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Determination of the Hardness and the Parameters of the Surface Roughness in Peach Wood

Şeftali Odununda Sertlik Değerinin ve Yüzey Pürüzlülüğüne Ait Parametrelerinin Tespiti

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Abstract

The peach (*Prunus persica* (L.) Batsch.) tree has been an important fruit tree since ancient times and it grows in various parts of the world. In this study, shore - D hardness value and surface roughness parameters of peach wood surfaces were investigated. The surfaces of the experimental samples of peach wood were sanded with 80, 100, 120, 150 and 180 numbered sanders. Then, R_a, R_z and R_q parameters of surface roughness and shore - D hardness value were determined. According to the results of the research, the sanding number of R_a, R_z and R_q parameters was obtained significantly for variance analysis. Shore - D hardness value was determined as 54.80. For all roughness parameters, it was observed that the roughness values decreased with increasing the sanding number.

Keywords: Peach, Surface roughness, Shore - D hardness, Wood.

Özet

Şeftali (*Prunus persica* (L.) Batsch.) ağacı eski zamanlardan beri önemli bir meyve ağacı olup dünyanın çeşitli yerlerinde yetişmektedir. Bu çalışmada, şeftali odunu yüzeylerine ait shore - D sertlik değeri ve yüzey pürüzlülüğü parametreleri araştırılmıştır. Şeftali odununa ait deney örneklerinin yüzeyleri 80, 100, 120, 150 ve 180 numaralı zımparalar ile zımparalanmıştır. Daha sonra yüzey pürüzlülüğüne ait R_a, R_z ve R_q parametreleri ve shore - D sertlik değeri belirlenmiştir. Araştırma sonuçlarına göre, varyans analizleri için R_a, R_z ve R_q parametrelerine ait zımpara numarası anlamlı olarak elde edilmiştir. Shore - D sertlik değeri 54.80 olarak belirlenmiştir. Bütün pürüzlülük parametreleri için zımpara numarasının artması ile pürüzlülük değerlerinin azaldığı görülmüştür.

Anahtar kelimeler: Şeftali ağacı, Yüzey pürüzlülüğü, Shore - D sertlik, Ahşap.

1. INTRODUCTION

Peach (*Prunus persica* L.) is a deciduous tree species belonging to the "Rosaceae" family. The tree is 4 - 10 m in height (Martinez-Gomez et al., 2003).

It belongs to Prunoideae (Hesse, 1975) with 8 basic and 16 somatic chromosome numbers (2n = 16). Although peaches are originally from Iran, peaches originally came from Central Asia. It has been civilized in China, where cultivation has been documented for more than 3000 years. Its botanical name comes from the Asia Minor region brought by Alexander the Great and silk merchants from China in the 3rd century BC. After that, Roman armies spread them to the Mediterranean basin and from there to the whole of Europe. From the 16th century, it reached America through Spanish and Portuguese expeditions (Bassi et al., 2016).

The introduction of peach to Ethiopia and North Africa entered a period of exploration and colonization by Europeans in the 16th and 17th centuries (Scorza & Sherman, 1996).

Recent fossil evidence has revealed that it was domesticated as early as 7.500 years (Zheng et al., 2014). In India it is grown only in Himachal Pradesh, Kashmir and Uttar Pradesh (Nadkarni, 1976; Pulliah, 2006; Bhattacharjee, 2000).

Peach is the third most abundant fruit worldwide after apple and pear (Abidi et al., 2018). It can be used as a fresh, dried or frozen fruit and is an essential part of the human diet (Zhao et al., 2015). Peaches have adapted to a wide variety of climates, from cold temperate to tropical climates (Byrne et al., 2012).

Peach is one of the most important fruit crops in the world in terms of production reaching 18 million tons with 1.6 million ha of cultivation area (FAOSTAT, 2010).

In peach trees, seasonal growth of stems, leaves, and stemwood decreases as crop load increases (Miller & Walsh 1988; Blanco et al., 1995; Grossman & DeJong 1995). It is grown in temperate regions for its fruits with nutritional and therapeutic value (Lim, 2012, Cantín et al., 2009).

This tree produces edible juicy fruit (Martinez-Gomez et al., 2003). Fruits are popular worldwide for their pleasant aroma and delicious taste, as well as suitability for industrial food processing (Layne & Bassi 2008). Fruit ripening periods can be as long as six to eight months (Byrne et al., 2012).

Fruits are considered a functional food due to their low calorie content and high levels of antioxidants, vitamins, minerals and fiber, and are important in preventing oxidative stress and the onset of degenerative diseases, including cardiovascular diseases and cancer (Lim, 2012; Cantín et al., 2009).

A semi - drying oil is obtained from the seed (Schery, 1954). It is used instead of almond oil in skin creams (Bown, 1995).

The seeds are traditionally used in Korea, Japan, China and other Asian countries as an anti-

asthma, antitussive, emollient, laxative, analgesic, and sedative (Lim, 2012).

It is used as a gum glue obtained from its body (Howes, 2002). Rotten leaves, when rubbed into any container, will remove strong odors such as garlic or cloves as long as they are thoroughly cleaned before any grease (Grieve, 1964).

Green (Grae, 1974) and yellow (Moerman, 1998) dye can be obtained from the leaves. A dark gray to green dye can be obtained from the fruit (Grae, 1974).

The bark is traditionally used as a sedative, diuretic, expectorant and sedative (Lim, 2012). Methanolic extract obtained from the peel is anti-bacterial and antioxidant (Raturi et al., 2011).

Typically it has high flower fertilization rates (Faust & Timon, 1995). Flowers are used in traditional medicine as diuretic, sedative, vermifuge and laxative (Lim, 2012). Peach blossoms show light protection against UV radiation when applied topically; Compounds responsible for this effect are kaempferol glycosides, including multiflorin B (Kim et al., 2000; Kim et al., 2002; Heo et al., 2001).

The amount of extractive material in the fruit seed of peach was 3.5%, soluble lignin 3.2%, insoluble lignin 36.4%, holocellulose 56.7%, alpha cellulose 24.7% and ash 1.5% (Wechsler et al., 2018).

Thermal conductivity value of 0.155 k (W/mK) and density of 0.641 g/cm^3 were obtained in peach wood (Cavus et al., 2019).

In this study, surface roughness parameters (R_a, R_z and R_q) obtained after applying different abrasives and shore - D hardness values were determined.

Surface roughness is important in the general assessment of quality wood surfaces (Csanády et al., 2015).

It is seen in the literature research that no anatomical, mechanical, physical, chemical and biological research of peach wood has been done. It is aimed that these results will provide important information to the literature world of peach tree wood.

2. MATERIAL AND METHODS

2.1. Material

In this study, peach (*Prunus persica* (L.) Batsch.) wood was selected as the tree species. Test samples were prepared in 10 x 10 x 2 cm dimensions. Air conditioning processes were made on the samples (ISO 554, 1976).

2.2. Methods

Wooden specimens of the peach tree species with dimensions of 10 x 10 x 2 cm were sanded with 80, 100, 120, 150 and 180 numbered sanders.

2.3. Determination of Surface Roughness

Surface roughness measurements on peach wood were determined on the JTKY JD - 520 model (Beijing Jitai Tech Detection Device Co., Ltd., Tongxia Gongyuan, Huilongguan, Beijing, China) (Figure 1A), by taking 10 measurements according to ISO 16610-21 (2011) standard. The

surface roughness measurement was made perpendicular to the fibers, with a sample length of 2.5 mm and a sample length of 5 (cut-off). A total of 10 measurements were taken from each sample.

2.4. Determination of Shore - D Hardness

Shore - D hardness value is with 5 kg load applied on shore meter (Stand: model Ld-J Loyka and Durometer: Shenzhen Yibai Network Technology Co., Ltd., Guangdong, China) (Figure 1B), ASTM D 2240, (2010) standard 10 measurements were taken.

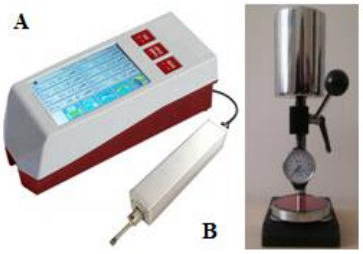

Figure 1. Surface roughness tester (A) and Shore - D hardness tester (B)

2.5. Statistical analysis

In this study, analysis of variance, standard deviations, minimum and maximum values, homogeneity groups, averages and coefficients of variation were determined using a SPSS program.

3. RESULTS AND DISCUSSION

Table 1 shows the result for the shore - D hardness value determined in peach wood. According to this result, shore - D hardness value was obtained as 54.80 and it was determined that it ranged from 52.00 to 57.00 (Table 1).

Using the studies in the literature, the comparison of the value determined in the peach tree and the shore - D hardness values determined in some tree species is given in Table 2.

It had reported in the literature that hardness varies greatly from tree to tree (Şanıvar & Zorlu 1980).

The variance analysis result determined for the surface roughness parameters in peach wood is given in Table 3. According to Table 3, it is seen that the surface treatment application is significant for the parameters of surface roughness R_a, R_z and R_q in peach wood.

The results of the surface roughness parameters (R_a, R_z and R_q) determined in the experimental samples of peach wood are given in Table 4. While the highest R_a, R_z and R_q) parameters were obtained on the test samples with sanding process 80, the lowest R_a, R_z and R_q parameters were obtained on the samples 180 sanded. It is seen that the roughness parameters (R_a, R_z and R_q) decrease with the increase of the abrasive number (Table 4).

The comparison of the surface roughness parameters (R_a, R_z and R_q) determined in some tree species are given in Table 5. The results obtained in this study were consistent with literature studies. Sulaiman et al. (2009) in Rubberwood (*Hevea brasilinsis*) wood, Vitosytė et al. (2015) by birch (*Betula* L.), ash (*Fraxinus excelsior* L.), scotch pine (*Pinus sylvestris* L.), European spruce (*Picea abies* L.), for common alder (*Alnus glutinosa* L.) wood, the surface roughness studies performed by Tiburcio (2009) and Varanda et al. (2010) in *Eucalyptus grandis* provide better surface quality with the increase of

abrasive numbers. It has been reported. Surface roughness is an important feature in wood technology (Csanády et al., 2015).

The concept of surface roughness is often associated with the least possible roughness caused by a cutting or abrasive tool (Davim, 2013). The size of the irregularities and shapes depends on various factors and they are interrelated and some of them are; dental traces or waves created by anatomical structure (traheid diameter, thickness of cell walls, vessel size, etc.), machining method (planer, sandpaper, etc.), and vibrations and misalignment of axes, etc. It has been reported that there are variations produced in the processing process such as (Ritcher et al., 1995).

Table 1. Result for shore - D hardness value determined in peach wood

Number of Measurements	Mean	Standard Deviation	Minimum	Maximum	Coefficient of Variation
10	54.80	1.87	52.00	57.00	3.42

Table 2. Comparison of Shore - D hardness values determined for some wood species

Wood Type	**Shore - D**	**Reference**
Poplar (*Populus alba* L.)	31.50	Akçay (2020)
Ayous (*Triplochiton scleroxylon* K. Schum.)	37.65	Ayata (2020)
Scots pine (*Pinus sylvestris* L.)	39.20	Akçay (2020)
Simul (*Salmalia malabarica*)	40.00	Devi & Maji (2012)
Lime (*Tilia grandifolia* Ehrh.)	40.40	Akçay (2020)
Poplar (*Populus* spp.) sapwood	42.35	Li et al. (2018)
Loblolly (*Pinus taeda*) çamı	42.60	Mattos et al. (2015)
Poplar (*Populus* spp.)	43.52	Dong et al. (2015)
Fig (*Ficus hispida*)	45.00	Hazarika & Maji (2013)
Poplar (*Populus tomentosa* Carr.)	46.35	Yan (2015)
Rubber wood (*Hevea brasiliensis*)	46.57	Devi et al. (2003)
Pinus sp.	48.40	Dos Santos et al. (2016)
Poplar (*Populus beijingensis* W. Y. Hsu)	51.80	Chu et al. (2016)
Birch (*Betula pendula* L.)	52.60	Ayata & Bal (2020b)
Beech (*Fagus orientalis* L.)	52.80	Akçay (2020)
Peach (*Prunus persica* (L.) Batsch.)	**54.80**	**In this study**
Monkey pod (*Pithecellobium saman* (Jacq.) Benth.)	71.70	Çamlıbel & Ayata (2020)
Black locust (*Robinia pseudoacacıa* L.)	79.35	Ayata & Bal (2020c)

Table 3. Variance analysis result for surface roughness parameters in peach wood

Test	Source	Sum of Squares	DF	Mean Square	F	Sig.
R_a	Sandpaper number	83.834	4	20.958	459.894	0.000*
	Error	2.051	45	0.046		
	Total	720.590	50			
R_q	Sandpaper number	124.945	4	31.236	369.409	0.000*
	Error	3.805	45	0.085		
	Total	1170.118	50			
R_z	Sandpaper number	3460.477	4	865.119	117.561	0.000*
	Error	331.150	45	7.359		
	Total	40329.809	50			
*: Significant						

Table 4. Results for the surface roughness parameters (R_a, R_z and R_q) in peach wood

Surface Roughness Parameter	Sanding Number	Number of Measure-ments	Mean (µm)	Stan-dard Devi-ation	Homo-geneity Group	Mini-mum	Maxi-mum	Coeffi-cient of Variation
R_a	80	10	5.554	0.39	A*	5.119	6.127	7.07
	100	10	4.404	0.20	B	4.163	4.751	4.45
	120	10	3.358	0.08	C	3.179	3.445	2.26
	150	10	2.579	0.14	D	2.474	2.935	5.37
	180	10	1.920	0.10	E	1.800	2.118	5.27
R_q	80	10	6.946	0.49	A*	6.365	7.791	7.12
	100	10	5.679	0.33	B	5.338	6.326	5.89
	120	10	4.286	0.10	C	4.062	4.401	2.30
	150	10	3.350	0.20	D	3.179	3.871	5.93
	180	10	2.557	0.13	E	2.404	2.750	5.10
R_z	80	10	39.369	4.33	A*	34.312	46.121	11.01
	100	10	33.343	3.74	B	30.089	40.579	11.22
	120	10	24.832	0.48	C	23.682	25.340	1.94
	150	10	21.453	1.51	D	19.383	23.471	7.05
	180	10	16.167	1.23	E	14.910	18.119	7.59

*: Highest value.

Table 5. Comparison of determined surface roughness parameters (R_a, R_z and R_q) in some wood species

Surface Roughness Parameter	**Sanding Number**	**Peach (*Prunus persica* (L.) Batsch.)**	**Lemon (*Citrus Limon* L.) Burm.)**	**Loquat (*Eriobotrya japonica L.*)**	**Tiama (*Entandrophragma angolense*)**	**Ayous (*Triplochiton scleroxylon* K. Schum)**	**Maun (*Swietenia mahagoni* L.)**	**Oak (*Quercus petreae* L.)**	**Black walnut (*Juglans nigra* L.)**	**Alder (*Alnus barhata* C. A. Mey)**	**Dibétou (*Lovoa Trichilioides*)**	**Dabema (*Piptadeniastrum africanum* Brenan)**	**Birch (*Betula* L.)**	**Ash (*Fraxinus excelsior* L.)**	**Birch (*Betula pendula* L.)**	**Monkey pod (*Pithecellobium saman* (Jacq.) Benth.)**
R_a	**80**	5.554	7.485	7.773	8.119	-	-	-	-	-	12.460	10.872	8.43	6.04	8.278	6.462
	100	4.404	6.515	5.393	6.085	-	-	-	-	-	9.598	7.716	-	-	6.800	5.473
	120	3.358	4.909	4.538	4.558	6.90	11.39	8.76	6.09	5.31	6.013	5.662	5.14	8.64	5.383	4.521
	150	2.579	3.311	3.179	3.676	-	-	-	-	-	5.176	4.052	4.34	4.59	4.252	3.761
	180	1.920	2.113	2.799	2.568	5.30	9.00	5.00	5.07	5.14	4.516	2.720	4.40	4.73	3.858	2.681
R_q	**80**	6.946	9.302	9.743	11.344	-	-	-	-	-	16.292	19.048	-	-	10.320	8.450
	100	5.679	8.295	6.865	9.940	-	-	-	-	-	12.590	14.402	-	-	8.470	7.507
	120	4.286	6.441	5.972	6.807	8.92	16.07	14.08	9.47	6.94	8.766	9.112	-	-	7.039	6.297
	150	3.350	4.536	4.068	4.977	-	-	-	-	-	7.190	6.240	-	-	5.708	5.494
	180	2.557	2.808	3.606	3.455	7.48	13.59	8.44	8.41	6.85	6.350	4.050	-	-	5.430	4.228
R_z	**80**	39.369	48.714	50.870	61.371	-	-	-	-	-	89.314	111.009	59.67	51.39	50.823	44.372
	100	33.343	43.636	37.293	56.476	-	-		-	-	67.697	79.341	-	-	44.928	42.048
	120	24.832	34.732	35.579	40.480	50.23	85.23	79.81	61.01	40.84	55.675	55.552	39.74	77.45	41.763	38.181
	150	21.453	29.009	22.295	30.890	-	-	-	-	-	44.430	40.993	38.98	43.29	35.970	32.837
	180	16.167	19.095	22.382	22.598	45.94	78.99	48.69	56.65	40.61	40.245	31.196	43.59	46.03	34.022	27.786
Refe-rence →		**In this study**	Ayata & Bal (2020a)	Ayata & Bal (2020a)	Ayata & Bal (2020a)	Ayata (2020)	Ayata & Bal (2019a)	Ayata & Bal (2019b)	Ayata & Bal (2019c)	Ayata & Bal (2019d)	Ayata & Bal (2019e)	Ayata & Bal (2019f)	Vitosyte et al., (2012)		Ayata & Bal (2020b)	Çamlıbel & Ayata (2020)

4. CONCLUSION

In this study, surface roughness values and shore - D hardness property of peach (*Prunus persica* (L.) Batsch.) wood were investigated. According to the results, it was concluded that the sanding number of R_a, R_z and R_q parameters were obtained significantly for the variance analysis determined. The Shore - D hardness value was found to be 54.80, and it was determined that the roughness values decreased with the increase of the abrasive number for all roughness parameters.

REFERENCES

Abidi, W., Moreno, M. A., & Gogorcena, Y. (2018). Phenotypic and biochemical diversity in peach [*Prunus persica* (L.) Batsch] cultivars. *Journal of New Sciences, Agriculture and Biotechnology*, *51*(5), 3171-3178.

Akçay, Ç. (2020). Determination of decay, larvae resistance, water uptake, color, and hardness properties of wood impregnated with honeybee wax, *BioResources*, *15*(4), 8339-8354. doi: 10.15376/biores.15.4.8339-8354

ASTM D 2240 (2010). Standard test method for rubber property - durometer hardness, American Society for Testing and Materials, West Conshohocken, Pennsylvania, United States.

Ayata, Ü. (2020). Ayous odununun bazı teknolojik özelliklerinin belirlenmesi ve ısıl işlemden sonra renk ve parlaklık özellikleri. *Mobilya ve Ahşap Malzeme Araştırmaları Dergisi*, *3*(1), 22-33. doi: 10.33725/mamad.724596

Ayata, Ü., & Bal, B. C. (2019a). Maun (*Swietenia mahagoni* L.) odununda yüzey pürüzlülüğü üzerine zımparalama ve planyanın etkisi. Avrasya 4. Uluslararası Uygulamalı Bilimler Kongresi, 27-29 Eylül, Kiev, Ukrayna, 19-22.

Ayata, Ü., & Bal, B. C. (2019b). Sapsız meşe (*Quercus petreae* L.) odununda statik sertlik tayini ve yüzey pürüzlülüğü parametreleri, ISPEC 2. Uluslararası Tarım Ve Kırsal Kalkınma Kongresi, 27-29 Eylül, Kiev, Ukrayna, 22-28.

Ayata, Ü., & Bal, B. C. (2019c). Amerikan ceviz odununda yüzey pürüzlülüğü, janka sertlik değeri ve çivi tutma direncinin belirlenmesi, Çukurova 3. Uluslararası Yenilikçi Bilimsel Araştırmalar Kongresi, 3-6 Ekim, Adana, Türkiye, 440-448.

Ayata, Ü., & Bal, B. C. (2019d). Kızılağaç odununda statik sertlik, yüzey pürüzlülüğü ve çivi tutma direncinin belirlenmesi, III. Uluslararası Akdeniz Orman ve Çevre Sempozyumu, 3-5 Ekim, Kahramanmaraş, Türkiye, 921-926.

Ayata, Ü., & Bal, B. C. (2019e). Dibétou odununda yüzey pürüzlülüğü parametrelerinin araştırılması, Avrasya 5. Uluslararası Uygulamalı Bilimler Kongresi, 15-17 Kasım, Adana, Türkiye, 646-651.

Ayata, Ü., & Bal, B. C. (2019f). Dabema (*Piptadeniastrum africanum* Brenan) odununda bazı yüzey özelliklerinin belirlenmesi, Ziraat, Orman ve Su Ürünleri Alanında Araştırma Makaleleri, Gece Kitaplığı Yayınevi, Ankara, Türkiye, Genel Yayın Yönetmeni: Atilla Atik, Editörler: İsmet DAŞDEMİR, Hüseyin Atilla ATİK, 16 Aralık 2019, 252-266. Matbaa Sertifika

No: 42539, Yayıncı Sertifika No: 15476, ISBN: 978-625-7958-10-3.

Ayata, Ü., & Bal, B. C. (2020a). Tiama, limon ve malta eriği odunlarının zımparalanmasında zımpara tanecik büyüklüğünün yüzey pürüzlülüğüne etkisi, Gece Kitaplığı Yayınevi, Ankara, Türkiye, Genel Yayın Yönetmeni: Eda Altunel, Editör: Nigar Yarpuz Bozdoğan, 19 Eylül 2020, 65-81. ISBN: 978-625-7243-66-7.

Ayata, Ü., & Bal, B. C. (2020b). Determination of surface roughness, nail holding resistance and shore - D hardness value of birch wood, 4th Asia Pacific International Modern Sciences Congress, 12- 13 December 2020 Subic Bay Freeport Zone, Philippines College of Subic Montessori - Subic Bay, 611-622.

Ayata, Ü., & Bal, B. C. (2020c). Yalancı akasya (*Robinia pseudoacacia* L.) odununda bazı fiziksel ve mekanik özelliklerinin belirlenmesi. Ziraat, Orman ve Su Ürünleri Alanında Teori ve Araştırmalar II, Gece Kitaplığı Yayınevi, Editör: Prof. Dr. Koray ÖZRENK, Ankara, 199-216.

Bassi, D., Mignani, I., Spinardi, A., & Tura, D. (2016). Peach (*Prunus persica* (L.) Batsch). In: Simmonds MSJ, Preedy VR (eds) Nutritional composition of fruit cultivars, Elsevier Inc., pp 535-571. doi: 0.1016/B978-0-12-408117-8.00023-4

Bhattacharjee, S. K. (2000). Hand Book of Aromatic Plants, 1st ed., Jodhpur, India: Popular Offset Se Blanco rvice Pvt. Ltd; 119-471.

Blanco, A., Pequerul, A., Val, J., Monge, E., & Aparisi, J. G. (1995). Cropload effects on vegetative growth, mineral nutrition and leaf waterpotential in Catherine peach. *Journal of Horticultural Science, 70*, 623-629.

Bown, D. (1995). Encyclopaedia of Herbs and their Uses, Dorling Kindersley, London, ISBN 0-7513-020-31.

Byrne, D. H., Raseira, M. B., Bassi, D., Piagnani, M. C., Gasic, K., Reighard, G. L., Moreno, M. A., & Perez, S. (2012). Peach, In: Badenes, M.L., Byrne, D.H. eds. Fruit Breeding, Handbook of Plant Breeding 8, Springer Science and Business Media LLC, New York, pp. 505-569.

Cantín, C., Moreno, M. A., & Gogorcena, Y. (2009). Evaluation of the antioxidant capacity, phenolic compounds, and vitamin C content of different peach and nectarine [*Prunus persica* (L.) Batsch] breeding progenies. *Journal of Agricultural and Food Chemistry*, 57, 4586-4592.

Cavus, V., Sahin, S., Esteves, B., & Ayata, U., (2019). Determination of thermal conductivity properties in some wood species obtained from Turkey. *Bioresources, 14*(3), 6709-6715. doi: 10.15376/biores.14.3.6709-6715.

Chu, D., Xue, L., Zhang, Y., Kang, L., & Mu, J. (2016). Surface characteristics of poplar wood with high-temperature heat treatment: Wettability and surface brittleness, *BioResources, 11*(3), 6948-6967. doi: 10.15376/biores.11.3.6948-6967

Csanády, E., Magoss, E., & Tolvaj, L. (2015). Surface Roughness of Wood, Quality of Machined Wood Surfaces, Pages 183-236. Online ISBN 978-3-319-22419-0. doi: 10.1007/978-3-319-22419-0

Çamlıbel, O., & Ayata, Ü. (2020), Monkey pod odununda yüzey pürüzlülüğü parametrelerinin ve shore - D sertlik değerinin belirlenmesi. *Mobilya ve Ahşap Malzeme Araştırmaları Dergisi, 3*(2), 93-100. DOI:10.33725/mamad.827211

Davim, J. P. (2013). Wood Machining, 1st Edition, 288 pages, Wiley-ISTE; 1st Edition (April 2, 2013).

Devi, R. R., & Maji, T. K. (2012). Chemical modification of simul wood with styrene - acrylonitrile copolymer and organically modified nanoclay. *Wood Science and Technology*, 46, 299-315. doi 10.1007/s00226-011-0406-2

Devi, R. R., Ali, I., & Maji, T. K. (2003). Chemical modification of rubber wood with styrene in combination with a crosslinker: effect on dimensional stability and strength property. *Bioresource Technology*, *88*, 185-188. doi: 10.1016/S0960-8524(03)00003-8

Dong, Y., Yan, Y., Zhang, S., Li, J., & Wang, J. (2015). Flammability and physical - mechanical properties assessment of wood treated with furfuryl alcohol and nano-SiO_2. *European Journal of Wood and Wood Products*, *73*, 457-464. doi: 10.1007/s00107-015-0896-y

Dos Santos, P. S. B., Erdocia, X., Gatto, D. A., & Labidi, J. (2016). Bio - oil from base - catalyzed depolymerization of organosolv lignin as an antifungal agent for wood. *Wood Science and Technology*, *50*(3), 599-615. doi: 10.1007/s00226-015-0795-8

FAOSTAT, (2010). Food and agricultural organization statistical database, Agriculture Production.

Faust, M., & Timon, B. (1995). Origin and dissemination of peach. In: Janick, J.ed. Origin and Dissemination of Prunus Crops: Peach, Cherry, Apricot, Plum, Almond. *Scripta Horticulturae*, *11*, 11-54.

Grae, I. (1974). Nature's Colors - Dyes from Plants, MacMillan Publishing Co. New York, ISBN 0-02-544950-8.

Grieve, A. (1984). A Modern Herbal, Penguin 1984 ISBN 0-14-046-440-9.

Grossman, Y. L., & DeJong, T. M. (1995). Maximum vegetative growth potential and seasonal patterns of resource dynamics during peachtree growth. *Annals of Botany*, *76*, 473-482.

Hazarika, A., & Maji, T. K. (2013). Effect of different crosslinkers on properties of melamine formaldehyde - furfuryl alcohol copolymer / montmorillonite impregnated softwood (*Ficus hispida*). *Polymer Engineering and Science*, *53*, 1394-1404. doi: 10.1002/pen.23391

Heo, M. Y., Kim, S. H., Yang, H. E., Lee, S. H., Jo, B. K., & Kim, H. P. (2001). Protection against ultraviolet B - and C - induced DNA damage and skin carcinogenesis by the flowers of *Prunus persica* extract. *Mutation Research - Genetic Toxicology and Environmental Mutagenesis*, 496, 47-59.

Hesse, C. O. (1975). Peaches. In: Janick, J., Moore, J., (eds.). Advances in fruit breeding,

Purdue Univ. Press, West Lafayette, Ind. Pp. 285-335.

Howes, F. N. (2002). Vegetable Gums and Resins, Faber.

ISO 16610-21, (2011). Geometrical Product Specifications (GPS) - Filtration - Part 21: Linear Profile Filters: Gaussian Filters, Standard.

ISO 554, (1976). Standard atmospheres for conditioning and/or testing - specifications, International Organization for Standardization.

Kim, Y. H., Yang, H. E., Kim, J. H., Heo, M. Y., & Kim, H. P. (2000). Protection of the flowers of Prunus persicaextract from ultraviolet B - induced damage of normal human keratinocytes. *Archives of Pharmacal Research*, *23*(4), 396-400.

Kim, Y. H., Yang, H. E., Park, B. K., Heo, M.Y., Jo, B. K., & Kim, H. P. (2002). The extract of the flowers of *Prunus persica*, a new cosmetic ingredient, protects against solar ultraviolet-induced skin damage in vivo. *Journal of Cosmetic Science*, *53*(1), 27-34.

Layne, D. R., & Bassi, D. (2008). The Peach: Botany, Production and Uses, CABI, Wallingford, UK., Pages: 615.

Li, J., Zhang, A., Zhang, S., Gao, Q., Chen, H., Zhang, W., & Li, J. (2018). High-performance imitation precious wood from low-cost poplar wood via high-rate permeability of phenolic resins. *Polymer Composites*, *39*(7), 2431-3440. DOI: 10.1002/pc.24226.

Lim, T. K. (2012). Edible medicinal and non-medicinal plants, vol. 4 - Fruits, Springer Science & Business Media, London, U.K., 2012, 492-509.

Martinez-Gomez, P., Sozzi, G. O., Raquel, S. P., Manuel, R., & Thomas, M. G. (2003). New approaches to Prunus tree crop breeding. *Journal of Food Agriculture and Environment*, *1*(1), 52-63.

Mattos, B. D., Cademartori, P. H. G., Missio, A. L., Gatto, D. A., & Magalhaes, W. L. E. (2015). Wood-polymer composites prepared by free radicalin situ polymerization of methacrylate monomersinto fast-growing pinewood. *Wood Science and Technology*, *49*: 1281-1294. doi: 10.1007/s00226-015-0761-5

Miller, A. N., & Walsh, C. S. (1988). Growth and seasonal partitioning of dry matter in eight-year-old 'Loring' peach trees. *Journal of the American Society for Horticultural Science*, *103*, 309-314.

Moerman, D. (1998). Native American Ethnobotany Timber Press. Oregon, ISBN 0-88192-453-9.

Nadkarni, K. M. (1976). Indian Materia Medica, Ist Vol., Bombay, India: Popular Prakashan, 1036-1037.

Pulliah, T. (2006). Encyclopedia of World Medicinal Plants. India: Regency, 1620-1621.

Raturi, R., Singh, H., Bahuguna, P., Sati, S. C., & Badoni, P. P. (2011). Antibacterial and antioxidant activity of methanolic extract of bark of *Prunus persica*. *Journal of Applied and Natural Science*, 3(2), 312-314.

Ritcher, K., William, C., & Mark, K. (1995). The effect of surface roughness on the performance of finishes. Part 1. Roughness characterization and

stain performance. *Forest Products Journal*, *4*(7/8), 91-97.

Schery, R.W., (1954). Plants for Man.

Scorza, R., & Sherman, W. B. (1996). Peachs. In: Janick, J., Moore, J. N., (eds.), Fruit breeding: tree and tropical fruits 1. Wiley, New York, NY, USA. pp. 325-440.

Sulaiman, O., Hashim, R., Subari, K., & Liang, C. K. (2009). Effect of sanding on surface roughness of rubberwood. *Journal of Materials Processing Technology, 209*, 3949-3955.

Şanıvar, N., & Zorlu, İ. (1980), Ağaç işleri gereç bilgisi temel ders kitabı, Mesleki Ve Teknik Öğretim Kitapları, Milli Eğitim Basımevi, İstanbul, Etüd ve Programlama Dairesi Yayınları No: 43, 472 sayfa.

Tiburcio, U. F. O. (2009). Medição e análise do acabamento superficial da madeira de eucalipto na usinagem de torneamento cilíndrico e lixamento. 2009. 101 p. Tese (Doutorado em Engenharia Mecânica) - Universidade Estadual Paulista, Guaratinguetá.

Varanda, L. D., Alves, M. C. S., Gonçalves, M. T. T., & Santiago, L. F. F. (2010). Influência das varáveis no lixamento tubular na qualidade das peças de *Eucalyptus grandis*. *Cerne, Lavras, 16*: 23-32.

Vitosyte, J., Ukvalbergiene, K., & Keturakis, G. (2012). The effects of surface roughness on adhesion strength of coated ash (*Fraxinus excelsior* L.) and birch (*Betula* L.) wood, *Materials Science (Medžiagotyra), 18*(4): 347-351. doi: 10.5755/j01.ms.18.4.3094.

Vitosytė, J., Ukvalbergienė, K., & Keturakis, G. (2015). Roughness of sanded wood surface: an impact of wood species, grain direction and grit size of abrasive material. *Materials Science*, *21*(2), 255-259. doi: 10.5755/j01. mm.21.2.5882

Wechsler, A., Molina, J., Nunez, M., Ballerini, A., & Cayumil, R. (2018). Peach pits and PP composite. *Santiago: Mendeley*. doi: 10.17632/gvys6g6z6d.1

Yan, Y., Dong, Y., Li, J., Zhang, S., Xia, C., Shi, S. Q., & Cai, L. (2015). Enhancement of mechanical and thermal properties of poplar through the treatment of glyoxal-urea/nano-SiO_2. *Royal Society of Chemistry Advances*, *5*(67), 54148-54155. doi: 10.1039/C5RA07294H

Zhao, X., Zhang, W., Yin, X., Su, M., Sun, C., Li, X., & Chen, K. (2015). Phenolic composition and antioxidant properties of different peach [*Prunus persica* (L.) Batsch] cultivars in China. *International Journal of Molecular Sciences*, *16*(3), 5762-5778. doi: 10.3390/ijms16035762

Zheng, Y., Crawford, G. W., & Chen, X. (2014). Archaeological evidence for peach (*Prunus persica*) cultivation and domestication in China. *PLoS ONE 9*(9), e106595.