.250	4.215	87.875	67.250a	10.629	34.750a
	Tipping	4.250	123.750	3.438	81.625	69.250a	10.566	33.750a
	1/3	4.429	128.000	3.677	98.286	45.143 b	8.566	23.571 b
	1/2	3.889	107.556	3.729	68.889	30.556 c	8.548	17.667 c
	2/3	3.778	146.667	4.389	96.222	22.222 d	10.033	11.111 d
	3-6cm	1.625	51.188	4.248	29.375	2.625 e	10.379	1.750 e
	F	1.723 n.s.	0.691n.s.	0.964n.s.	0.887n.s.	93.534*	0.872n.s.	47.653*
	$LSD_{0.05}$	-	-	-	-	7.771	-	5.378
2	Control	6.625ab	165.500ab	3.901	16.492	66.500a	11.196a	36.250a
	Tipping	7.625a	219.938a	4.311	18.143	59.875a	11.269a	31.750a
	1/3	4.750 bc	111.250 bc	3.938	17.424	36.375 b	9.751ab	19.500 b
	1/2	2.667 cd	70.278 c	4.073	19.315	24.556 c	7.777 bc	13.333 c
	2/3	1.375 d	31.313 c	3.456	16.875	15.688 c	6.326 c	7.750 d
	3-6cm	2.000 d	78.833 bc	4.616	23.852	2.889 d	9.461ab	3.111 e
	F	9.987*	4.884*	1.648n.s.	1.387n.s.	52.574*	5.973*	69.001*
	$LSD_{0.05}$	2.351	89.832	-	-	10.037	2.285	4.615
3	Control	7.444a	208.722	4.031	20.189	47.389a	10.894	24.000a
	Tipping	7.222a	166.778	3.916	20.877	41.556a	9.386	23.889a
	1/3	6.889a	228.111	4.604	25.444	36.778ab	11.313	18.889a
	1/2	4.667 b	112.667	3.917	20.010	27.556 bc	8.769	13.111 b
	2/3	2.750 bc	99.875	4.773	30.388	19.250 c	8.200	10.000 b
	3-6cm	1.375 c	56.400	4.102	25.400	3.667 d	7.986	3.111 c
	F	10.133*	2.169n.s.	0.720n.s.	1.565n.s.	17.754*	1.194n.s.	18.194*
	$LSD_{0.05}$	2.214	-	-	-	10.825	-	5.506

Table 2. Effect of different pruning types on vegetative shoot growth in 'Dixired' cultivar

Year	Pruning	No. of Annual Shoots	Annual Total Shoot Length (cm)	Annual Shoot Diameter (mm)	No. of Buds/Annual Shoot	2-Year-Shoot Length (cm)	2-Year-Shoot Diameter (mm)	No. of Buds/2-Year-Shoot
1	Control	6.889a	272.444	5.250	21.921	64.111a	14.211	36.111a
	Tipping	5.556ab	147.833	3.811	14.974	61.778a	10.994	35.889a
	1/3	4.889abc	212.111	5.905	27.487	44.778 b	14.641	23.556 b
	1/2	3.625 bc	163.875	4.799	24.384	35.000 c	10.905	20.375 b
	2/3	2.778 cd	132.556	5.075	26.526	20.889 d	10.821	12.111 c
	3-6cm	1.143 d	50.714	5.229	24.714	1.786 e	10.536	1.286 d
	F	6.180*	2.256n.s.	1.938n.s.	1.912n.s.	65.451*	1.386n.s.	66.617*
	$LSD_{0.05}$	2.241	-	-	-	8.036	-	4.494
2	Control	7.444a	239.389a	4.864ab	23.539	52.722a	12.816a	32.889a
	Tipping	7.857a	221.429a	4.636 bc	21.776	50.000a	11.560a	31.571a
	1/3	3.857 b	90.929 b	3.698 c	16.560	36.857 b	8.151 b	22.286 b
	1/2	2.667 bc	62.500 b	3.729 c	18.514	23.833 c	7.122 b	16.500 bc
	2/3	2.111 bc	62.944 b	4.606 bc	24.046	16.611 c	7.429 b	9.778 c
	3-6cm	1.400 c	63.750 b	5.818a	26.000	2.857 d	8.801 b	2.000 d
	F	9.595*	5.730*	2.640*	0.971n.s.	23.180*	6.391*	15.786*
	$LSD_{0.05}$	2.306	91.514	1.068	-	10.758	2.487	7.430
3	Control	6.444a	251.667	5.412	29.751 c	47.556a	14.788a	26.333a
	Tipping	6.222ab	203.556	5.594	31.051 bc	40.333ab	13.194ab	21.889ab
	1/3	6.667a	199.000	4.789	23.818 c	32.500 bc	11.592abc	18.222 bc
	1/2	4.222 bc	180.444	6.003	31.061 bc	26.611 c	11.267abc	15.222 c
	2/3	2.889 cd	148.000	7.187	40.843a	16.444 d	11.439 bc	8.889 d
	3-6cm	1.143 d	82.000	6.278	39.750ab	4.071 e	8.211 c	2.857 e
	F	8.854*	1.607n.s.	2.370n.s.	3.788*	22.691*	2.820*	17.687*
	$LSD_{0.05}$	2.034	-	-	8.767	8.998	3.502	5.520

The number of annual shoots was the highest in control, tipping, and 1/3 pruning in the 1st and 3rd years; and of that was the highest in tipping and control in the 2nd year. The annual total shoot length was the highest in control and tipping in the 2nd year. The annual shoot diameter was the highest in 3-6 cm and control in the 2nd year. The number of buds/annual shoot was the highest 2/3 and 3-6 cm pruning applications in the 3rd year.

Discussion

Variation among obtained data was large due to difficulties of selecting uniform shoots in the peach pruning experiment. In general; control, tipping, and 1/3 pruning applications increased the annual number of shoots and annual total shoot length. However, while Tedeschini et al. (2004) reported that severe pruning (40-50%) in olives showed better shoot growth, canopy development, and yield compared to the trees having little pruning (10-20%) or not pruned at all, Günver-Dalkılıç et al. (2005) in walnut the highest annual total shoot length and total number of buds was obtained from in 1/2 and 2/3 pruning severities. Differences observed among the pruning experiment repeated in three years were affected by the previous year's pruning effect. In addition, besides vegetative development, generative development (number of fruit etc.) can be determined in pruned shoots. Pre-harvest summer and winter pruning application increased shoot diameter and length in apricot (Demirtas et al. 2010). Severe pruning and high water restriction applications decreased total shoot length in peach (Bussi et al. 2010).

Conclusion

In this study, the effect of vegetative growth of different pruning severity was investigated in eight-year-old 'Redhaven' and 'Dixired' peach trees. Generally; the annual number of shoots and annual total shoot length were increased by control, tipping, and 1/3 pruning applications. The annual shoot diameter and number of buds were increased in severe pruning.

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