

Performance of Some Almond Cultivars under Soan Valley Climatic Conditions

Muhammad Akram Nasir, Attiq Akhtar and Shakil Ahmad
Hill Fruit Research Station, Sunny Bank, Murree, Pakistan

Abstract: The present studies were made on the performance of six imported cultivars and one local selection of almond strain at the Horticultural Research Station, Soan Valley Nowshera, Khushab during 1997 to 1999.

Local selection almond strain gave a little earlier bloom while all other cultivars were late. However, all tested cultivars matured at the same time during second week of July. Jordonela, Non-perial, Neplus-Ultra, Vesta and Mission are thin shelled while local selection kernel percentage were produced by Jordonela and minimum in Mission and local selection. Is medium thick shell. Maximum nut length, nut thickness, kernel length, kernel weight and kernel percentage were produced by Jordonela and minimum in Mission and local selection. Yield in terms of number of fruit per tree and nut weight per tree was maximum in Nepus-Ultra followed by Non-Perial and Jordonola. Kernel breadth was maximum in Mission. On the basis of overall performance, qualitatively Jordonola performed the best and quantitatively Nepus-Ultra and Non-perial were found better.

Key words: Performance, Almond cultivars, climatic conditions, Nut size, Nut weight, Kernel percentage

Introduction

Almond (*Prunus amygdalus* Bail) has remained in the frong rank among edible nuts for generations and its popularity never wanes. The quantities that enter world commerce are larger than those of any other nut. Almond has very wide use. Apart from their uses as desert nuts in raw state, these are utilized as a food in many ways such as roasted and toasted almond. In addition to these, the milk of almond is a refreshing drink made from crushed and ground kernel during summer season. Above all both sweet and bitter almonds are a rich source of oil upto 38 to 55%. This is extensively used in confectionery, cosmetics and pharmaceutical preparations. Keeping in view the importance of nut and fruit and suitability to Soan valley climatic conditions for its cultivation, some foreign and local germplasm of almond were tried. The results are discussed in this write-up.

Almond requires mild temperature climate in the upland of Quetta and Kalat regions and the sub-mountainous tract of Kashmir. It can sustain maximum summer temperature upto 106 F and also can withstand fairly low temperatures during winter. The almond develops better taste and oil content in dry and mild warm region than in warm and humid localities (Ginai, 1968). Almond flowers during mid February in sub-mountainous tract while during April in Plains (Khan, 1984). A little rise in temperature above 100 F during summer causes hindrances in nut development. There is total failure of almond crop in Murree due to heavy rainfall 50 - 8- inches (Ahmad and Khan, 1971). Mild temperature climate is the best suited to almond cultivation blossoming period in spring should be free from frost and rain. Almonds strains are classified as bitter and sweet almonds. The former class is used either for roots stock or as medicinal purpose while the latter class is further divided into thick shelled and thin shelled cultivars as reported by Anonymous (1984). In pecan nut, highest kernel percentage (82%) is due to thin shell in Mahari variety and least kernel percentage in Barkat strain in the plains of Peshawar (Hussain *et al.*, 1986).

Materials and Methods

The present studies were carried out at the experimental garden of Horticultural Research Station, Soan Valley, Nowshera, Khushab during the year 1997 to 1999. Six almonds cultivars viz. Jordonela, Non-Perial, Neplus-Ultra, Vesta, Mission and local selection, ten years of age were selected.

The plant material was laid out as per square system at 7.5 meters distance. For comparison of various character three plants of each variety were included in the trial which were growing under similar cultural operations. Almonds were harvested when the hulls on the nuts became loose and start bursting. Whole almond crop was hand picked, hulls were removed from the nuts. These harvested nuts were sun dried for four days. Twelve fruit from the dried harvested heap were picked up randomly. Size (length, diameter and thickness) of the almond nut/kernel were measured in centimeters with the help of vernier calipers to get means value. Triple beam balance was used to weight the nut and kernel in grams and yield was determined in number and weight of nuts per tree. Kernel percentage was calculated on the basis of whole almond nut weight and kernel weight. Maturity was adjudged when eighty percent hulls on the nuts became loose. The experiment was laid out on Completely Randomized Design (CRD) with six treatments and three trees per replications as experimental unit. The analysis of variance and least significant difference at 5% probability level were used to test the significant means by using MSTATC computer software (Bricker, 1991).

Results and Discussion

Blooming period, maturity and shell thickness: It shows from Table 1 that cultivar local selection gave a little earlier bloom, while all other cultivars were late. The early bloom in local selection may be low chilling requirements as compared to other cultivars. However, the fruit of all tested varieties matured at the same time during second week of July. Jordonola, Non-Perial, Neplus-Ultra, Vesta and Mission almond cultivars have thin shell while the local selection is equipped with a medium thick shell.

Nut size: A nut size in length, breadth and thickness measured in centimeters during 1997, 1998, 1999 are found significant (Table 2). Maximum nut length was noted in Jordonola (4.31 cms) followed by Non-Perial (3.79 cms), Neplus-Ultra (3.38 cms) while minimum nut length was recorded in Mission cultivar followed by Local Selection with means of 2.12 and 3.01 cms respectively during first year. Almost similar trend was noted during second and third year. Almond nut breadth was maximum in Non-Perial followed by Local Selection, Vesta, Jordonola and Neplus-Ultra with means of 2.15, 2.02, 1.96 and 1.39 cms respectively during 1997.

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Table 1: Blooming period, maturity and shell thickness in some almond cultivars

Cultivars	Blooming Period			Maturity			Shell Thickness		
	1997	1998	1999	1997	1998	1999	1997	1998	1999
Jordonela	Feb, 2nd week	Feb, 2nd week	Feb, 2nd week	July 2nd week	July 2nd week	July 2nd week	Thin	Thin	Thin
Non-perial	Feb, 1st week	Feb, 1st week	Feb, 1st week	July 1st week	July 1st week	July 1st week	Thin	Thin	Thin
Neplus-Ultra	Feb, 3rd week	Feb, 3rd week	Feb, 3rd week	July 2nd week	July 2nd week	July 2nd week	Thin	Thin	Thin
Vesta	Feb, 3rd week	Feb, 3rd week	Feb, 3rd week	July 2nd week	July 2nd week	July 2nd week	Thin	Thin	Thin
Mission	Feb, 1st week	Feb, 1st week	Feb, 1st week	July 2nd week	July 2nd week	July 2nd week	Thin	Thin	Thin
Local selection	Feb, 4th week	Feb, 4th week	Feb, 4th week	July 2nd week	July 2nd week	July 2nd week	Thin Thick	Thin Thick	Thin Thick

Table 2: Nut length, Nut diameter and thickness of six almond cultivars

Cultivars	Nut length (cms)			Nut Diameter (cms)			Nut Thickness (cms)		
	1997	1998	1999	1997	1998	1999	1997	1998	1999
Jordonola	4.31a	4.30a	4.25a	1.93c	1.95c	1.91c	1.22a	1.20a	1.15a
Non-Perial	3.79b	3.80b	3.74a	2.15a	2.16a	2.11a	1.03	1.04b	1.01b
Neplus-Ultra	3.38c	3.22c	3.17d	1.39d	1.37d	1.33d	1.06b	1.04b	1.00c
Vesta	3.23b	3.20c	2.48c	1.96c	2.05b	2.00b	1.04c	1.06b	1.02b
Mission	2.12f	2.10c	2.05c	1.17c	1.15c	1.10c	1.03c	1.02c	0.98d
Local Selection	3.01c	3.00d	2.96b	2.02b	2.01b	1.95b	1.06b	1.05b	1.00c
LSD value at 5%	0.079	0.177	0.830	0.056	0.079	0.079	0.017	0.035	0.170

Table 3: Kernel length, kernel diameter and kernel thickness of six almond cultivars

Cultivars	Kernel length (cms)			Kernel diameter (cms)			Kernel thickness (cms)		
	1997	1998	1999	1997	1998	1999	1997	1998	1999
Jordonloa	3.08a	3.07a	3.02a	1.29b	1.28b	1.23c	1.11c	1.10b	1.05c
Non-Perial	2.51b	2.52b	2.47b	1.31a	1.31b	1.26b	0.79e	0.80c	0.74e
Neplus-Ultra	2.29	2.27d	2.22d	1.16d	1.15c	1.10d	1.15b	1.14b	1.10b
Vesta	2.40b	2.38c	2.33c	1.16d	1.15c	1.11d	0.90d	0.90c	0.85d
Mission	2.19d	2.18e	2.13d	1.22c	1.88a	1.85a	0.79e	0.78c	0.75e
Local Selection	2.16d	2.15f	2.10a	1.30a	1.28b	1.25b	1.78a	1.77a	1.72a
LSD value at 5%	0.177	0.079	0.035	0.017	0.030	0.017	0.17	0.177	0.017

Table 4: Nut weight, Kernel weight, kernel percentage, numbr of nuts per tree and nut weight per tree in six almond cultivars

	Cultivars							LSD Value at 5%
	Jordonola	Non-perial	Neplus-Ultra	Vesta	Mission	Local Selection		
Nut weight (g)								
1997	2.25c	2.52b	2.07d	2.05e	2.01f	4.24a	0.017	
1998	2.23c	2.55b	2.05d	1.85e	2.00d	3.71a	0.079	
1999	2.18c	2.50b	2.00d	1.80f	1.95e	3.70a	0.017	
Kernel weight (g)								
1997	1.50a	1.23b	0.90e	1.00d	1.04c	0.72f	0.35	
1998	1.52a	1.25b	0.92d	1.02c	1.03c	0.75e	0.35	
1999	1.47a	1.20b	0.87d	0.98c	0.97c	0.70e	0.017	
Kernel percentage								
1997	66.86a	48.80b	43.47c	48.78b	51.74b	16.98d	3.590	
1998	68.16a	49.01d	44.87e	55.13b	51.50c	20.21f	0.035	
1999	67.43a	48.00d	43.50e	54.44b	49.74c	18.90f	0.056	
Nut number per tree								
1997	892.30bc	1040.0b	1300.0a	749.30cd	615.00de	508.30e	233.500	
1998	864.30bc	1054.0b	1465.0a	765.00cd	717.30cd	608.30d	207.500	
1999	900.00bc	1055.0b	1584.0a	725.00cd	720.00d	700.00d	177.900	
Nut weight per tree (kg)								
1997	2.00b	2.62a	2.69a	1.53c	1.23d	2.15b	0.061	
1998	1.92c	2.68b	3.00a	1.41d	1.43d	2.25c	0.530	
1999	1.96c	2.63b	3.16a	1.30d	1.40d	2.59b	0.110	

Almost similar trends were found during 1998 and 1999. Almond nut thickness was found larger in Jordonola followed by Local selection and Neplus-Ultra with means of 1.22, 1.06 and 1.06 cms respectively during the first year. Minimum nut

thickness in mission, vesta and non-perial. Almost similar trend was noted in the following two years. Our results fully support the findings of Ginai, 1968 that almond bloom during mid February in sub-mountainous regions.

Kernels size: Kernel size in length, breadth and thickness were found significant during 1997, 1998 and 1999 as is evident from the data presented in Table 3.

During first year maximum kernel length was found in Jordonola followed by Non-perial and Vesta with means of 3.08, 2.51 and 2.40 cms per kernel respectively. Minimum kernel length was measured in kernels of local selection followed by mission and neplus-ultra cultivars with means of 2.16, 2.19 and 2.29 cms respectively. Almost similar trend was noted in kernel breadth and thickness of various cultivars during second and third years.

Nut weight: Almond nut weight calculated in grams were found significant (Table 4). Maximum nut weight was found in Local selection (4.24 g/nut) followed by Non-Perial (2.52 g/nut) and Jordonola (2.25 g/nut) while minimum nut weight was calculated in mission (2.01 g/nut) followed by Vesta (2.05 g/nut). Almost similar trends was noted during 1998 and 1999.

Kernel weight: From the perusal of the data in Table 4 during 1997, it is evident that the maximum kernel weight was noted in Jordonola cultivar (1.50 g) followed by Non-Perial (1.23 g). Minimum weight was noted in local selection (0.72 g) followed by Mission, Vesta and Neplus-Ultra with means of 1.04, 1.00 and 0.90 g/kernel respectively. Almost similar trend was in kernel weight during 1998 and 1999.

Percentage kernel: It was noted from the experimental data (Table 4) that during first year, maximum kernel percentage was noted in Jordonola (66.86) against all other tested cultivars ranging from 43.47 to 51.74 %. However, kernel percentage was minimum in Local Selection (16.98). Almost similar results were found during the following two years. All the parameters studied differed among the cultivars (Table 2, 3 and 4). The highest kernel percentage was in Jordonola dur

to thin shell. These aspects are also reported by Hussain *et al.* (1986) in pcan nut.

Yield: Significant difference were found for yield both in number of almonds nuts per tree and nut weight per tree for three consecutive years (Table 4). During first year maximum number of nuts per tree were obtained in Neplus-Ultra (1300/tree) followed by Non-Perial (1040/tree) and Jordonola (892.93/tree). Minimum number of nuts per tree were in Local Selection (508.30) followed by Mission (615.00) and Vesta (749.30). Maximum nut weight per tree was noted in Neplus-Ultra and Non-Perial with means of 2.69 and 2.62 lg respectively and minimum in Mission (1.23 kg) followed by Vesta (1.53). Local Selection and Jordonola cultivars found intermedicre in nut weight per tree. Almost similar trend was noted during second and third years pertaining to yield in number of nuts per tree and nut weight per tree.

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