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The Effect of Genotype and Year on the Average Percentage of Oil Seed Content of Almond

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Abstract: Almond oil is used in many cosmetic products and as a snack in confectionery (marzipan, "turrón", nougat), food products (almond milk, ice cream, chocolate), culinary recipes and also cosmetic base. Seeds of 18 almond genotypes and cultivars: Azar, Rabie, A200, Shahroud13, Zodgol2, A230, Tuono, Shahrekord1, Shahroud 21, Najafabad, Nonpareil, Zodgol1, Yalda, K12-8, Supernova, Shekofeh, Sahand and Sefied were obtained from research station of Seed and Plant Improvement Institute of Karaj and then analyzed for oil content in 2008 and 2011. 10 almond kernels from each genotype and cultivar of almond with 3 replications were examined individually. Oil extraction methyl esters were done in one step. Results showed significant variation between genotypes and cultivars and some degree of different years. Oil content varied from 58.8% to 43.85% of the total kernel dry weight. According to these results, almond genotypes and cultivars based on oil content were divided in four groups: high (55-60%), good (50-55%), medium (45-50%) and poor (less than 45%).

Keywords: Almond, oil content, genotype, crop year

INTRODUCTION

The almond has been used as food for the mankind, the animals and the birds, and due to the high oil content has a good calorie. On the other hand, by having effective materials such as fiber, vitamin, mineral elements, as well as antioxidant properties and etcetera, it always has been paid attention to. The several studies in recent years has shown that herbal oils especially the oil of almond seeds, not only is used as a food in the diet but it can also be used in making the cosmetic detergent creams, soap and perfumery industries, and preventing the itching of the skin and the acnes [1 & 6]. Also in reducing heart disease by conserving the useful cholesterols (HDL) and by reducing the total harmful cholesterol content (Triglyceride and LDL) It has been reported to be effective. Nowadays vast researches in identifying and accessing cultivars with high oil seeds are done [4]. The study of almond seeds oil and cultured genotypes done by Kodad and Socias I Company (2008) showed that there are considerable differences among the cultivars and genotypes. Oil content of 5 commercial cultivars of US-grown almonds such as Carmel, Mission, Neplus, Nonpareil, and Peerless was reported from 53.59% to 56.05% [7]. Also recently, On the basis of the report of [8], fatty composition of California grown almonds was significant difference depending on the cultivar, location, and crop year. Oil content of twenty-six almond [*Prunus dulcis* (Miller) D.A. Webb.] genotypes were selected from Elazig province

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located on eastern Anatolia region of Turkey in 1999 and 2001 by Askin et al. (2007) was reported 25.19-60.77%. Therefore, the present research is done to determine the perspective almond cultivars or genotypes according to the oil content and also for the compare of Iran-grown almonds cultivars and genotypes of the almond according to the percentage of the oil, also, the effect of year on the percentage of their oil seed content.

MATERIALS AND METHODS

Almond fruits of 18 genotypes and cultivars: Azar, Rabie, A200, Shahroud13, Zodgol2, A230, Tuono, Shahrekord1, Shahroud 21, Najafabad, Nonpareil, Zodgol1, Yalda, K12-8, Supernova, Shekofeh, Sahand and Sefied, after being collected from the almond collection of the Seeds and Plant Improvement Institute of Karaj region were used as the experimental material in order to determine the oil percentage. In this experiment, at least 10 almond kernels of each cultivar with 3 replications were done. To do this, first the cut filter paper was put for an hour in the oven; then after 20 minutes it was maintained in the desiccators for the absorption of moisture, and then the dry paper weight was determined with the digital scale. The ground almond kernels were poured into the filter paper and then the samples were put in the oven for 1:30 hours. After that they were put in the desiccators for 30 minutes and were weighted with the digital scale (paper and sample weight before the Soxhelt device), then they were placed for a day in the Soxhelt device which was based on the use of Trent Solvent system [3]; therefore, the samples were placed in the vicinity of the air so that their ether is vapoured. Finally, they were put in the oven for 1:30 hours, and then in the desiccators for 45 minutes. At the end, they were weighted (the weight of the paper and samples after Soxhelt) and their oil percentage was determined according to the method of Foma and Abdola (1985).

RESULTS AND DISCUSSION

Results of extracted oil content using the petroleum ether of cultivars and genotypes of almond in 2008 and 2011 regardless of the cultivar and the crop year is summarized in Table 1. The gained results of the experiment of determining the oil percentage of almond fruits of 18 cultivars and genotypes in different years showed that there are considerable differences among the cultivars and genotypes in a way that the oil content ranged from 42.43% to 62.86% of the total kernel dry weight in 2008, while it was 39.65% to 59.53% in 2011. Differences of oil content among the cultivars and genotypes regardless of the crop year were little.

Table1. The effect of genotype and year on the average percentage of oil seed content of almond

2008					
Azar	53.18b*	Tuono	49.98bc	Yalda	46.98 c
Rabie	56.57 a	Shahrekord1	57.42a	K12-8	52.98 b
A200	55.75 ab	Shahroud 21	47.56c	Supernova	50.54bc
Shahroud13	59.84a	Najafabad	50.89 bc	Shekofeh	54.39b
Zodgol2	62.86a	Nonpareil	47.86c	Sahand	51.54 b
A230	50.67 bc	Zodgol1	54.75 b	Sefied	42.43d
2011					
Azar	57.06a	Tuono	46.67c	Yalda	45.65
Rabie	51.96 b	Shahrekord1	52.56 b	K12-8	50.76bc
A 200	54.19 ab	Shahroud 21	44.67d	Supernova	47.67c

Shahroud13	55.36 b	Najafabad	48.69c	Shekofeh	50.21bc
Zodgol2	59.53a	Nonpareil	44.78d	Sahand	49.67 c
A230	49.12bc	Zodgol1	50.86 b	Sefied	39.65d

*Mean with the same letter are not significantly different at p=0.05using Duncan's multiple range test

According to these results, the cultivars and genotypes of almond based on the oil content are divided into four groups: high oil content (55-60%); good oil content (50-55%); average oil content (45-50%) and poor oil content (less than45%)(Table 1).

These results agree with the reports of the experiments of examining the almond oil done by Kodad and Socias I Company in Spain (2008) and Sathe et al (2008) that has been showed oil content of different locals grown almonds had significant variation depending on the cultivar, location, and crop year. This kind of differences is more due to the types of almond genotypes than other factor typically. A significant variability was observed for oil content in all cultivars of almond (Table 1) in a way that the some cultivars as Zodgol 2 and Shahroud13 had higher oil content than the others.

CONCLUSIONS

Almond seed contains high fat content and is known as a high energy food [6], and also because of its oily character, it sometimes gives immediate relief in heart burn; the fatty acid composition is a successful factor that lowers LDL cholesterol and preserves HDL cholesterol. Thus, almond oil is a more potent cholesterol reducing agent than olive oil because it contains mom or polyunsaturated fatty acids rather than saturated fatty acids. Therefore, obtainable to genotypes and cultivars with high fat content can be used in almond breeding program to obtain new cultivars with high oil content, satisfying the industrial and consuming sectors [9].In this study, the large variability was observed for oil content between all genotypes and cultivars of almond but variability for oil content between same genotype or cultivar in different years was diminutive. Totally, some cultivars in same growth contention were found with higher oil contents than other that could be used as genitor in almond breeding program to improvement almond quality.

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