

## EVALUATION OF DIFFERENT APRICOT VARIETIES UNDER CLIMATIC CONDITIONS OF SOAN VALLEY

Malik Mohsin Abbas\*, Malik Allah Bakhsh, Muhammad Ashraf Sumrah\*\*,  
Azhar Hussain\*\*\* and Attiq Akhtar\*\*

### ABSTRACT

Performance of seven apricot varieties (castle Bright, Sarbaghal, Narai, Gold Cort, Badami, NJA-13 and Habi) was evaluated at Horticultural Research Station, Soan Valley, Nowshera, Khushab, Pakistan during the year 2010 to 2012. At fruit maturity, sensory and physio-chemical analysis was carried out. The results revealed that variety castle Bright topped in fruit colour with maximum prints (8.51) and orange yellow colour which is highly appreciated in local market and matures during second week of May. The data further depicted that maximum points for flavor were attained by three varieties simultaneously i.e. castle bright (8.50), Badami (8.50) and Sarbaghal (7.75) while taste of fruit was better in castle Bright and Badami (8.50 each). Castle bright also attained maximum fruit weight (45.75g) and fruit size (1867.67mm<sup>2</sup>) with minimum flesh stone ratio (5.27%) and more pulp. Maximum TSS was noted in variety Badami (17.25%) followed by Castle bright (17.1%) and Sarbaghal (16.25%). Variety sarbaghal also excelled in fruit yield (39.00 kg/plant) followed by Castle Bright (32.50 kg/plant).

**KEYWORDS:** *Prunus armeniaca*; Apricot; Acclimatization; sensory and Physio-chemical Analysis

### INTRODUCTION

Apricot (*Prunus armeniaca* L.) is a member of genus *Prunus*, family *Rosaceae*, the family of roses, which also includes other fruits such as plums, peaches, raspberries and pears. Apricot is consumed fresh as well as in preserved form. In Baluchistan it is called as “zardalu”, a vernacular name. Apricots are sold fresh and dried. These are used in baking, fruit salad, snack if dried, dishes, sauces, toppings for desserts, ice cream, candies, jam, preserves, pies, wine, oil and flavoring agent. The apricot oil is used in making cosmetics and ground kernels are used as a fine exfoliating medium in fine cosmetic applications.

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\*Horticultural Research Institute, AARI, Faisalabad, \*\*Horticultural Research Station Soan Valley, Nowshera, Khushab, \*\*\*Barani Agricultural Research Institute, Chakwal, Pakistan.

In Pakistan, apricot is grown commercially in Gilgit Baltistan, KPK, Baluchistan, Azad Kashmir and Punjab (12). In Punjab the apricots are being cultivated at Murree and its surrounding area like Chitta Morgh, New Murree, Ghora Gali, Upper Topa and Lower Topa, Bhurban, Alliot and Khairra Gali. Apricot can be also be grown in areas of Soan Valley and allied hills of Potohar successfully.

Apricot is wrongly considered as a "subtropical" fruit. It is native to continental climate regions, with cold winters and also can be grown in Mediterranean climates very successfully (2). Apricots is grafted on root stock, Hari (Wild apricot), plum or, peach. A nursery plant produced via asexually by cuttings of mother plant generates the fruit of identical characteristics like size, flavour etc. Rootstock ensures the growth characteristics of the scion plant. A hybrid of apricots with plums or peach is called plumcots, pluots or apriums (13). The plant is more cold-hardy than peach and can tolerate winter cold upto -30°C or lower being healthy. The limiting factors for apricot are the spring frosts, hail storms and strong winds storms (13).

The fruitful cultivation of apricot requires adequate sunshine, long growing season, mild winter, a plentiful supply of moisture, and protection from hailstorm and strong winds. The ideal temperature requirement for apricot is 28-30°C during summer and as low upto 4°C during winter, which is enough for its chilling requirements. It can also thrive well in a long chilling cold weather (4).

The fruit characteristics like flavour, colour, taste and texture are considered important factors. Recent Surveys local market, consumers as well as experts showed that many consumers select apricot based on appearance, taste, flavour, and other internal fruit quality characters. The consumers rate the apricot varieties on eating quality basis (appearance, flavour, taste and texture).

Many apricot varieties have been evaluated by the scientists (8) in different climatic and ecological zones of the world on the basis of fruit quality, dietary importance and marketing. They studied Turkish cultivars and hybrid of Irano-Caucasian- and European eco-geographic groups alongwith important cultivars of apricot in eastern Mediterranean region of Turkey. They observed considerable variation in fruit quality and chemical properties of apricot varieties. Some other scientists (6) also conducted research in Central Serbia on biological traits of fruits samples from 1, 210 grafted trees of pomological and sensorial traits. They selected 14 genotypes and compared with control

cultivar, Maria and Sosna (5) studied three apricot varieties under climatic conditions of lower Silesia and revealed that fruit weight mostly depends on the cultivar and crop load. In another trial (3) performance of apricot varieties was evaluated and larger fruit was observed in variety, Hargrand. Milosevic *et al.* (6) also evaluated apricot varieties where variety Bergeron produced 45g size of fruit and has good market value. Aytekin and Caliskan (1) evaluated seven cultivars of apricot (Canino, Precoce, de Colomer, Rouge de Sernhac, Beliana, Feriana, Macar and Tokaloglu) for Phenological and pomological characteristics.

The germ-plasm present in northern areas needs chilling requirement which ranging from 250 to 1200 hours depending on the cultivar needs and are characterised as low chilling varieties (250-500 hr) and high chilling varieties (600-1200 hr) (9). Regular bearing of apricot is important for apricot cultivation which cultivation is greatly restricted by climatic conditions.

The varieties with low chill requirements can be grown in the Potohar region. The present study was conducted to select suitable cultivar for cultivation in the Potohar region with respect to promising physiochemical characters and yield.

## **MATERIALS AND METHODS**

This study was conducted at Horticultural Research Station, Soan Valley, Nowshera, Khushab, Pakistan during the year 2010 to 2012. Nowshera city is a summer resort that has three popular lakes (Ucchali, Khabbeki and Jahlar lakes) and is located 65 km away from Khushab at 32° 34' 11.24" N - 72° 09' 04.10" E , spreading from Padhrar village to Sakesar village. Soan valley is about 56 km long and 14 km wide, nearly at the elevation of 2700-5000 ft. Its mean maximum temperature is 42°C and lowest temperature is -3 °C and average temperature remains in the range of 33°C. This valley receives average 350-500 mm average rain. Lot of varieties of deciduous fruits including apricot have been introduced in this valley for evaluation. Seven varieties of apricot (Castle Brigh, Sarbaghal, Narai, Gold Cort, Badami, NJA-13 and Habi) were evaluated. Six year old plants of each variety, budded on wild apricot locally called "Hari" were selected as experimental material. At maturity of fruits, physiochemical analysis of these varieties was carried out in the laboratory.

All the plants were given the standard cultural practices. The plants were watered underground water via submersible pump by making the basins.

NPK @ 300- 225- 225g alongwith 30 kg FYM per plant were applied during December. Nitrogen was applied in three split doses i.e. before flowering, at pea stage and during August, 2010 and 2011. One kilogram fruit per plant of each variety was picked randomly during May to August, to determine color, flavor, taste, texture, maturity time, average fruit weight, average fruit size, average stone size, average stone weight, flesh seed ratio, average TSS and yield.

Hedonic scale (1-9) was used to rate the cultivars for color, taste, flavor and texture. On the scale 1-unit intervals were considered: 1 as dislike extremely (2) dislike moderately (3), dislike very much (4), dislike slightly (5), neither like nor dislike, (6), like slightly, (7), like moderately, (8), like very much and (9) like extremely. A committee of judges was constituted and fruits of all varieties were given to them for filling the performa to assess each variety. Experts were instructed to lightly polish the surface of fruit with a soft towel to remove dust, spray deposit, bloom, or other surface residues.

Fruit size was measured by electronic digital caliper, weight was measured by Electronic scale, SF-400 and TSS was measured by Digital Refractometer Pal-1.

Experiment was laid out according to RCBD with four replications. Data were analyzed statistically using Fishers analysis of variance and treatments were compared using the least significant difference (LSD) test at 5 percent probability level (12).

Each variety was considered as individual treatment making total number of experimental units as 28.

## RESULTS AND DISCUSSION

**Table 1. Fruit color and time of maturity.**

Name of Variety	Fruit Color	Time of Maturity
Castle Brigh	Orange Yellow	2 <sup>nd</sup> week of May
Sarbaghal	Whitish	2 <sup>nd</sup> week of June
Narai	Light Yellow	3 <sup>rd</sup> week of June
Gold cort	Yellow to light orange	3 <sup>rd</sup> week of May
Badami	Yellow to light orange	2 <sup>nd</sup> week of June
NJA-13	Orange Yellow	1 <sup>st</sup> week of May
Habi	Light Yellow to greenish	3 <sup>rd</sup> week of May

The results (Table 1) indicated that varieties NJA-13 and Castle Bright matured earlier i.e. during 1<sup>st</sup> and 2<sup>nd</sup> week of May, respectively and showed

orange yellow colour. Sarbaghal, Badami and Narai mature during 2<sup>nd</sup> and 3<sup>rd</sup> week of June and had attractive appearance (whitish, yellow to light orange and light yellow color). Due to slight high range of temperature as compared to Swat, varieties cultivated at lower hills mature earlier and fetch more prices. Mostly, varieties of Swat are sold in the markets of Punjab during July and onward.

**Table 2. Sensory evaluation by hedonic scale rating.**

Name of Variety	Color	Taste	Flavor	Texture
Castle Bright	8.51a	8.51a	8.50a	8.25a
Sarbaghal	7.52ab	7.49ab	7.75a	7.00abc
Narai	6.50b	6.25bc	5.75bc	6.75bc
Gold cort	7.26ab	7.00b	7.50 ab	7.00abc
Badami	7.00ab	8.51a	8.50a	8.25a
NJA-13	8.27ab	7.50ab	8.25abc	7.50ab
Habi	4.25b	5.25c	5.50c	6.00c
LSD 0.05	1.9270	1.3201	1.9260	1.2831

### Sensory evaluation

The data regarding sensory evaluation (Table 2) showed that maximum points (8.51) for fruit colour were obtained by variety Castle Bright showing orange yellow color which is much appreciated in local market. Varieties NJA-13, Gold Cort, Sarbaghal and Narai remained at par with 8.27, 7.26, 7.52 and 6.50 points, respectively. These varieties can be marketed easily and will be accepted in local markets Habi variety attained minimum points (4.25). These results are agree to those of Ruiz and Egea (10) who observed that peel characteristics and flesh color of apricots, did not correlate with attractiveness, whereas it was inversely correlated with fruit taste. Variation in results could be attributed to the differences in apricot cultivars, climate and group of cultivars.

The data further indicated that Castle Bright and Badami fetched maximum points (8.51) for taste followed by NJA-13 (7.50) and Sarbaghal (7.49). Narai and Habi attained minimum points (6.25 and 5.25) (Table 2) with regards to flavor of fruit maximum points (8.50, 8.50 and 7.75) were obtained by Castle Bright (8.50), Badami (8.00) and Sarbagal (7.75) (Table 2). Variety Gold Cort was also marked as good flavored variety (7.50). Castle bright and Badami which was highly appreciated by the panel of judges also excelled in texture of fruit (8.25) (Table 2). Variety NJA-13 also showed good texture (7.5) and varieties, Sarbaghal and Gold Cort were at par (7.00). Variety Habi attained minimum points (6.0).



**Badami**

A variety with attractive color, flavor and yield



**Castle Bright**

A variety with attractive size color, Taste and high yield



**Sarbaghal**

A variety with attractive appearance and TSS



**Gold Cort**

A variety with attractive taste and flavor

### Physio-chemical analysis

All tested varieties significantly differed in physio-chemical characteristics. Castle Bright showed maximum fruit size (1848.67 mm<sup>2</sup>) followed by NJA-13 (1710.24 mm<sup>2</sup>) (Table 3). Varieties Sarbaghal, Gold Cort and Badami showed average size of 1337.18, 0944.63 and 0968.67 mm<sup>2</sup>, respectively. Minimum size (1113.25 mm<sup>2</sup>) was observed in Habi. Lopez and Brunton (3) have also reported similar findings.

Maximum fruit weight (45.75g) was noted in variety Castle Bright followed by NJA-13, (40.04g). Sarbaghal, Gold Cort and Narai showed average weight of 23.75 g, 22.25 g and 22.17g, respectively. Minimum weight of fruit (18.50g) was noted in Habi (Table No. 3). These findings do not agree to those of Milosevic et al. (6) which may be due to difference in varieties or climate.

The data regarding stone size revealed that Castle Bright attained maximum stone size (575.70 mm<sup>2</sup>) followed by Habi (449.05 mm<sup>2</sup>) and NJA-13 (394.24 mm<sup>2</sup>). Varieties; Sarbaghal, Gold Cort and Narai showed average size of stone 322.17, 296.49, and 287.35mm<sup>2</sup>, respectively and were at par statistically. Similarly, Sarbaghal excelled in the stone weight (2.58g) followed by Narai (2.23g) against minimum weight in Badami (1.40 g) (Table 3).

**Table 3. Physio-chemical analysis.**

Treatments	Fruit size (mm <sup>2</sup> )	Fruit weight (g)	Stone size (mm <sup>2</sup> )	Stone weight (g)	Flesh ratio (%)	TSS (%)	Yield (kg/plant)
Castle Bright	1848.67b	45.75a	575.70a	2.40ab	05.27d	17.25a	32.50ab
Sarbaghal	1337.18c	23.75c	322.17d	2.58a	11.00a	16.25ab	39.00a
Narai	1128.66d	22.17c	287.35d	2.23b	10.04ab	13.50cd	22.00cd
Gold Cort	0944.63e	22.25c	296.49d	01.75c	07.92c	15.50ab	17.50d
Badami	0968.67e	16.13d	302.19d	01.40d	08.68bc	17.00a	27.75bc
NJA-13	1710.24b	40.04b	394.24c	02.18b	05.45d	12.50d	29.50b
Habi	1113.25d	18.50d	449.05b	01.70cd	09.24abc	15.00bc	16.75d
<b>LSD 0.05</b>	<b>99.476</b>	<b>2.6784</b>	<b>36.345</b>	<b>0.3154</b>	<b>1.9041</b>	<b>1.8314</b>	<b>6.6351</b>

Flesh stone ratio is important parameter for analyzing the cultivar. The varieties with small flesh stone ratio is considered good varieties. The results indicated that minimum flesh stone ratio (5.27 %) was measured in variety Castle Bright followed by NJ-13 (5.45%) Gold Cort (7.92%) and Badami (8.68%). Maximum flesh stone ratio (11%) was measured in apricot variety Sarbaghal. Similar results were reported earlier (6, 7) where cultivars of higher flesh pit ratio were observed desirable.

Maximum TSS (17.25%) was measured in variety Castle Bright followed by Badami (17%). Minimum TSS (12.50) was recorded in variety Habi. These results confirm the findings of Oguzhan and Sumbul (7).

The data regarding yield revealed that maximum yield per plot (39.00 kg/plant) was noted in variety Sarbaghal. However average size of fruit of Sarbaghal was less as compared to Castle Bright and NJA-13, but Sarbaghal excelled in number of fruits which resulted in more yield. Castle Bright was statistically at par with Sarbaghal (32.50 kg/plant). Minimum yield (17.50 kg/plant) was recorded in variety Gold Cort. Maria and Sosna (5) also report similar findings.

### CONCLUSION

The study concludes that Castle Bright, Sarbaghal and Badami cultivars of apricot may be cultivated on low mountainous area upto 2500-3500 feet from

sea level, like Soan Valley and related areas. Castle Bright proved as early season cultivar with attractive color, taste, size of fruit and yield. Sarbaghal proved to be mid-season cultivar. It showed also attractive color, taste and high yielder. Badami was observed also as mid-season cultivar and is famous for its taste, texture and yield. The above three varieties of apricot can be recommended for commercial cultivation.

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**CONTRIBUTION OF AUTHORS:**

<b>Malik Mohsin Abbas</b>	<b>:</b>	<b>Studied the varieties behavior, collected the data and prepared writeup</b>
<b>Malik Allah Baksh</b>	<b>:</b>	<b>Helped in first harvesting, collected and recorded the data</b>
<b>Muhammad Ashraf Sumrah</b>	<b>:</b>	<b>Applied irrigations and cultural practices</b>
<b>Azhar Husain</b>	<b>:</b>	<b>Helped in data arrangement and writeup</b>
<b>Attiq Akhtar</b>	<b>:</b>	<b>Helped in data analysis and interpretation of the results</b>