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Determination of pomological characteristics of some local and foreign almond cultivars in Yayladagý (Hatay) ecological conditions

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SUMMARY – This study was carried out during the years between 1996 and 1998. The aim of this study was to determine the performance of three local types (48-1, 48-5 and 101-9) selected from different regions of Turkey and two foreign (Texas, Nonpareil) almond cultivars under Yayladagý (in the Eastern Mediterranean Region of Turkey) ecological conditions. In the experiment, weight, width lengths and heights, as shelled nuts and kernel, width of shell and kernels ratio were measured and calculated. The in-shell almond and kernel weight and shelling percentage in the almond types and cultivars under study were 4.10-7.09 g, 1.41- 2.72 g and 27.95-47.16%, respectively.

Key words: Almond, adaptation, pomological characteristics.

RESUME – *"Détermination des caractéristiques pomologiques de quelques cultivars d'amandiers locaux et étrangers dans les conditions écologiques de Yayladagý (Hatay)". Cette étude a été faite entre les années 1996 et 1998 pour déterminer les caractères pomologiques de trois variétés locales sélectionnées en Turquie (101-9, 48-1 et 48-5) et de variétés étrangères (Nonpareil et Texas) dans les conditions de Yayladagý (Hatay). Dans cette expérience, on a déterminé le poids du fruit, avec écorce et sans écorce (g), la largeur du fruit, la hauteur du fruit, l'épaisseur du fruit, index de forme, l'épaisseur d'écorce et le rendement d'amande. Finalement, on a montré que le poids du fruit avec écorce est entre 4,10 et 7,09 g, le poids d'amande entre 1,41 et 2,72 g, et le rendemend d'amande est entre 27,95 et 47,16%.*

Mots-clés : *Amande, adaptation, caractères pomologiques.*

Introduction

Turkey is the one of the genetic origins of almond. Almond (*Amygdalus communis* L.) is one of the major hard shelled fruits adapted to our country's ecological conditions. Turkey has about 729,000 ton of nut production and is ranked after USA, Spain and Italy.

Although almond growing areas are widely spreaded in the world, their productivity are restricted by some ecological factors (especially late spring frost).

Almond has very low chilling requirements, so they blossom in early spring and pollination and fertilization of them are negatively affected by low temperatures.

In Turkey, almond growing is more important in Aegean and Mediterranean regions. Because, very early flowering almonds do not create any problem from the point view of late spring frost in these regions.

In the almond growing countries, late flowering cultivars are getting more important day by day. In our country late flowering local types (101-9, 101-13, 106-1, Gülcan-1) which are later even than Texas were selected by Dokuzoguz and Gülcan (1979). The flowering period of these types were observed as even later cultivars than Texas under Adana ecological conditions (Kaska *et al.,* 1993).

This work was carried out to determine quality characteristics of some selected almond types and standard cultivars under arid conditions.

Materials and methods

This study was carried out between 1996 and 1998 at the Department of Horticulture, Faculty of Agriculture, University of Mustafa Kemal. In the experiment, 3 selected local almond types (48-1, 48-5, 101-9) and two foreign cultivars (Texas, Nonpareil) were used. The place of the experimental orchard is at about 300 m elevation from sea level and is not irrigated.

The vegetative growth of the cultivars and types were obtained by measuring the trunk diameters and length of yearly shoots.

Pomological analysis were done on shelled nuts and kernels according to Gülcan (1985). The analysis were done with three replicates and in each replicate 20 fruits (nut) were used.

Widths, lengths and heights of the nuts were measured with caliper compass as mm, shelled nuts and kernel weights were measured and kernel ratios were found by "(Kernel weight/shelled nut weight) 100" equation.

The experiment was established according to the randomized design with 3 replications and the values were evaluated by Tukey test and the angular transformation were applied to the % values.

Results and discussion

Some nut characteristics of the experimental almond cultivars and types were given in Table 1. The nuts weight of Texas (7.09 g) was found bigger than the others. 48-5 (5.96) and Nonpareil (5.19) types were followed Texas. The nuts width and height value of Texas type (18.79 mm and 24.92 mm, respectively) were also observed higher than the others. The nut width and height of other types were found between 19.57-20.69 mm and 14.01-16.49 mm, respectively. The highest length of nut was obtained in Nonpareil type with 40.20 mm. The thickness of shell of the types were found between 2.56-3.62 mm. The differences between all these characteristics of the types were found statistically significant (Table 1).

Table 1. Nut characteristics of the experimental almond cultivars and types (average of 1996-1998 years)

Cultivars	Weight (g)	Width (mm)	Length (mm)	Height (mm)	Thickness shell (mm)	Nut shape	Shell color intent.	Mark outer shell	Suture open shell	Shell reten.	Softness of shell
48-1	4.96	19.57 a	31.58 b	14.01 b	2.66 b	Oblong	Intermediate	Scribed	Excellent seal	None retained	Hard
48-5	5.96	21.40 ab	33.90 ab	15.01 b	2.70 ab	Oblong	Intermediate	Scribed	Excellent seal	None retained	Extremely hard
101-9	4.10	20.41 ab	27.99 b	16.05 b	2.56 b	Ovate	Light	Densely pared	Excellent seal	None retained	Hard
Texas	7.09	24.92 a	36.56 ab	18.79 a	3.62 a	Oblong	Intermediate	Intermediate	Excellent seal	Partly missing	Soft
Nonpareil	5.19	20.65 ab	40.20 a	16.49 ab	2.59 b	Cordate	Light	Sparsly pared	Open	None retained	Paper
D %1	NS	-	8.60	2.66	-						
D %5		5.03			0.96						

[a,b]Means within a column followed by different letter are significantly different at the 1% or 5% by Tukey test; NS = not significant.

Some kernel characteristics of the almond cultivars and types were given in the Table 2. The kernel weight was found the highest in Texas (2.72 g) and Nonpareil (2.50 g) and the lowest in 48-1 (1.41). The differences between the weight of almond types and cultivars were found statistically significant at 1% level in tree years.These values are higher than the ones obtained by Gülcan (1976) and Kaska *et al.* (1993).

The kernel length was determined the highest in Nonpareil with 29.90 mm and was followed by Texas with 26.93 mm.The kernel width was obtained the highest in Texas with 15.35 mm and the lowest in 48-1 with 12.36 mm.The kernel heights and kernel percentages of almond types and cultivars were found between 7.22-9.60 mm and 27.95-47.96, respectively.

In three experimental years, the differences between all kernel characteristics of almond types and cultivars were found statistically significant at 1%.

The highest trunk diameter was obtained from 48-1 with 12.89 cm. Nonpareil gave the smallest (9.46 cm) trunk growth (Table 3).The shoot length of Texas (43.53 cm) was found longer than the others. 48-1 (42.76) followed Texas. The shortest shoots were obtained in Nonpareil type with 32.67 mm (Table 3).

Table 2. Kernel characteristics of the experimental almond cultivars and types (average of 1996-1998 years)

Cultivars	Weight (g)	Width (mm)	Length (mm)	Height (mm)	Kernel ratio (%)	Color intent.	Sherivelled kernel	Kernel pubescence	Flavor kernel taste
48-1	1.41	12.36 b	23.75 bc	7.22	27.95 b	Dark	Intermediate	Intermediate	Sweet
48-5	1.66	13.53 ab	25.61 b	7.27	30.28 ab	Intermediate	Wrinkled	Intermediate	Sweet
101-9	1.75	13.39 ab	20.70 c	9.60	42.12 ab	Light	Intermediate	Low	Sweet
Texas	2.72	15.35 a	26.93 ab	9.04	38.97 ab	Intermediate	Intermediate	High	Sweet
Nonpareil	2.50	13.53 ab	29.90 a	9.17	47.16 a	Intermediate	Slightly wrinkled	High	Sweet
D %1	NS	2.550	3.84	N.S	18.07				

[a,b,c]Means within a column followed by different letter are significantly at the 1% by Tukey test; NS = not significant.

Table 3. Tree shape and vigor of the experimental almond cultivars and types

Cultivars	Tree shape	Leafiness in winter	Average trunk diameter (cm)[†]	1-5 Scale[†]	Average length of yearly shoots (cm)[††]
48-1	5	No	12.89	5.00	42.76
48-5	3	Yes	10.24	4.36	39.80
101-9	5	No	10.43	4.50	36.63
Texas	7-5	No	10.68	4.33	43.53
Nonpareil	3	No	9.46	4.33	32.67

[†]Data of the 1998 year.

[††]Each means is average of measured of 15-40 shoots.

In the near future almond will utilize big potential of Mediterranean region in our country. The most suitable cultivars must be selected and recommended to the growers to develop almond growing in this region (Küden *et al.,* 1994).

On the other hand, these very early flowering almonds do not create any problem from the point view of the late spring frosts in this region although their chilling requirements are very low (Küden and Kaska, 1993).

Conclusions

In this study, especially Texas and Nonpareil types were given better result than the others. If these standard almond types are used in establishing the orchards and they are properly irrigated, the production of almond in the region will definitely be increased.

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