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Determination of harvesting time of Bacon, Fuerte and Zutano avocado cultivars in Antalya conditions

Antalya koşullarında Bacon, Fuerte ve Zutano avokado çeşitlerinin hasat zamanının belirlenmesi

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ABSTRACT

In recent years in Turkey, Bacon, Fuerte and Zutano avocado cultivars growing is steadily increasing and reaching important production areas. Presenting the fruit to the market in a healthy condition and in a high commercial quality has a great commercial value. With this reason, the fruit samples were taken from the trees of each cultivar at intervals of 15-20 days between October and May. Some quality criteria (dry weight, fruit flesh firmness, fruit weight loss, taste and fruit skin color) and the interaction among each other were analysed in ripening process of the post-harvest and harvest. As a result, the dry weight (DW) content as the maturity index still yields the most reliable result. It has been found to be directly related to harvesting time along with the taste of the fruit. Medium or high level relationships were observed between cultivars and harvesting time. According to fruit maturity the earliest harvesting time was determined as a period between November and December for Fuerte (23-30% DW), between beginning of November and mid-November for Bacon (20-24% DW), and during November for Zutano (18-20% DW). The most optimal harvest time was decided as a period between January and March for Fuerte (31-36% DW), between mid-November and mid-January for Bacon (25-27% DW), and between beginning of December and mid-January for Zutano (% 21-23 DW). The latest harvest time was determined as a period between April-May for Fuerte (37-38% DW), between mid-January and the End-January for Bacon and Zutano (28-29% DW and 24-25% DW, respectively).

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ÖZ

Türkiye'de son yıllarda Bacon, Fuerte ve Zutano avokado çeşitlerinin yetiştiriciliği, giderek artmakta ve önemli üretim alanlarına ulaşmaktadır. Meyvenin yüksek kalitede ve sağlıklı bir şekilde pazarda sunulabilmesinin büyük ticari değeri olmaktadır. Bu gerekçe ile tüm çeşitlere ait ağaçlardan, Ekim-Mayıs ayları arasında 15-20 gün aralıklarla meyve örnekleri alınmıştır. Hasat ve hasat sonrası olgunlaşma sürecinde bazı kalite kriterleri (kuru ağırlık, meyve eti sertliği, meyve ağırlık kaybı, tat ve meyve kabuğu rengi) ve birbirleri arasındaki ilişkiler analiz edilmiştir. Sonuç olarak, olgunluk indeksi olarak kuru ağırlık (KM) içeriğinin hala en güvenilir sonucu verdiği ve meyvenin tadı ile birlikte, hasat zamanı ile doğrudan ilişkili olduğu tespit edilmiştir. Çeşitler ve hasat zamanı arasında orta veya çok yüksek seviyede ilişkiler görülmüştür. Meyve olgunluğuna göre; erken hasat için Fuerte'de Kasım-Aralık arası (%23-30 KM), Bacon'da Kasım başı-ortası arası (%20-24 KM) ve Zutano'da Kasım ayı boyunca (%18-20 KM) devam eden bir dönem olarak belirlenmiştir. En uygun hasat için Fuerte'de Ocak-Mart arası (%31-36 KM), Bacon'da Kasım ortası-Ocak ortası arası (%25-27 KM) ve Zutano'da Aralık başı-Ocak ortası arası (%21-23 KM) bir dönem olarak saptanmıştır. Geç hasat için Fuerte'de Nisan-Mayıs arası (%37-38 KM), Bacon ve Zutano'da Ocak ortası-sonu arası (sırasıyla %28-29 ve %24-25 KM) bir dönem olarak kararlaştırılmıştır.

1. Introduction

In the horticultural cultivation, 60% of all costs in the production and marketing system occurs in the harvest and post-harvest stages. If the correct procedures are not followed, significant quality loss may occur. Generally, the risk of quality loss is higher into the time from harvest to consumption (Hofman et al. 2002). In addition, due to the competitive pressure resulting from increased market saturation and the globalization of product markets, the importance of quality in the horticultural growing has steadily increased in the last few years (Magwaza and Tesfay 2015). The external appearance of many fruit species for fruit growing can usually not be the correct guide for the internal structure of the fruit or the eating quality (Lee et al. 1983; Wedding et al. 2011). As to quality of avocado fruit, it is affected by different components as visual appearance, the texture of the fruit flesh, the nutritional content and taste, at maturity the dry matter level and the oil content (Lee et al. 1983; Magwaza and Tesfay 2015). As to determining the fruit quality of avocado with these different components is a very compulsive task (Magwaza and Tesfay 2015). On the other hand, the physical properties of avocado fruit, its appearance and aesthetic appeal are the main factors affecting the customer's sense of purchase and their decision (Kassim et al. 2013). The defined physical quality parameters of avocado fruit include the skin color, firmness, physical deterioration in texture and in fruit (Wedding et al. 2011; Kassim et al. 2013) and these parameters vary according to the time of harvesting (Kassim et al. 2013; Bayram et al. 2016).

The time and method of harvesting in avocado are very effective on the ripening process and the shelf life after harvest (Osuna-Garcia et al. 2010; Kassim et al. 2013). Therefore; the determination of maturity and ripening status according to harvesting times for avocado has a very great importance (Osuna-Garcia et al. 2010, 2011) and the correct determination of harvest maturity is one of factors that play an important role on the post-harvest fruit quality (Magwaza and Tesfay 2015). If avocado harvested in the early period at the beginning of the maturity, this case along with undesirable fruit quality it causes to be found in lower level of the dry matter contents of fruit (Kassim et al. 2013; Carvalho et al. 2014). On the contrary, if harvest time is delayed, this case may be cause some changes such as cracking in the fruit bark, fruit drop, deteriorating and browning in the fruit flesh (Flitsanov et al. 2000; Bayram and Tepe 2019). Optimum harvest maturity of avocado is one of the most important factors determining the quality of fruit (Osuna-Garcia et al. 2010; Magwaza and Tesfay 2015) and varies depending on avocado cultivars (Kassim et al. 2013). In order to have the desired quality of the fruit in marketing of avocado, it is necessary to be known the characteristic features of each cultivar and to be defined the maturity criteria (Osuna-Garcia et al. 2010, 2011; Kassim et al. 2013; Bayram et al. 2016).

The objective of this study was to determine the fruit maturity standards and harvest period of Bacon, Fuerte and Zutano cultivars, which are produced in a significant amount in the Mediterranean Region.

2. Material and Methods

This research was carried out at the Fruit Growing Department of Batı Akdeniz Agricultural Research Institute in Antalya between 2010 and 2013 years. Trees of Fuerte, Bacon and Zutano cultivars, which were 20 years old, were used as the material of the study.

The harvesting period studies of the first year were done from October-2010 to June-2011 and the second year studies were conducted between October 2012 and June 2013. Due to frost damage and periodicity, there was no work at the harvest periods in 2011-2012. The experiment was carried out in a completely randomized design (CRD) with three replications and two trees at each replication. Twelve fruit samples were taken from the four sides of trees for each replication at 15-20 days intervals during the harvest period. The harvested fruits were immediately transported to the laboratory and the first analysis was done on the same day. During the harvest period between October-June, the ripening process of fruits was carried out at the room temperature in the laboratory, and the samples were kept for 7 and 14 days without any heating or cooling treatment. Additionally, it was observed that the average temperature in the laboratory condition varied between 18ºC and 30ºC, while the proportional humidity ranged between 25% and 85%.

According to Lee and Coggins (1982) dry weight (%), fruit flesh firmness (kg cm^{-2}) with 3 mm tip, and fruit weight loss (%) were measured. Furthermore, according to C.I.E. L* a * b * color system belonging to Zerbini and Polesello (1984), the color of the fruit skin and of the fruit flesh were determined with Minolta CR-400 chromameter. Additionally, the Chroma (C^*) and hue (h^0) values were calculated as reported by McGuire (1992). Taste analyses were evaluated according to their color, texture and flavour. The taste evaluations were determined with a score of at least 5 panellists according to IPGRI's 1-5 (1: Very bad, 2: Bad, 3: Medium, 4: Good, 5: Very good) scoring principle. Statistical analysis, the physical and chemical features of the fruit samples that were taken at different harvest times were analysed using the JUMP software program and differences between means were determined by LSD test.

3. Results and Discussion

According to the analysis done in ripening process of the harvest and post-harvest; dry weight, fruit flesh firmness, fruit weight loss and taste values determined in Fuerte during 2010-2011 harvest period are given in Table 1, while the color values (L*, C^*, h^0) of fruit skin are given in Table 2. During 2010-2011 and 2012-2013 harvest periods, the values of dry weight, fruit flesh firmness, fruit weight loss and taste determined in Bacon and Zutano cultivars are given in Table 3 and fruit skin color (L*, C^*, h^0) values are given in Table 4.

The dry weight values (%) of Fuerte, Bacon and Zutano cultivars (Table 1); among beginning values of the harvests (0^{th} day) and between each values of the ripening processes (7^{th} or 14^{th} day), although generally found as increased during harvest periods, there detected no relation between the analyses performed in the ripening process for each harvest (0^{th}, 7^{th} and 14^{th} days). As the degree of maturity of avocado fruit varies throughout the harvest period, it directly affects the quality and market value (Olarewaju 2014) and the determination of the most appropriate harvesting time for each cultivar has a great importance (Olarewaju 2014; Bayram and Tepe 2018). Harvesting period is a very effective commercial decision, which is needed to be given, in order to be presented of fruits to the market at the right time and in the desired quality (Bayram and Tepe 2018). Therefore, dry weight content of the fruit of

Table 1. The values of dry matter content (%), fruit flesh firmness (kg cm^{-2}), fruit weight loss (%) and taste (1-5) during harvest and post-harvest ripening process of Fuerte cultivar. (2010-2011 harvest period).

Harvesting Time	Dry Matter (%)*				Fruit Flesh Firmness (kg cm^{-2})*				Fruit Weight Loss (%)*				Taste (1-5)*			
	0th day	7th day	14th day	*LSD***	0th day	7th day	14th day	*LSD***	0th day	7th day	14th day	*LSD***	0th day	7th day	14th day	*LSD***
05 October 2010	18.81 **Bg**	21.30 **Af**	19.32 **ABg**	***2.40***	58.03 **Ag**	50.64 **Ba**	0.00 **Cb**	***5.03***	0.00 **Ca**	10.20 **Ba**	17.01 **Aa**	***4.17***	0.00 **Ba**	0.00 **Be**	3.50 **Acde**	***0.58***
19 October	19.48 **Bg**	21.31 **Af**	20.81 **ABfg**	***1.36***	72.74 **Acd**	46.47 **Bab**	0.00 **Cb**	***15.44***	0.00 **Ca**	7.51 **Bb**	12.41 **Ab**	***2.21***	0.00 **Ba**	4.17 **Abc**	3.67 **Abcd**	***0.74***
03 November	23.14 **Af**	22.91 **Af**	23.02 **Aef**	***2.36***	85.24 **Aab**	52.53 **Ba**	0.00 **Cb**	***13.69***	0.00 **Ca**	4.92 **Bcde**	10.34 **Abc**	***0.58***	0.00 **Ba**	0.00 **Be**	4.00 **Aabcd**	***0.58***
23 November	24.70 **Aef**	23.61 **Aef**	24.54 **Ade**	***1.47***	71.09 **Ad**	50.40 **Ba**	0.00 **Cb**	***15.46***	0.00 **Ca**	4.44 **Bcdef**	9.65 **Ac**	***2.46***	0.00 **Ba**	0.00 **Be**	3.50 **Acde**	***0.58***
12 December	26.58 **Ae**	26.14 **Ade**	25.61 **Ad**	***3.08***	84.69 **Aab**	31.45 **Babcd**	0.00 **Cb**	***6.45***	0.00 **Ca**	3.30 **Bf**	6.50 **Ad**	***2.02***	0.00 **Ba**	4.00 **Abc**	2.67 **Be**	***0.67***
29 December	29.56 **Ad**	27.91 **Ad**	28.57 **Ac**	***3.74***	80.29 **Aab**	51.82 **ABa**	12.11 **Ba**	***53.42***	0.00 **Ca**	3.45 **Bef**	6.75 **Ad**	***1.41***	0.00 **Ba**	0.00 **Be**	4.67 **Aa**	***0.67***
13 January 2011	29.37 **Ad**	28.16 **Ad**	28.45 **Ac**	***3.74***	85.79 **Aa**	22.03 **Bbcde**	0.00 **Bb**	***37.96***	0.00 **Ca**	3.47 **Bef**	6.82 **Ad**	***1.25***	0.00 **Ba**	3.33 **Ad**	3.33 **Ade**	***0.94***
17 February	34.40 **Ac**	32.49 **Ac**	33.44 **Ab**	***3.75***	78.87 **Abc**	0.00 **Be**	0.00 **Bb**	***5.18***	0.00 **Ca**	4.46 **Bcdef**	7.20 **Ad**	***1.62***	0.00 **Ca**	5.00 **Aa**	3.67 **Bbcd**	***2.78***
10 March	37.31 **Aab**	34.43 **Bbc**	34.73 **Bb**	***2.50***	68.73 **Adef**	35.07 **Babc**	0.00 **Cb**	***8.21***	0.00 **Ca**	3.85 **Bdef**	8.29 **Acd**	***2.84***	0.00 **Ba**	4.17 **Abc**	3.67 **Abcd**	***1.10***
23 March	35.33 **Abc**	34.74 **Abc**	35.33 **Aab**	***1.60***	69.51 **Adef**	0.00 **Be**	0.00 **Bb**	***2.06***	0.00 **Ca**	5.29 **Bcd**	8.21 **Acd**	***1.29***	0.00 **Ba**	4.50 **Aab**	4.33 **Aabc**	***0.88***
08 April	37.22 **Aab**	38.00 **Aa**	37.34 **Aa**	***2.55***	70.69 **Ade**	12.19 **Bcde**	0.00 **Bb**	***13.94***	0.00 **Ca**	5.79 **Bc**	8.84 **Acd**	***1.36***	0.00 **Ba**	4.17 **Abc**	4.50 **Aab**	***0.67***
25 April	36.69 **Abc**	36.52 **Aab**	****RF**	***10.18***	67.00 **Adef**	5.66 **Bde**	******RF**	***0.52***	0.00 **Ba**	5.63 **Ac**	****RF**	***0.32***	0.00 **Ba**	4.83 **Aa**	****RF**	***1.08***
10 May	37.74 **Aab**	38.57 **Aa**	****RF**	***4.03***	63.54 **Afg**	6.05 **Bde**	******RF**	***45.78***	0.00 **Ba**	4.75 **Acdef**	****RF**	***1.03***	0.00 **Ba**	4.83 **Aa**	****RF**	***1.08***
24 May	39.90 **Aa**	38.00 **Aa**	****RF**	***14.99***	63.64 **efg**	2.70 **Bde**	******RF**	***32.00***	0.00 **Ba**	9.08 **Bab**	****RF**	***2.84***	0.00 **Ba**	3.77 **Acd**	****RF**	***1.08***
LSD*	***2.46***	***2.91***	**2.38**		***6.49***	***26.91***	***10.71***		***0.00***	***1.54***	***2.35***		***0.00***	***0.58***	***0.75***	

***** The difference between values in the same letter group is not significant (LSD<0.01). ******Capital letters; each harvest shows differences between days 0, 7 and 14. ******* Small letters; It shows the difference between harvest periods. ****** RF:** Rotting fruit.

Table 2. The values of fruit skin color (L*, *C**, h^0) during harvest and post-harvest ripening process of Fuerte cultivar (2010-2011 harvest period).

Harvesting Time	L *			*C**			h^0		
	0th day	7th day	14th day	0th day	7th day	14th day	0th day	7th day	14th day
05 October 2010	41.08 **a**	39.70 **b**	40.22 **abc**	22.67 **c**	21.25 **ef**	21.68 **abc**	57.77 **h**	59.48 **e**	65.84 **cd**
19 October	40.85 **a**	40.44 **b**	40.87 **abc**	22.17 **cd**	22.06 **def**	24.08 **a**	58.72 **fgh**	60.70 **de**	61.65 **e**
03 November	43.03 **a**	39.97 **b**	41.50 **a**	23.19 **c**	19.61 **fg**	21.35 **abc**	52.00 **ı**	59.90 **e**	55.62 **f**
23 November	41.96 **a**	41.04 **ab**	41.96 **a**	24.14 **abc**	22.46 **cdef**	20.52 **bc**	58.83 **fgh**	61.40 **de**	67.56 **abc**
12 December	42.51 **a**	42.95 **a**	41.32 **ab**	26.62 **ab**	26.33 **a**	22.59 **ab**	58.40 **gh**	60.41 **a**	63.11 **de**
29 December	42.58 **a**	41.61 **ab**	40.84 **abc**	25.13 **abc**	24.71 **abcd**	24.21 **a**	60.06 **ef**	60.34 **de**	63.33 **de**
13 January 2011	40.95 **a**	39.64 **b**	39.72 **abcd**	25.17 **abc**	23.89 **abcde**	23.30 **ab**	59.54 **efg**	60.78 **de**	66.22 **bcd**
17 February	41.30 **a**	41.46 **ab**	40.25 **abc**	25.27 **abc**	26.50 **a**	22.29 **abc**	60.97 **de**	63.72 **cd**	69.35 **ab**
10 March	40.90 **a**	40.01 **b**	37.67 **d**	23.31 **c**	24.28 **abcd**	19.15 **c**	61.91 **cd**	62.26 **cd**	66.23 **bcd**
23 March	42.05 **a**	41.25 **ab**	39.11 **bcd**	26.84 **a**	25.38 **abc**	21.70 **abc**	63.03 **bc**	65.30 **b**	69.99 **a**
08 April	40.62 **a**	39.92 **b**	38.82 **cd**	23.65 **bc**	23.18 **bcde**	21.21 **abc**	62.97 **bc**	64.41 **b**	68.40 **abc**
25 April	41.07 **a**	40.03 **b**	****RF**	25.21 **abc**	25.82 **ab**	****RF**	64.53 **ab**	65.48 **b**	****RF**
10 May	41.50 **a**	40.85 **ab**	****RF**	25.03 **abc**	24.43 **abcd**	****RF**	66.02 **a**	68.00 **a**	****RF**
24 May	36.53 **b**	35.35 **c**	****RF**	19.06 **d**	17.55 **g**	****RF**	62.72 **cd**	64.58 **bc**	****RF**
LSD	***2.92***	***2.27***	***2.25***	***3.13***	***2.99***	***3.37***	***1.59***	***2.09***	***3.43***

***** The difference between values in the same letter group is not significant (LSD<0.01). **** RF:** Rotting fruit.

Table 3. The values of dry matter content (%), fruit flesh firmness (kg cm^{-2}), fruit weight loss (%) and taste (1-5) during harvest and post-harvest ripening process of Bacon and Zutano cultivars (2010-2011 and 2012-2013 harvest period).

Cultivars	Harvesting Time	Dry Matter (%)*				Fruit Flesh Firmness (kg cm^{-2})*				Fruit Weight Loss (%)*				Taste (1-5)*			
		0th day	7th day	14th day	*LSD**	0th day	7th day	14th day	*LSD**	0th day	7th day	14th day	*LSD**	0th day	7th day	14th day	*LSD**
Bacon	**05 October 2010**	19.22 **Ac**	19.22 **Ae**	18.96 **Acd**	***1.72***	64.28 **Aab**	43.45 **Bab**	5.03 **Ca**	***18.80***	0.00 **Ca**	12.79 **Ba**	19.37 **Aa**	***3.83***	0.00 **Ba**	0.00 **Bc**	3.00 **Ac**	***0.33***
	19 October	19.84 **Ac**	18.51 **ABe**	17.59 **Bd**	***1.77***	66.53 **Aab**	29.25 **Bbc**	0.00 **Ca**	***5.89***	0.00 **Ca**	8.85 **Bb**	15.36 **Ab**	***3.29***	0.00 **Ba**	4.17 **Aa**	3.67 **Aabc**	***0.94***
	03 November	20.47 **Ac**	19.49 **Ae**	19.98 **Acd**	***2.40***	65.66 **Aab**	48.83 **Bab**	0.00 **Ca**	***9.20***	0.00 **Ca**	6.29 **Bc**	13.22 **Ab**	***2.81***	0.00 **Ba**	0.00 **Bc**	4.33 **Aa**	***0.33***
	23 November	21.65 **Ac**	22.45 **Ad**	21.23 **Ac**	***3.16***	73.05 **Aa**	28.47 **Bbc**	0.00 **Ca**	***28.44***	0.00 **Ca**	5.26 **Bcd**	9.74 **Ac**	***1.92***	0.00 **Ba**	3.50 **Ab**	3.83 **Aabc**	***1.05***
	12 December	25.57 **Ab**	23.33 **Acd**	24.57 **Ab**	***3.82***	61.34 **Abcd**	53.47 **Aa**	0.00 **Ba**	***11.59***	0.00 **Ca**	3.71 **Bde**	7.66 **Acd**	***1.18***	0.00 **Ba**	0.00 **Bc**	4.50 **Aa**	***0.33***
	29 December	25.40 **Ab**	25.11 **Ac**	24.13 **Ab**	***2.16***	72.19 **Aa**	59.92 **Aa**	9.83 **Ba**	***22.23***	0.00 **Ca**	3.34 **Be**	6.74 **Ad**	***1.07***	0.00 **Ba**	0.00 **Bc**	4.17 **Aab**	***0.88***
	13 January 2011	27.56 **Aab**	25.87 **Abc**	26.26 **Aab**	***4.21***	71.95 **Aab**	43.25 **Bab**	0.00 **Ca**	***27.22***	0.00 **Ca**	3.80 **Bde**	8.01 **Acd**	***1.88***	0.00 **Ba**	3.50 **Ab**	3.83 **Aabc**	***0.67***
	17 February	27.47 **Aab**	28.17 **Aab**	26.33 **Aab**	***2.83***	51.51 **Ad**	7.63 **Bcd**	0.00 **Ca**	***20.77***	0.00 **Ca**	4.59 **Bde**	6.65 **Ad**	***1.05***	0.00 **Ba**	3.50 **Ab**	3.33 **Abc**	***1.05***
	10 March	29.74 **Aa**	28.69 **Aa**	28.70 **Aa**	***4.21***	62.44 **Aabc**	28.70 **Bbc**	0.00 **Ca**	***18.29***	0.00 **Ca**	3.55 **Be**	8.27 **Acd**	***2.03***	0.00 **Ca**	3.50 **Bb**	4.00 **Aab**	***0.99***
	23 March	27.81 **Aab**	28.54 **Aa**	28.16 **Aa**	***1.76***	52.53 **Acd**	4.88 **Bd**	0.00 **Ba**	***10.21***	0.00 **Ca**	5.16 **Bcd**	8.00 **Acd**	***1.57***	0.00 **Ba**	4.33 **Aa**	4.33 **Aa**	***0.47***
	LSD	***2.45***	***2.53***	***2.87***		***10.65***	***23.41***	***10.30***		***0.00***	***1.61***	***2.45***		***0.00***	***0.64***	***0.91***	
	08 October 2012	18.48 **Bd**	18.90 **ABd**	20.58 **Ad**	***1.89***	68.25 **Aa**	43.01 **Ba**	0.00 **Ca**	***11.93***	0.00 **Ca**	14.38 **Ba**	28.47 **Aa**	***6.10***	0.00 **Aa**	0.00 **Ae**	0.00 **Ac**	***0.00***
	05 November	22.53 **Ac**	21.70 **Ac**	21.94 **Acd**	***3.82***	72.11 **Aa**	0.00 **Bc**	0.00 **Ba**	***1.81***	0.00 **Ca**	8.04 **Bb**	15.45 **Ab**	***2.26***	0.00 **Ca**	4.67 **Aa**	3.50 **Bab**	***1.05***
	21 November	25.34 **Ab**	23.72 **Abc**	23.55 **Abcd**	***3.84***	45.22 **Ab**	15.80 **Bbc**	0.00 **Ba**	***24.35***	0.00 **Ca**	5.97 **Bc**	12.38 **Ac**	***2.73***	0.00 **Ba**	3.83 **Ab**	4.00 **Aa**	***0.88***
	12 December	26.08 **Aab**	26.09 **Aa**	23.93 **Abc**	***2.59***	43.49 **Ab**	19.58 **Babc**	0.00 **Ba**	***22.76***	0.00 **Ca**	5.47 **Bd**	9.39 **Ad**	***2.49***	0.00 **Ca**	2.33 **Bd**	4.17 **Aa**	***0.74***
	03 January 2013	26.33 **Aab**	25.49 **Aab**	24.93 **Aab**	***2.85***	41.20 **Ab**	33.58 **Bab**	0.00 **Ca**	***1.82***	0.00 **Ca**	4.19 **Bd**	7.12 **Ad**	***1.10***	0.00 **Ba**	0.00 **Be**	3.00 **Ab**	***0.58***
	24 January	27.91 **Aa**	26.54 **Aa**	27.71 **Aa**	***2.74***	28.23 **Ac**	9.51 **ABbc**	0.00 **Ca**	***20.11***	0.00 **Ba**	5.04 **Ad**	8.02 **Ad**	***3.33***	0.00 **Ba**	3.17 **Ac**	3.50 **Aab**	***0.67***
	LSD	***2.16***	***2.29***	***2.97***		***7.19***	***24.66***	***0.00***		***0.00***	***1.87***	***2.97***		***0.00***	***0.55***	***0.98***	
Zutano	**05 October 2010**	16.78 **Ag**	17.31 **Aef**	16.85 **Af**	***1.56***	56.14 **Abc**	46.71 **Ab**	1.89 **Bb**	***22.11***	0.00 **Ca**	11.44 **Ba**	18.53 **Aa**	***4.86***	0.00 **Ba**	0.00 **Bc**	3.00 **Ac**	***0.33***
	19 October	17.34 **ABfg**	15.86 **Bf**	19.04 **Aef**	***1.97***	65.19 **Aab**	46.31 **Bb**	0.00 **Cb**	***7.93***	0.00 **Ca**	7.14 **Bb**	13.71 **Ab**	***1.86***	0.00 **Ba**	4.17 **Aa**	3.67 **Aabc**	***0.94***
	03 November	18.34 **Aef**	18.40 **Ade**	18.37 **Aef**	***1.22***	64.09 **Aabc**	53.23 **Bab**	0.00 **Cb**	***5.65***	0.00 **Ca**	5.29 **Bcd**	11.12 **Ac**	***2.64***	0.00 **Ba**	0.00 **Bc**	4.33 **Aa**	***0.33***
	23 November	19.27 **Ade**	18.39 **Ade**	18.73 **Aef**	***2.47***	59.53 **Aabc**	43.88 **Bb**	0.00 **Cb**	***7.20***	0.00 **Ca**	4.54 **Bcde**	9.91 **Acd**	***1.25***	0.00 **Ba**	3.50 **Ab**	3.83 **Aabc**	***1.05***
	12 December	20.38 **Acd**	19.68 **Ad**	20.25 **Ade**	***2.92***	64.72 **Aab**	54.42 **Bab**	0.00 **Cb**	***3.76***	0.00 **Ca**	3.44 **Bef**	7.03 **Af**	***1.53***	0.00 **Ba**	0.00 **Bc**	4.50 **Aa**	***0.33***
	29 December	21.72 **Abc**	20.10 **Acd**	21.73 **Acd**	***2.25***	68.18 **Aa**	63.54 **Aa**	30.59 **Ba**	***23.51***	0.00 **Ca**	2.95 **Bf**	6.51 **Af**	***1.23***	0.00 **Ba**	0.00 **Bc**	4.17 **Aab**	***0.88***
	13 January 2011	22.11 **Ab**	21.67 **Ac**	20.33 **Acde**	***2.86***	67.23 **Aa**	47.57 **Bb**	0.00 **Cb**	***16.56***	0.00 **Ca**	3.75 **Bef**	7.32 **Af**	***1.38***	0.00 **Ba**	3.50 **Ab**	3.83 **Aabc**	***0.67***
	17 February	25.32 **Aa**	23.97 **ABb**	22.95 **Bbc**	***2.27***	67.00 **Aab**	29.25 **Bc**	0.00 **Cb**	***11.41***	0.00 **Ca**	5.03 **Bcd**	7.87 **Aef**	***2.32***	0.00 **Ba**	3.50 **Ab**	3.33 **Abc**	***1.05***
	10 March	25.03 **Aa**	24.60 **Aab**	24.44 **Aab**	***2.46***	58.11 **Aabc**	53.87 **Aab**	0.00 **Bb**	***6.19***	0.00 **Ca**	4.16 **Bdef**	9.04 **Ade**	***1.48***	0.00 **Ca**	3.50 **Bb**	4.00 **Aab**	***0.99***
	23 March	24.74 **Aa**	26.27 **Aa**	25.79 **Aa**	***3.38***	53.16 **Ac**	5.82 **Bd**	0.00 **Bb**	***12.65***	0.00 **Ca**	5.72 **Bc**	10.65 **Acd**	***0.97***	0.00 **Ba**	4.33 **Aa**	4.33 **Aa**	***0.47***
	LSD	***1.50***	***1.84***	***2.68***		***10.94***	***12.56***	***10.78***		***0.00***	***1.22***	***1.66***		***0.00***	***0.64***	***0.91***	
	08 October 2012	17.24 **Ad**	18.73 **Ac**	18.42 **Ac**	***1.84***	58.74 **Ab**	47.97 **Aa**	18.09 **Ba**	***24.90***	0.00 **Ca**	12.27 **Ba**	24.11 **Aa**	***5.07***	0.00 **Aa**	0.00 **Ab**	0.00 **Af**	***0.00***
	05 November	20.53 **Abc**	20.85 **Abc**	22.76 **Aab**	***4.77***	66.92 **Aa**	43.49 **Bab**	0.00 **Cb**	***7.55***	0.00 **Ca**	8.70 **Bb**	16.09 **Ab**	***2.13***	0.00 **Ba**	0.00 **Bb**	2.17 **Ade**	***0.33***
	21 November	19.36 **Acd**	20.95 **Aabc**	20.60 **Abc**	***4.14***	45.38 **Ac**	33.82 **Aabc**	0.00 **Bb**	***14.40***	0.00 **Ca**	6.64 **Bc**	13.61 **Ac**	***2.47***	0.00 **Ba**	0.00 **Bb**	2.00 **Ae**	***0.33***
	12 December	22.66 **Aab**	23.23 **Aab**	21.59 **Aab**	***4.74***	44.35 **Ac**	34.67 **Aabc**	0.24 **Bb**	***11.33***	0.00 **Ca**	5.59 **Bc**	9.45 **Ad**	***1.71***	0.00 **Ba**	0.00 **Bb**	2.83 **Acd**	***0.33***
	03 January 2013	23.44 **Aa**	24.93 **Aa**	22.51 **Aab**	***3.86***	40.01 **Ac**	27.45 **Abcd**	5.35 **Bab**	***15.62***	0.00 **Ba**	5.23 **Ac**	7.82 **Ae**	***2.96***	0.00 **Ba**	0.00 **b**	3.17 **bc**	***0.88***
	24 January	23.29 **Aa**	23.90 **Aab**	24.08 **Aa**	***2.62***	45.61 **Ac**	18.95 **Bcd**	0.00 **Bb**	***25.21***	0.00 **Ca**	5.78 **Bc**	9.16 **Ade**	***2.34***	0.00 **Ca**	2.67 **Ba**	4.33 **Aa**	***0.47***
	12 February	21.71 **Aabc**	23.76 **Aab**	23.23 **Aab**	***2.42***	40.81 **Ac**	9.51 **Bd**	0.00 **Bb**	***10.07***	0.00 **Ca**	6.23 **Bc**	9.34 **Ad**	***2.62***	0.00 **Ba**	3.00 **Aa**	3.83 **Aab**	***1.33***
	LSD	***2.51***	***4.02***	***2.88***		***7.56***	***20.01***	***14.11***		***0.00***	***1.68***	***1.51***		***0.00***	***0.69***	***0.72***	

***** The difference between values in the same letter group is not significant (LSD<0.01). ******Capital letters; each harvest shows differences between days 0, 7 and 14. ******* Small letters; It shows the difference between harvest periods. ****** RF:** Rotting fruit.

Table 4. The values of fruit skin color (L*, *C**, h^0) during harvest and post-harvest ripening process of Bacon and Zutano cultivars (2010-2011 and 2012-2013 harvest period).

Cultivars	Harvesting Time	0^{th} day	7^{th} day	14^{th} day	0^{th} day	7^{th} day	14^{th} day	0^{th} day	7^{th} day	14^{th} day
Bacon	**05 October 2010**	37.68 **cd**	38.11 **bc**	36.13 **bc**	19.49 **c**	20.55 **cde**	19.25 **abc**	57.17 **c**	57.13 **d**	59.24 **de**
	19 October	37.19 **d**	36.54 **c**	38.56 **ab**	20.27 **c**	18.67 **de**	16.65 **bcd**	57.38 **bc**	58.35 **cd**	68.63 **bcd**
	03 November	38.55 **bcd**	36.01 **c**	37.28 **abc**	21.08 **c**	17.13 **e**	19.09 **bc**	51.57 **d**	56.63 **d**	53.85 **e**
	23 November	37.86 **cd**	37.77 **bc**	37.00 **abc**	20.14 **c**	21.18 **cd**	14.94 **cd**	57.68 **bc**	59.46 **bcd**	72.54 **ab**
	12 December	37.71 **cd**	38.20 **bc**	38.82 **ab**	22.76 **bc**	22.92 **bc**	20.51 **ab**	56.76 **c**	56.87 **d**	62.16 **cde**
	29 December	39.99 **abcd**	39.43 **ab**	39.84 **a**	26.32 **ab**	25.02 **ab**	24.07 **a**	58.65 **b**	58.31 **cd**	60.67 **cde**
	13 January 2011	38.12 **cd**	37.95 **bc**	37.56 **abc**	22.59 **bc**	23.00 **bc**	19.28 **abc**	57.87 **bc**	58.10 **cd**	65.20 **bcd**
	17 February	41.44 **a**	40.14 **ab**	34.64 **c**	27.74 **a**	24.74 **ab**	13.14 **d**	60.15 **a**	62.11 **ab**	79.57 **a**
	10 March	42.22 **a**	40.66 **a**	38.27 **abc**	28.98 **a**	28.08 **a**	19.58 **abc**	60.48 **a**	60.06 **bc**	69.81 **abc**
	23 March	40.74 **ab**	39.32 **ab**	36.49 **abc**	27.30 **a**	23.10 **abc**	16.76 **bcd**	60.29 **a**	62.96 **a**	70.79 **abc**
	LSD	***2.48***	***2.37***	***3.69***	***4.08***	***3.54***	***4.91***	***1.39***	***2.84***	***10.14***
	08 October 2012	37.96	36.62 **c**	38.24 **ab**	23.40 **b**	21.58 **b**	22.77 **a**	54.83 **c**	54.33 **c**	58.90 **b**
	05 November	38.32	37.68 **bc**	37.45 **ab**	23.16 **b**	22.67 **ab**	20.77 **ab**	55.59 **c**	57.64 **b**	60.03 **b**
	21 November	39.01	38.85 **ab**	36.92 **b**	21.25 **b**	21.84 **b**	18.19 **b**	54.90 **c**	55.33 **c**	62.33 **b**
	12 December	38.21	39.02 **ab**	39.03 **a**	26.99 **a**	24.17 **ab**	22.66 **a**	57.80 **b**	57.79 **b**	59.92 **b**
	03 January 2013	39.45	39.60 **ab**	38.88 **ab**	24.23 **ab**	25.93 **a**	24.37 **a**	57.45 **b**	58.33 **b**	60.25 **b**
	24 January	38.97	40.03 **a**	33.30 **c**	27.16 **a**	25.90 **a**	12.23 **c**	59.68 **a**	60.55 **a**	76.95 **a**
	LSD	***1.50***	***2.13***	***2.07***	***3.02***	***3.91***	***4.16***	***1.65***	***1.07***	***4.75***
Zutano	**05 October 2010**	39.64 **f**	38.68 **d**	40.69 **d**	20.92 **e**	19.61 **e**	25.41 **cde**	58.25 **e**	58.36 **c**	63.14 **bcd**
	19 October	41.42 **def**	40.37 **cd**	43.45 **bc**	26.45 **cd**	24.02 **de**	29.43 **abc**	60.39 **cd**	61.07 **bc**	62.34 **cd**
	03 November	43.47 **bc**	40.37 **cd**	41.92 **cd**	28.06 **bc**	24.32 **d**	26.18 **cde**	55.13 **f**	59.42 **c**	57.12 **e**
	23 November	41.02 **ef**	44.25 **ab**	40.12 **d**	24.68 **d**	24.89 **cd**	23.84 **e**	59.63 **cde**	71.37 **a**	59.85 **de**
	12 December	41.53 **cdef**	40.83 **cd**	44.21 **bc**	28.72 **bc**	27.27 **bcd**	28.54 **abcd**	58.85 **de**	58.61 **c**	60.53 **cde**
	29 December	41.93 **bcde**	42.10 **cd**	44.86 **ab**	29.42 **abc**	29.10 **abc**	32.19 **a**	59.25 **de**	59.30 **c**	60.96 **cde**
	13 January 2011	41.50 **cdef**	42.11 **bc**	44.41 **abc**	28.81 **bc**	29.22 **abc**	30.58 **ab**	59.48 **de**	59.81 **c**	62.18 **cd**
	17 February	43.11 **bcd**	43.14 **abc**	47.01 **a**	30.38 **ab**	30.53 **ab**	32.26 **a**	61.64 **bc**	61.02 **bc**	64.02 **bc**
	10 March	45.47 **a**	45.75 **a**	44.65 **ab**	32.35 **a**	33.21 **a**	27.57 **bcde**	64.20 **a**	63.94 **b**	66.45 **b**
	23 March	43.91 **ab**	45.71 **a**	43.66 **bc**	31.00 **ab**	32.00 **a**	25.18 **de**	62.76 **ab**	63.19 **b**	72.57 **a**
	LSD	***2.00***	***2.81***	***2.63***	***3.25***	***4.61***	***4.12***	***2.06***	***3.30***	***4.02***
	08 October 2012	42.95 **cd**	41.10 **d**	43.88 **c**	37.99 **a**	34.15 **a**	33.87	62.84 **a**	62.01 **a**	60.54 **cd**
	05 November	42.02 **d**	41.96 **cd**	45.26 **bc**	35.91 **ab**	33.39 **ab**	33.24	62.19 **a**	61.28 **a**	61.80 **bc**
	21 November	43.85 **c**	43.17 **bcd**	46.50 **bc**	33.60 **bc**	32.47 **ab**	32.96	60.17 **b**	59.95 **b**	61.28 **bcd**
	12 December	45.78 **b**	44.39 **bc**	44.54 **bc**	32.05 **cd**	30.54 **bc**	32.75	59.67 **b**	59.73 **b**	59.61 **d**
	03 January 2013	44.03 **c**	43.27 **bcd**	44.77 **bc**	29.91 **de**	28.79 **cd**	32.12	57.38 **c**	58.92 **b**	60.27 **cd**
	24 January	46.02 **b**	45.84 **ab**	46.99 **ab**	29.50 **e**	28.10 **cd**	31.82	57.37 **c**	57.29 **c**	62.58 **b**
	12 February	48.48 **a**	47.88 **a**	49.40 **a**	28.54 **e**	26.45 **d**	31.61	56.64 **c**	57.15 **c**	66.65 **a**
	LSD	***1.38***	***3.28***	***2.68***	***2.36***	***3.53***	***3.60***	***1.54***	***1.16***	***2.04***

***** The difference between values in the same letter group is not significant (LSD<0.01).

avocado is an important criterion for the determination of maturity time (Mizrach et al. 1999; Kassim et al. 2013; Carvalho et al. 2014). It is a known fact since a long time that the dry weight values of the fruit have increased during the harvest period and therefore, it has changed in a positive way of fruit quality (Arpaia et al. 2003; Ozdemir et al. 2003; Parodi et al. 2007; Osuna-Garcia et al. 2011). Also, in New Zealand Requejo-Tapia et al. (1999) and Pak et al. (2003), in Antalya/Turkey Ozdemir and Topuz (2004) and Bayram and Aşkın (2006), and in Mexico Osuna-Garcia et al. (2010) reported that the dry matter content increased during the harvest period according to the degree of ripening. In addition, it was reported that the dry matter content increased during the harvest period according to the degree of maturity in the many studies, which they were conducted by Requejo-Tapia et al. (1999) and Pak et al. (2003) in New Zealand, by Ozdemir and Topuz (2004) and Bayram and Aşkın (2006) in Antalya/Turkey, and by Osuna-Garcia et al. (2010) in Mexico. In this study, it was found that dry matter content of each cultivar increased to a certain level and to be the most important maturity indicator. However, previously as it was reported by Degani et al. (1986), it was determined that the dry weight content of avocado did not change after harvest (between 0^{th}, 7^{th} and 14^{th} days) and was not a reliable index to determination the physiological changes associated with post-harvest ripening process (Table 1 and 3).

As to fruit flesh firmness values (kg cm^{-2}) of all cultivars, although a regular and distinct change in the beginning of the harvest period cannot be detected in the beginning of the analysis (0^{th} day) during the 2010-2011 harvest period, then a gradual decline in the ongoing process has been observed. However, the fruit flesh firmness values of the Bacon and Zutano cultivars have decreased more prominently during the 2012-2013 harvest period. The process of ripening at the post-harvest was usually completed in 7-14 days for all cultivars. During this ripening process (between 0^{th}, 7^{th} and 14^{th} days), the fruit flesh of all cultivars softened and the firmness values decreased to zero level (Table 1 and 3). The fruit flesh firmness is one of the most reliable and accepted methods for determination the maturity and ripening of avocado (Ginsberg 1985; Magwaza and Tesfay 2015) and the firmness values vary gradually depending on the maturity or ripening process of the fruit (Magwaza and Tesfay 2015). When it used as a measure for determination of the post-harvest ripening stage, the firmness values decreases to near zero level in full ripening (Magwaza and Tesfay 2015). In addition, when these values were evaluated together with the other studies made in Mexico (Villa-Rodríguez et al. 2010; Osuna-Garcia et al. 2011), in New Zealand (Cox et al. 2004) and in Turkey (Bayram and Tepe 2018), the similar results were also obtained from this study for all cultivars and the fruit firmness values decreased during the ripening process.

In Fuerte, Bacon and Zutano cultivars, according to harvesting time, maturity and ripening of fruit (Table 1 and 3), it was determined significant differences in weight loss values (%). Depending on the harvest period of cultivars, higher weight loss values were found in the early and late harvested of fruits. In addition, as the maturity level of the fruit increased, at the same time, the weight loss values decreased. Generally, along with it varies according to cultivars, it was determined as the period in which it was of the lowest weight loss between December and April. This period is determined as a certain specific time for each cultivar. It was observed in average that was found between December 15 and April 15 in Fuerte, between December 15 and the end of March for the first harvest period and between December 15 and the end of January for the second harvest period in Bacon, and between December 15 to February 15 for the first harvest period and throughout January for the second harvest period in Zutano. At the post-harvest, depending on the ripening process (7^{th} or 14^{th} day), the values of weight loss have changed. It has been reported in many studies that the weight loss (%) of the fruit has decreased according to the harvest dates with the increase in fruit maturity (Lee 1981a; Vakis et al. 1985; Osuna-Garcia et al. 2011; Bayram and Tepe 2018). In early harvest (Lee 1981b; Vakis et al. 1985) and especially fruits not matured in more time than 10-11 days (Vakis et al. 1985), it was generally determined that there was a large amount of weight loss and wrinkling of fruit. Consistent with these reports, the weight loss values of the fruit of all cultivars were directly affected by their maturity levels and ripening processes. In addition, as Bayram and Tepe (2018) reported from their post-harvest studies, it was observed that the weight loss of the fruit changed according to the conditions of the ripening environment.

Taste analyses were performed on the 7^{th} day and/or the 14^{th} day, depending on the ripening of the fruit. In these sensory analyses, a certain linear relationship could not be determined during the harvest period, although it usually varied according to the varieties. According to taste analysis made in the fruit; Lee et al. (1983) in his study in California, along with the increase of maturity and fat accumulation in the fruit from September to January, the palatability of Fuerte has been reported to increase rapidly. With the increase in maturation in avocado, it is stated that a less watery texture emerged along with a fruit flesh of softer, smoother and butter-like and at the same time less greenish grass and richer taste are formed (Obenland et al. 2012). As a result, it has been reported that the acceptability of the fruit risen along with the increase of palatability (Lee 1981a, b; Mizrach et al. 1999; Obenland et al. 2012; Kassim et al. 2013; Cañete et al. 2018).

For fruit skin color values (L*, C^*, h^0); although there was a statistically significant difference between October and May for Fuerte, no linear relationship was found between these values throughout the harvest period. However, at the end of May, a reduction in the brightness of the fruit skin and a conversion to a lighter green and yellow color were detected. According to the analysis of Fuerte cultivar which made in ripening process (between the 0^{th}, 7^{th} and 14^{th} days), it was only observed to be some reduction in green color. In the color values of Bacon and Zutano during the two harvest periods, it was generally determined that some increase in the brightness of the fruit skin and at the same time a change in darker green and yellow color direction were found. The color analysis made in the ripening process of these two cultivars, only in Bacon was found a correlation between January and March in 2010-2011 harvest period, which in this time was a change in decrease direction in the brightness with green and yellow color of fruit skin. The skin color of fruit varies between cultivars of avocado (Kassim et al. 2013). However, as the avocado does not ripening on the tree, it is difficult to determine maturity according to the change in the external appearance of the fruit (Lee et al. 1983). In some cultivars, although there is no external and physical change during maturity process, it shows a change from green to light green (Magwaza and Tesfay 2015). Although fruit skin color is one of the indicators that helps to determination of the quality of avocado (Kassim et al. 2013), there is a slow change over a long period. As in this study, although there is a certain difference between the color values of the fruit skin between harvesting times, it is not possible to talk about a very rapid and significant

change. Since, therefore, the quality occurs with the combination of different properties in the fruit, the determination of maturity according to the color of the skin is alone inadequate in the application (Osuna-Garcia et al. 2010, 2011) and its effect is difficult to evaluate (Magwaza and Tesfay 2015; Bayram and Tepe 2019).

The correlation analysis for each cultivar was made to determine of the relationship between harvesting times with maturity and ripening. The correlation coefficients (r) calculated for each harvest period are given in Table 5.

During the ripening process of all cultivars (the 0th, 7th and 14th day); a positive correlation was observed in very high level between harvesting time and values of dry matter, especially in Fuerte cultivar. When analysed relationships between harvesting time and fruit flesh firmness values, especially in the beginning values (0th day) for the 2012-2013 harvest period, it was found to be a negative relationship at a high level (r= -0.91) for Bacon and at a moderate level (r= -0.73) for Zutano. Between the harvest time and the weight loss values of the fruit, a moderate negative relationship was observed in Bacon for both harvest periods. In the Zutano cultivar, especially during the ripening period of 2012-2013 (7th and 14th days), a medium level relationship was found between harvest time with weight loss and taste values. At the same time, especially in the hue values of the 0th and 7th days of the 2010-2011 harvest period (Fuerte) and the 2012-2013 harvest period (Zutano and Bacon), it was found to be a the medium level relationship between harvesting time and fruit skin color. In addition, between the harvest time and the chroma values of the 0th and 7th days of the fruit, a medium level relationship was observed in Zutano for both harvest periods. (Table 5).

The fruit maturity of avocado in horticulture is defined as the period when is properly softened of the harvested fruit and has a minimum acceptable amount of taste (Blumenfeld et al. 1992). In many countries where avocado cultivation is carried out, according to the quality characteristics before and after the harvest, it has been studied to determination of the fruit maturity and harvest period of the cultivars. The minimum dry matter content for determination of fruit maturity was found to be an acceptable index and also increased in a linear line during harvest period (Pak et al. 2003; Gamble et al. 2010; Bayram and Tepe 2018). As the rate of dry matter in the fruit increases, there is being talked about a constant increase in the intention and desire of consumers to buy (Clark et al. 2007; Gamble et al., 2010). Also; according to the maturity preferred of the consumers for avocado, it was determined as values that the dry matter content was between 22-27% , and the post-harvest fruit flesh firmness were 6.5 N or less (Gamble et al. 2010). In accordance with these reports, harvesting times were divided into 3 different periods in order to prevent early or late harvest in a period where Fuerte, Bacon and Zutano cultivars did not have the desired quality characteristics (Bayram and Tepe 2018). The harvest period of each cultivar has defined according to the maturity and ripening process of the fruit.

4. Conclusion

As a result, it was found that the most reliable maturity index was dry weight content, and there was a direct relationship between dry weight content and harvesting time. In cases where this index value was insufficient, taste analysis was determined as the most important factor that helps. Harvesting time of each cultivar were defined with three different harvest periods as early, optimum (most appropriate) and late. Early harvest was determined as a period situated between November and December for Fuerte, between the beginning and the middle of November for Bacon, and throughout November for Zutano. Optimum harvest was determined as a period being between the beginning of January and end-March for Fuerte, between mid-November to mid-January for Bacon, and between the beginning of December and mid-January for Zutano. Late harvest was agreed as an ongoing period between April and May for Fuerte, and between the mid-January and the end-January for Bacon and Zutano.

Table 5. The correlation coefficients (r) found between harvesting time with the fruit ripening and harvest maturity.

Variables		Fuerte	Bacon		Zutano	
X	**Y**	**2010-2011**	**2010-2011**	**2012-2013**	**2010-2011**	**2012-2013**
	Dry matter (0th.gün)	0.95	0.90	0.88	0.95	0.68
	Dry matter (7th day)	0.96	0.93	0.87	0.93	0.64
	Dry matter (14th day)	0.97	0.91	0.83	0.87	0.61
	Fruit flesh firmness (0th day)	-0.28	-0.39	-0.91	-0.09	-0.73
	Fruit flesh firmness (7th day)	-0.70	-0.42	-0.17	-0.44	-0.78
	Fruit flesh firmness (14th day)	0.00	-0.11	0.00	0.02	-0.38
	Fruit weight loss (7th day)	-0.16	-0.70	-0.79	-0.53	-0.70
	Fruit weight loss (14th day)	-0.14	-0.78	-0.84	-0.60	-0.81
	Taste (7th day)	0.65	0.45	0.01	0.45	0.77
Harvesting time	Taste (14th day)	0.32	0.25	0.53	0.25	0.89
	Fruit skin color L (0th day)	-0.31	0.68	0.45	0.60	0.84
	Fruit skin color L (7th day)	-0.25	0.58	0.76	0.71	0.74
	Fruit skin color L (14th day)	-0.54	-0.07	-0.41	0.55	0.53
	Fruit skin color *C* (0th day)	0.07	0.77	0.53	0.72	0.90
	Fruit skin color *C* (7th day)	0.21	0.66	0.68	0.82	0.79
	Fruit skin color *C* (14th day)	-0.08	-0.07	-0.42	0.20	0.21
	Fruit skin color *h* (0th day)	0.82	0.65	0.84	0.67	0.88
	Fruit skin color *h* (7th day)	0.83	0.64	0.82	0.16	0.87
	Fruit skin color *h* (14th day)	0.51	0.45	0.65	0.61	0.57

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