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Determination of Phenological and Pomological Properties and Fatty Acid Contents of Some Wild Almond Genotypes (*Prunus fenzliana* Fritsch) Grown on The Slopes of Mount Ararat

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ABSTRACT

The species *Prunus fenzliana* is acknowledged to be the possible ancestor of cultivated almond (*Prunus amygdalus* L.) and other wild almond species. The objective of this study was to determine phenological and pomological properties and fatty acid composition of the almond species *Prunus fenzliana* Fritsch, which grows naturally on the slopes of Mount Ararat. The study was conducted in 2016 and 2017. The fruit weight with shell, kernel weight, fruit thickness with shell: kernel ratios of the selected almond genotypes were 0.47–0.89 g, 0.13–0.22 g, 0.87-1.31 mm, and 22.38-37.36%, respectively. Double kernelled fruits were encountered in two genotypes [(PFG-10 (6.67%) and PFG-15 (7.14%)]. In 2016, the first flowering, full flowering, and harvesting time of the genotypes ranged from 20-25 March, 24-31 March and 17-23 August, respectively. In 2017, the first flowering, full bloom, and harvest time were observed between 08-12 April, 13-17 April and 4-9 September, respectively. The oleic acid concentration was much higher than in previous studies. In this context, the oleic, linoleic, palmitic, stearic and myristic acid concentrations were 69.2-77.9, 15.2-18.5, 4.6-5.3, 1.2-1.6 and 0.7-1.7%, respectively. The results revealed that genotypes under the *Prunus fenzliana* species could be used as a genetic resource in rootstock breeding programs and could be utilized in chemical and pharmaceutical industry due to its rich fat content.

Keywords: *Amygdalus communis* Spock, Almond breeding, Late flowering almond, Oleic acid, *Prunus amygdalus* L.

INTRODUCTION

Almond (*Prunus amygdalus* L. or *Amygdalus communis* Spock.) belongs to the genus *Prunus* within the family *Rosaceae* within the order *Rosales*. There are approximately 40 almond species under the subgenus *Amygdalus*, 12 of which grow in Turkey (Gülcan, 1976; Özbek, 1977; Socias *et al.*, 1992; Browicz and Zohary, 1996; Şimşek *et al.*, 2010). Among these species, *Prunus fenzliana* Fritsch became prevalent in the Northeastern Anatolia Region of Turkey, Armenia, the western region of Azerbaijan, and the northwestern region of Iran (Kester and Asay, 1975; Ladizinsky, 1999). Plants have bushy forms, 2 to 3 m height, and sometimes 4 m, on rocky slopes at altitudes from 700 to 1800 m (Browicz and Zielinsky, 1984; Denisov, 1988). The fruits are bitter, small, flat, hard-shelled with sparse pores on the shell surface. *P. fenzliana* is acknowledged to be the possible ancestor of cultivated almond owing to the fact that it is easily hybridizable with cultivated almond (*Prunus amygdalus* L.) and other almond species (Grasselly and Crossa-Raynaud, 1980; Ladizinsky, 1999). Almond is an early flowering fruit in Anatolia and is frequently and heavily affected by late spring frosts. Therefore, late flowering of this species is an important characteristic and a criterion for breeding

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(Dicenta *et al.*, 2005; Şimşek, 2015; Gülsoy *et al.*, 2016). *P. fenzliana* is used as a rootstock in almond breeding studies because it is a late flowering species (Graselly, 1976).

Almond grows on rocky, stony, and calcareous soils in Turkey. Almond trees are also grown in dry lands without any dramatic change in their growth since they are drought tolerant (Browicz and Zohary, 1996). Wild almond species have potential for large-scale adaptation since they are resistant to abiotic and biotic stress. Therefore, they are valuable as genetic resources for breeding studies (Gradziel *et al.*, 2001).

While sweet almond fruits are used in snack, confectionary, and chocolate productions, almond oil, obtained from bitter almond fruits, is utilized as raw in cosmetic, chemical, and paint industries. Some biochemical materials (amygdalin, prunasin etc.) contained in its fruit and leaves are used in pharmaceutics and medicine (Cherif *et al.*, 2004; Şimşek, 2016). *P. fenzliana* is one of the fruits with recently increasing levels of production owing to its high nutrition levels and benefits to human health. The increase in the production throughout the world is related to the increase in consumer awareness regarding the benefits to human health (Yen-Chen *et al.*, 2006).

Monounsaturated fats in almond kernels are rich in fiber, α-tocopherol, magnesium and copper (Kamil and Chen, 2012; Şimşek and Kızmaz, 2017). Especially, because of being rich in unsaturated fatty acids including linoleic and oleic acids, they increase good cholesterol (HDL) levels, decrease bad cholesterol levels, and minimize the risks of cardiovascular diseases and heart attacks (Davis and Iwahashi, 2001).

To our knowledge, no studies on phenological and pomological properties and fatty acid contents of wild almond genotypes have been reported from plants growing on the slopes of Mount Ararat. The objectives of this study were to determine phenological and pomological properties and fatty acid composition of in situ *Prunus fenzliana* Fritsch plants growing in this region of Turkey.

MATERIALS AND METHODS

This study was carried out in Turkey near the Iranian border within Aralık District of

Figure 1. Map of the study region (GE, 201**8**).

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Iğdır Province, in 2016 and 2017. It was performed in altitudes changing between 1237 and 1272 m asl on the slopes of Mount Ararat, at 39° 44 307′ N and l0 44° 29.188′ E (Figure 1). Fifteen almond trees (*Prunus fenzliana* Fritsch) growing naturally were studied in the region (Figures 2 and 3). Phenological observations and pomological analyses were performed each year and the total fat and fatty acid contents of the genotypes were determined. Fifteen trees were chosen for study and labelled. The same trees were studied in each year.

Figure 2. Pictures of *Prunus fenzliana* tree.

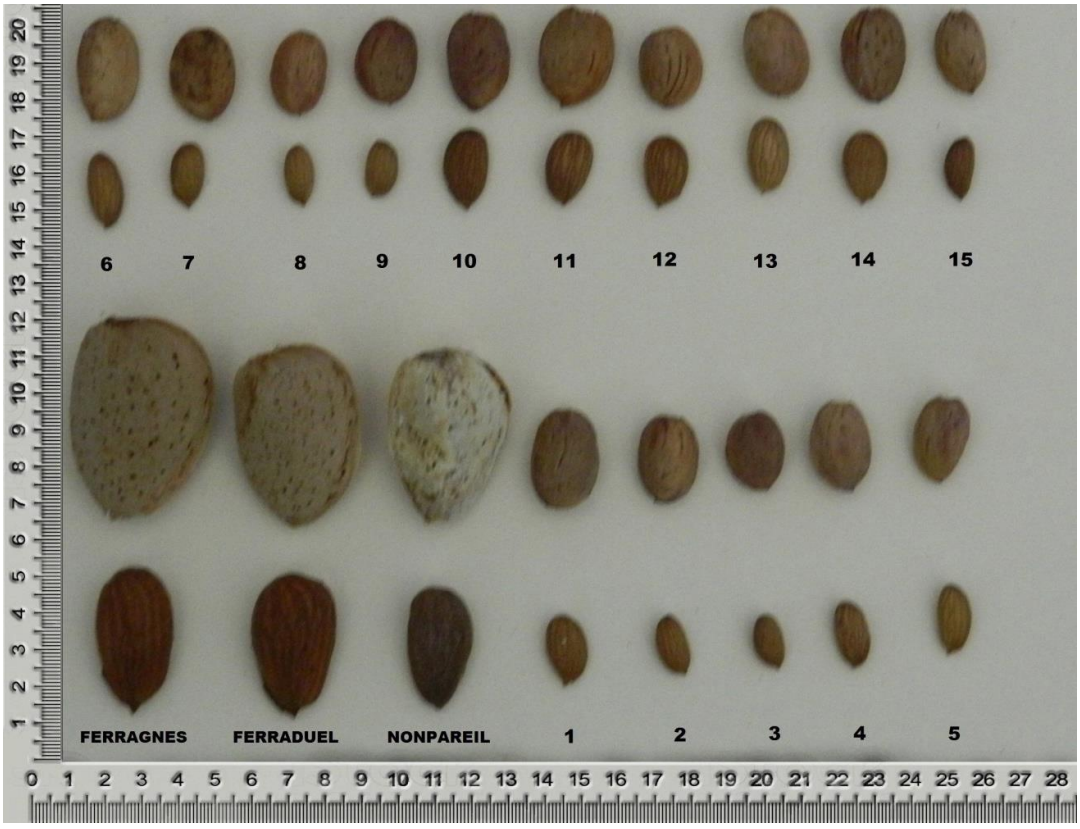

Figure 3. The fruit with shell and kernel of some standard almond cultivars and wild almond genotypes.

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Phenological Observations

Dates of the first flowering, full flowering, and harvest season were recorded for each plant.

Pomological Properties

Pomological analyses were performed on ten fruits of each tree, which were sampled three times. Weight of each fruit with shell and kernel was measured (g) using digital balance with a scale sensitive to 0.01 g. The height, width, and the thickness (mm) of the fruit and kernel were measured with a digital caliper. In addition, pomological properties such as fruit shape, shell color, outer shell porosity degree, kernel color, shriveling of kernel, kernel hairiness, taste, status of separation from the shell, and suture opening of the genotypes were assessed by a visually.

Total Fat and Fatty Acid Contents

Fifteen samples were analyzed in triplicate for fat and fatty acids. Fatty acid and oil content assays were made independently on seeds from each tree each year. The total fat contents of wild almond genotypes were obtained by introducing 60-80 mL of hexane to 5 g of ground dry almond kernels for each genotype extracting the mix in Soxhlet extraction device for 6 to 8 hours and finally scaling their weight before and after the extraction (AOAC, 1990). Gas Chromatography (GC) analysis was used to prepare fatty acid methyl esters (FAME) from 0.1 g of fat sample dissolved in 2 mL of heptane, into 0.2 mL of 2M methanolic KOH solution. The solution was shaken strongly for 30 seconds and was let idle until the supernatant liquid became clear. The heptane solution was injected into GC. FAME analysis was performed on a 60 m capillary column (ID= 0.25 mm) covered with an Agilent 6890 series gas chromatograph with a flame ionization detector, and 0.25 um and 50% cyanopropyl methylpolysiloxane (J & W Scientific, Folsom, CA, the USA). Helium gas was used as carrier with a flow rate of 30 mL m^{-1} and 1:50 ratio, and the temperatures of the injector and the detector were adjusted to 260 and 280°C, respectively. The oven temperature was programmed for a retention time of 1 minute at 120°C, and the temperature was raised to 170°C with 6.5°C min^{-1} rate, and finally to 215°C with 2.15°C min^{-1} rate. Fatty acid methyl esters were defined by using standard FAMEs (Supelco-47885-U) and calculated with their percentage values (Dieffenbacher and Pocklington, 1992; Batun *et al.*, 2017).

Statistical Assessment

The statistical package program SPSS 17.0 was used to determine the significance of difference among genotypes with Duncan's multiple range test. The *P* values of less than 0.05 were considered statistically significant (George, 2011).

RESULTS AND DISCUSSION

Phenological Observations

Almond is the leading early-flowering species among fruit species. Therefore, it is one of the fruits most affected by spring late frosts. One of the most important breeding goals is late flowering to avoid frost damage (Monastra and Raparella, 1997; Socias *et al.*, 1999; Şimşek, 2015). In this context, phenological observations of the genotypes in this study are presented in Table 1.

Flowering periods of the observed genotypes were recorded for two years. The first flowering, full flowering, and harvest periods of *P. fenzliana* were observed to be 20-23 March, 24-30 March and 17-21 August in 2016, respectively, and they were observed to be 8-10 April, 13-15 April and 4-7 September in 2017. Approximately a three-week delay in flowering and harvest periods was observed in 2017 (Figures 4 and 5). Five to six days differences among the

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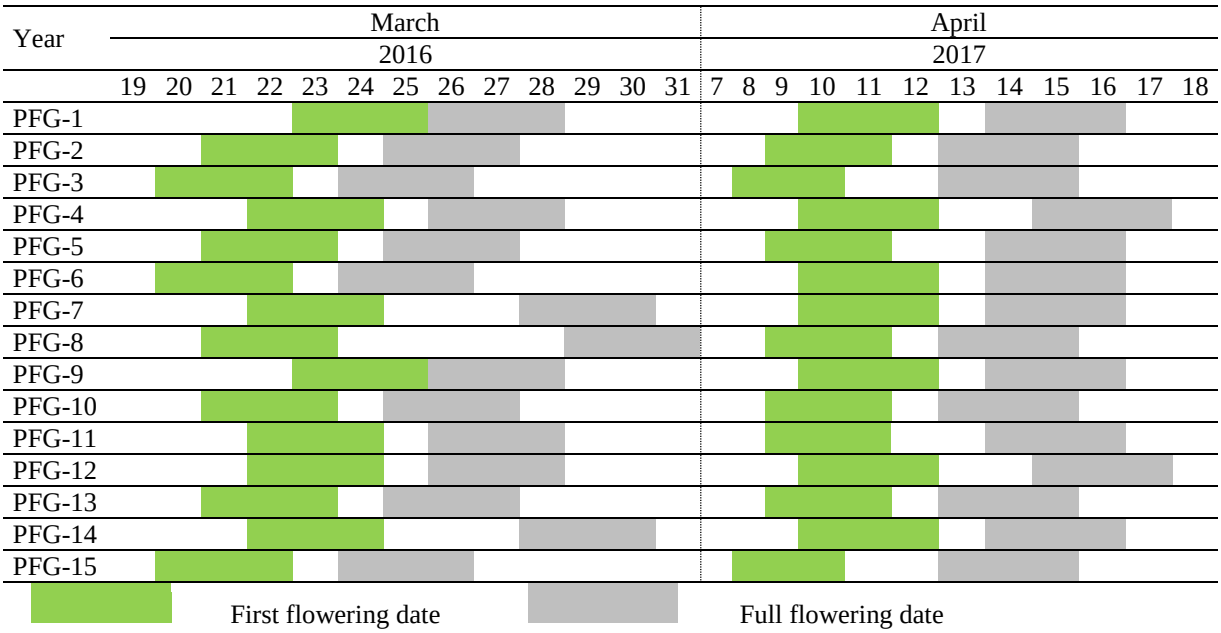

Figure 4. Phenogram of flowering time of some wild almond genotypes growing on the slopes of Mount Ararat.

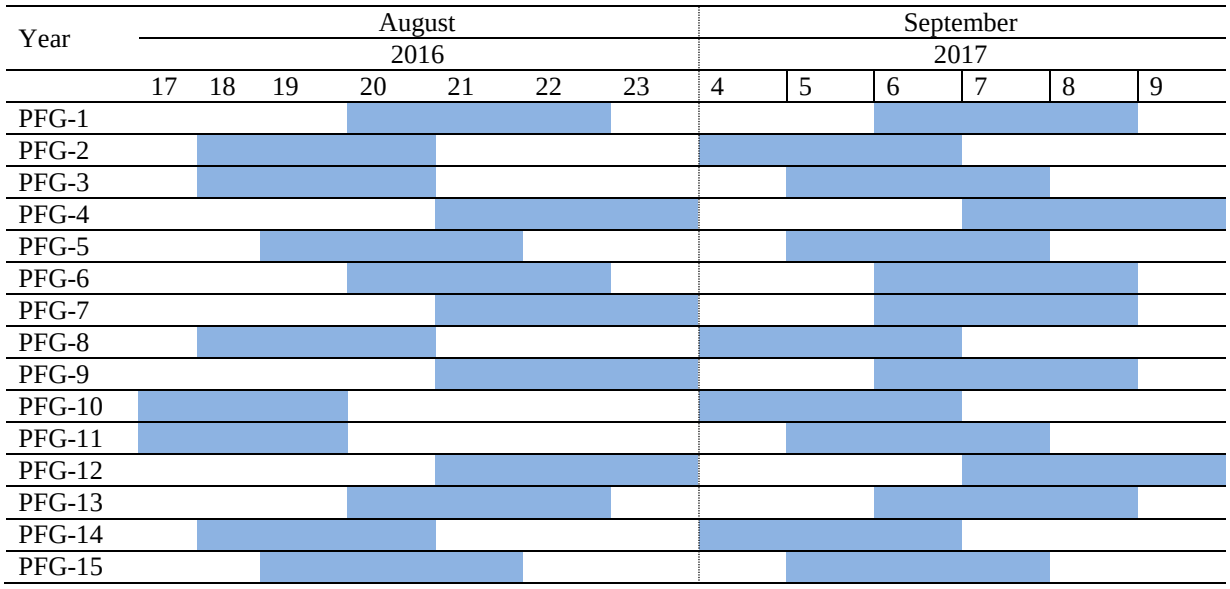

Figure 5. Phenogram of harvesting time of some wild almond genotypes growing on the slopes of Mount Ararat. PFG: Prunus Fenzliana Genotype.

genotypes were observed regarding the flowering periods. The differences between the flowering periods are thought to result from difference among them in ecology at the elevation where they grow, in addition to genetic differences. It has been reported in similar studies that some almond species flower later than standard types. Indeed, Gradziel *et al*. (2001) stated that two selections of *P. bucharica* flower later than Nonpareil and Legrand almond cultivars,

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while Ak *et al.* (2001) reported *Amygdalus turcomanica* flowers late.

Pomological Properties

According to the two-year means, statistically significant differences (P< 0.05) were found in fruit weight, fruit length and width, fruit thickness, kernel weight, height, width and thickness, shell thickness, and kernel ratios (Table 2). In this context, the fruit weights, length, width, and thicknesses with shell, and kernel weights, shell thicknesses, and kernel ratios of the genotypes ranged from 0.47 to 0.89 g, 14.69 to19.96 mm, 9.93 to13.67 mm, 6.30 to 7.38 mm, 0.13 to 0.22 g, 0.87 to 1.31 mm, and 22.38 to 37.36%, respectively.

Ak *et al.* (2001) found the average fruit weight, fruit length and fruit width with shell, and kernel weight were 6.21 g, 15.33 mm, 9.04 mm and 0.51 g, respectively, in *Amygdalus turcomanica*; and 8.58 g, 19.16 mm, 14.17 mm and 1.27 g, respectively, in *Amygdalus webbii*. Bayazit (2007) reported that the fruit weights of the species *Amygdalus orientalis* and *Amygdalus turcomanica* growing in the Southeastern Anatolia region of Turkey were 8.70-9.17 g and 9.18-9.24 g, respectively, while their kernel fruit weights were 0.17-0.19 g and 0.15-0.18 g, respectively. Khadivi-Khub and Anjam (2014) stated that the fruit weight with shell, the fruit height with shell, the fruit width with shell, shell thickness, and kernel weight of *Prunus scoparia* were in the range of 1.50 to 2.50 g, 12.70-25.00 mm, 7.50-20.90 mm, 0.20-0.88 mm, and 0.30-0.87 g, respectively. The shelled and kernel fruit weights of the species *Prunus fenzliana* were lower than the fruits of wild almond species analyzed in previous studies, which may have resulted from the genetic properties of *Prunus fenzliana* and ecological conditions in which it grows.

Double kernelled fruits were found only in two genotypes: PFG-10 (6.67%) and PFG-15 (7.14%). According to Beppu *et al.* (2001), the possibility of having double kernels increases when trees are exposed to high temperatures during the flower differentiation period. This situation may be due to genetic factors.

Among the 15 analyzed genotypes, in terms of taste, 4 were bitter and 11 were extremely bitter; in terms of shell shape, 2 were long and narrow, 4 were oval and 9 were long and oval; in terms of almond kernel color, 2 were dark, 5 were mid-light and 8 were light; in terms of shell porosity degree, 3 had deep groove and 12 were less porous; and lastly, in terms of shriveling of kernel, 6 were smooth and 9 were less wrinkled. In addition, every genotype was found to be little hairy, fully separated from the shell, and not open suture of the shell. Separation from the outer shell is an important property of almonds, and among the desired properties for breeding. All genotypes had high levels of separation from the shell (Table 3).

Total Fat and Fatty Acid Contents

Differences among genotypes were significant (P< 0.05) for the total fat and all five fatty acids i.e. myristic, palmitic, stearic, oleic and linoleic acids contents. For all 15 genotypes, the total fat content ranged from 43.6 to 71.4%. Hosseinzadeh *et al.* (2019) reported that the total fat contents of the almond species *Amygdalus scoparia, Amygdalus hauskenechtii and Amygdalus dulcis* were 44.4, 47.8, and 51.4%, respectively. The range in oleic acid content of wild almond genotypes was 69.2-77.9%, while their linoleic acid content ranged from 15.2 to 18.5% (Table 4). Oleic and linoleic acids were found to represent the highest concentration followed by palmitic, stearic, and myristic acids. Stepanenko *et al.* (1970) reported the oleic acid contents of *Amygdalus communis (*64.7%), *Amygdalus spinosissima (*66.3%), *Amygdalus bucharica (*67.9%), and *Amygdalus petounnicovii (*66.4%), while their linoleic acid contents were 23.7, 21.6, 24.3, and 27.3%, respectively. In addition, it was found in the same study that the fatty acid composition of wild almonds was similar to that of

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Table 2. Pomological properties of wild almond genotypes grown on the slopes of Mount Ararat (averages 2016-2017).[a]

Genotype No	Fruit weight (g)	Fruit thickness (mm)	Fruit width (mm)	Fruit length (mm)	Kernel weight (g)	Kernel thickness (mm)	Kernel width (mm)	Kernel length (mm)	Shell thickness (mm)	Kernel ratio (%)	The full kernel ratio (%)	Percentage of double kernel (%)
PFG-1	0.78b	6.83c-e	12.90b	18.80ab	0.21ab	3.84c-f	8.04ab	14.48a	1.22ab	27.54b-f	97.20b	0.00b
PFG-2	0.62de	6.34g	10.95e	16.20de	0.14hg	3.59f	6.37ef	12.37ef	1.07cd	22.38f	100.00a	0.00b
PFG-3	0.55ef	6.65ef	10.77ef	15.74de	0.14hg	4.01b-d	6.07e-g	11.34g	1.05c-e	24.55d-f	100.00a	0.00b
PFG-4	0.58e	6.95b-e	11.69d	18.17bc	0.18c-f	3.84c-f	6.50de	12.19ef	1.07cd	30.88bc	92.50c	0.00b
PFG-5	0.56ef	6.48fg	10.27fg	16.12de	0.15f-h	3.68ef	6.17e-g	12.59d-f	1.08c	26.99c-f	96.29b	0.00b
PFG-6	0.67cd	6.30g	11.79cd	19.96a	0.19a-d	3.77c-f	6.51de	14.30ab	0.96e	28.87b-e	100.00a	0.00b
PFG-7	0.60de	6.74d-f	12.36bc	16.71cd	0.17d-f	3.62f	6.93d	12.42ef	1.23ab	28.40b-e	100.00a	0.00b
PFG-8	0.55ef	6.65ef	10.76ef	14.69e	0.13g	3.63f	5.91fg	11.23g	1.20b	23.59ef	100.00a	0.00b
PFG-9	0.67cd	7.22ab	11.89cd	16.14de	0.16e-g	4.13b	6.89d	11.95fg	1.30a	24.04d-f	100.00a	0.00b
PFG-10	0.73bc	7.10a-c	12.51b	18.61ab	0.22a	4.03bc	8.17a	14.56a	1.18b	30.70bc	95.50b	6.67a
PFG-11	0.89a	7.04b-d	13.67a	19.72a	0.21ab	3.74d-f	8.30a	13.71bc	1.31a	24.15d-f	97.50b	0.00b
PFG-12	0.62de	6.81d-f	12.62b	16.31d	0.19b-e	3.96b-e	7.63bc	12.83de	1.03c-e	31.09bc	96.70b	0.00b
PFG-13	0.55ef	6.79c-f	11.75d	16.73cd	0.21a-c	4.22b	7.46c	12.94de	0.87f	37.56a	100.00a	0.00b
PFG-14	0.77b	7.38a	12.90b	16.80cd	0.22a	4.12b	7.70bc	13.26cd	1.23ab	29.16b-d	93.75c	0.00b
PFG-15	0.47f	7.01b-d	9.93g	16.20de	0.16f-h	4.53a	5.88g	11.21g	0.99de	33.19b	100.00a	7.14a

[a] The difference between the applications represented by the same letter in the same column is insignificant according to Duncan's multiple range test ($P< 0.05$).

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Table 3. Pomological and morphological properties of 15 wild almond genotypes growing on the slopes of Mount Ararat.

Genotype No	Nut shape	Hull porosity	Kernel colour intensity	Kernel shrivelling	Kernel hairiness	Taste	Shelled colour intensity	Status of separation from the shell	Suture of the shell
PFG-1	Oblong	Less porous	Dark	Less wrinkled	Less hairy	Extremely Bitter	Dark	Full	Not open
PFG-2	Oblong	Less porous	Light	Less wrinkled	Less hairy	Extremely Bitter	Medium	Full	Not open
PFG-3	Elliptic	Less porous	Medium	Smooth	Less hairy	Bitter	Very dark	Full	Not open
PFG-4	Oblong	Less porous	Light	Less wrinkled	Less hairy	Extremely Bitter	Medium	Full	Not open
PFG-5	Oblong	Less porous	Light	Smooth	Less hairy	Extremely Bitter	Medium	Full	Not open
PFG-6	Elliptic	Less porous	Orta	Less wrinkled	Less hairy	Extremely Bitter	Medium	Full	Not open
PFG-7	Oblong	Less porous	Light	Less wrinkled	Less hairy	Bitter	Dark	Full	Not open
PFG-8	Oblong	Less porous	Light	Smooth	Less hairy	Extremely Bitter	Dark	Full	Not open
PFG-9	Elliptic	Less porous	Light	Less wrinkled	Less hairy	Bitter	Very dark	Full	Not open
PFG-10	Oblong	Less porous	Medium	Smooth	Less hairy	Extremely Bitter	Very dark	Full	Not open
PFG-11	Oblong	Less porous	Medium	Less wrinkled	Less hairy	Extremely Bitter	Dark	Full	Not open
PFG-12	Elliptic	Deep groove	Med ium	Less wrinkled	Less hairy	Extremely Bitter	Very dark	Full	Not open
PFG-13	Oblong	Deep groove	Light	Smooth	Less hairy	Bitter	Medium	Full	Not open
PFG-14	Elliptic	Less porous	Light	Smooth	Less hairy	Extremely Bitter	Dark	Full	Not open
PFG-15	Oblong	Deep groove	Dark	Less wrinkled	Less hairy	Extremely Bitter	Dark	Full	Not open

cultivated almonds. Farhoosh and Tavakoli (2008) reported average oleic, linoleic, palmitic, stearic and myristic acid contents of fruits of *A.* scoparia in Iran were 62.8, 23.5, 8.9, 2.8, and 0.1%, respectively. Beyhan *et al.* (2011) reported that the average oleic acid contents of Picantili, Ferraduel, Drake and Nonpareil cultivated almond types were 62.6, 67.9, 59.8, and 64.8%, respectively, while their linoleic acid contents were 22.8, 11.8, 23.5, and 22.08%, respectively, and their palmitic acid contents were 6.3, 6.2, 7.0, and 6.1%, respectively. Kiani *et al.* (2015) reported that native almond genotypes in Iran contained 66.7-69.7% oleic acid on average. In our study, in all genotypes except PGF-7, more than 74.0% oleic acid was found. It is understood that oleic acid amount in the species *Prunus fenzliana* is higher when compared to species analyzed in other studies. Such differences are to be expected under different ecological conditions and varying genotypes. These genotypes under the species *Prunus fenzliana* may be utilized in breeding programs as source of their high oleic acid concentration. Additionally, it has been reported that they may also be utilized in food industry to be directly eaten or fried, because fats with high oleic acid can tolerate high temperature (Arslan, 2007).

CONCLUSIONS

The results show that *Prunus fenzliana* has late flowering status, similar to numerous other wild almond species. Due to this property, it can be utilized as a rootstock for the late-flowering property desired in almond breeding programs. Likewise, it can be recommended as a rootstock for other *Prunus* species such as almond, peach, plum and apricot due to its high resistance to arid climate conditions. Therefore, *Prunus fenzliana* may be used as genetic resource in breeding new cultivars and/or rootstock. Even though wild almond genetic resources are highly valuable in terms of their chemical fat compositions, their usage levels

Table 4. Fatty acid contents of some wild almond genotypes grown on the slopes of Mount Ararat (2-year means).[a]

Genotype	Total oil %	Saturated fatty acids (%)			Unsaturated fatty acids (%)	
		Myristic acid	Palmitic acid	Stearic acid	Oleic acid	Linoleic acid
PFG-1	59.9f	0.7ef	4.7fg	1.4b	77.8a	15.4ı
PFG-2	60.1e	1.7a	4.9de	1.9f	75.7bc	17.1f
PFG-3	65.7c	0.9c	4.9ef	1.3cd	75.9bc	17.1f
PFG-4	71.4a	0.7ef	4.7fg	1.4b	77.8a	15.4ı
PFG-5	61.9e	0.9c	4.9cd	1.3d	74.4d	18.5b
PFG-6	57.9g	0.8cd	5.1b	1.3de	74.4d	18.3c
PFG-7	45.6j	0.79c-e	5.3a	1.3de	69.2e	23.4a
PFG-8	52.6ı	0.79c-e	5.1b	1.3d	74.7d	18.1d
PFG-9	64.5d	0.9bc	4.7fg	1.3d	77.9a	15.2g
PFG-10	56.8h	0.8cd	4.9de	1.2ef	76.3b	16.8j
PFG-11	65.3cd	0.8cd	5.0bc	1.3d	75.0cd	17.8e
PFG-12	61.2e	0.7f	4.8d-f	1.2ef	76.5b	16.8g
PFG-13	71.0a	0.7d-f	4.8d-f	1.4bc	75.9bc	17.1f
PFG-14	71.1a	1.0b	4.6g	1.6a	77.1a	15.2j
PFG-15	67.2b	0.9c	4.7fg	1.5a	76.8a	16.1h

[A] The difference between the applications represented by the same letter in the same column is insignificant according to Duncan's multiple range test ($P< 0.05$).

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are still unsatisfactory. In this study, *Prunus fenzliana* draws attention with its high oleic acid content. Therefore, oil obtained from its genotypes can be used in pharmaceutical, chemical, and paint industries. In addition, reproducing *Prunus fenzliana* seeds and studying the effects of *Prunus fenzliana* rootstock on fertility levels, fruit quality, and flowering characteristics of these species by grafting these plants into domestic or foreign almond genotypes or cultivars under conditions of Iğdır Province are deemed highly important.

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تعیین خواص فنولوژیکی و میوه شناسی ومحتوای اسیدهای چرب بعضی ژنوتیپ های وحشی بادام (*Prunus fenzliana* Fritsch) کاشته شده روی شیب های کوه آرارات

ا. گولسوی

چکیده

گونه Prunus fenzlianaبه عنوان اجداد بادام کاشته شده (Prunus amygdalus L.) و دیگر گونه های بادام وحشی قلمداد می شود. هدف این پژوهش تعیین خواص فنولوژیکی و میوه شناسی و ترکیب اسیدهای چرب گونهPrunus fenzliana Fritsch بادام بود که به طور طبیعی روی شیب های کوه آرارات رشد میکند. این پژوهش در سال های ۲۰۱۶ و ۲۰۱۷ انجام شد.. به این منظور، وزن میوه با پوست، وزن مغز دانه، ضخامت میوه، با نسبت های پوست به مغز(kernel) ژنوتیپ بادام های انتخاب شده به ترتیب برابر بود با ۰/۸۹-۰/۴۷ گرم، ۰/۲۲-۰/۱۳ گرم، ۱/۳۱-۰/۸۷ میلی متر، و ۳۷/۳۶-۲۲/۳۸٪. میوه های دارای دو مغز (Double kernelled) در دو ژنوتیپ PFG-10 (6.67%)و PFG-15 (7.14%) مشاهده شد. در سال ۲۰۱۶، اولین گلدهی، گلدهی کامل، و زمان برداشت به ترتیب در ۲۵-۲۰ مارس،۳۱-۲۴ مارس، و ۲۳-۱۷ اوت رخ داد. در سال ۲۰۱۷، اولین گلدهی، گلدهی کامل، و زمان برداشت به ترتیب در ۱۲-۸ آوریل، ۱۷-۱۳ آوریل، و ۹-۴ سپتامبر ثبت شد. غلظت اولئیک اسید در این پژوهش خیلی بیشتراز تحقیقات قبلی بود. در این رابطه، غلظت اسیدهای اولئیک، لینولئیک، پالمیتیک، استاریک، و میریستیک به ترتیب برابر بود با ۷۷/۹-۶۹/۲٪، ۱۸/۵-۱۵/۲٪، ۵/۳-۴/۶٪، و ۱/۷-۰/۷٪ . نتایج آشکار کرد که به علت بالابودن غلظت های مواد چرب، ژنوتیپ های گونه Prunus fenzlianaرا می توان به عنوان یک منبع ژنتیکی در برنامه های بهنژادی پایه (rootstock) و در صنایع شیمیایی و دارویی استفاده کرد.

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