Himachal Journal of Agricultural Research 36 (2): 189-192, 2010

Preliminary evaluation of wild apricot (*Prunus armeniaca* L.) trees in Shimla district of Himachal Pradesh

S. Bhan and N.C. Sharma*
Department of Horticulture,
CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur-176 062, India.

(Manuscript Received: 22.07.2010; Accepted: 12.11.2010)

Abstract

Wild apricot (*Prunus armeniaca* L.) is found growing in eight out of twelve districts of Himachal Pradesh. Its fruits are attractive, delicious and highly nutritious and used for fresh consumption whereas the kernels from its seeds are a very good source of edible oil. Wild apricot seedling trees from Basantpur and Mashobra blocks of district Shimla were evaluated with the aim of selecting quality forms. Twelve forms were selected on the basis of yield and physico-chemical characteristics of the fruits from about 112 seedling trees. A marked variation was observed among the evaluated and selected forms with respect to yield and fruit quality characters. In the selected forms fruit yield ranged from 45 to 160 kg tree^{-1}, fruit length from 31.67 to 41.51 mm, fruit breadth from 31.10 to 43.38 mm, fruit thickness from 27.39 to 35.87 mm and fruit weight from 17.60 to 32.53 g. Similarly, total soluble solids, total sugars, acidity, ascorbic acid content and pulp recovery ranged from 11.0 to 15.8° B, 4.44 to 8.01 %, 1.37 to 3.85 %, 4.48 to 8.40 mg/ 100g and 88.21 to 93.14 %, respectively. However, in the evaluated forms fruit yield, fruit weight, total soluble solids, total sugars and pulp recovery ranged from 5 to 180 kg tree^{-1}, 5.03 to 32.53 g, 9.8 to 17.1° B, 1.65 to 8.22 % and 76.44 to 94.79 %, respectively.

Key words: Wild apricot, evaluation, selection, yield, physical and biochemical fruit characters.

Introduction

The wild apricot (*Prunus armeniaca* Linn.) is an important fruit and tree borne oil seed crop in mid hills and dry temperate region of the country. Wild apricot fruits are attractive, delicious and highly nutritious. Its fruits contain vitamin A, carbohydrates, protein, phosphorus and niacin in higher quantity than majority of other common wild and cultivated fruits. Besides its use as desserts, the fruits are canned and sun dried whereas, the kernels from its seeds are very good source of edible oil. The hill farming communities of Himachal have been maintaining wild apricot trees on their farmland bunds and adjoining crop land as part of farm forestry/Agro forestry practices. Wild apricots are grown with least cultural care in the tracts which are otherwise unfit for cultivating other temperate fruit crops. It is a drought resistant, salt tolerant, hardy plant and less susceptible to pests and diseases. Though the crop is of great importance due to its multi purpose uses and growing in eight out of twelve districts of Himachal Pradesh, it is still underutilized fruit crop. No systematic survey work has been carried out to locate elite seedling wild apricot trees especially in district Shimla. Therefore present investigations were undertaken to select the superior strains of wild apricot from Mashobra and Basantpur blocks of district Shimla.

Materials and Methods

A large population of wild apricot seedling trees (comparison plus trees), scattered over a large area in various villages of Basantpur and Mashobra blocks of Shimla districts of Himachal Pradesh were marked during the dormant season in the year 2005 on the basis of visual observations regarding growth, vigour, insect-pest incidence. The information on the individual tree was collected from owners through personal interactions. However, data was recorded on yield and physico-chemical parameters of fruit from 112 trees only which depicted the normal flowering and fruiting in the season. Twenty fruits were randomly collected from each tree and analyzed for physical and biochemical characteristics. The ascorbic acid contents in the fruits were determined by 2,6-Dichlorophenol-Indophenol Visual Titration Method (Rangana, 1986). The analysis for other fruit quality parameters was carried out as per the standard procedure given by AOAC (1984). For selection studies, 12 characters viz. fruit yield, fruit size, weight, volume, TSS, titratable acid contents, TSS/acid ratio, total sugars, ascorbic acid contents

* Temperate Horticultural Research Station, UHF, Kotkhai, Shimla-171 202

and pulp percentage were taken into consideration and a numerical scoring system was developed. Plants obtained high score in aggregate were selected as the superior trees.

Results and Discussion

Physical characters

Considerable variation was observed in seedling wild apricot trees with respect to yield and fruit quality parameters both in evaluated trees (Table 1) and selected trees (Table 2). The average fruit yield ranged from 5.0 to 180.0 in evaluated and from 45.0 to 160.0 in selected trees with the mean values of 53.76 and 84.17 kg tree^{-1}, respectively. The co-efficient of variation were 63.59 and 44.80 percent for evaluated and selected trees, respectively. The fruit size in terms of length, breadth and thickness in the evaluated trees ranged from 2.20 to 4.15, 2.10 to 4.34 and 1.74 to 3.59 cm with the mean values of 2.90, 2.83 and 2.50 cm, respectively. However, it ranged from 3.17 to 4.15, 3.11 to 4.34 and 2.74 to 3.59 cm, with the mean values of 3.49, 3.63 and 3.19 cm, respectively in the selected trees. The co-efficient of variation values regarding fruit length, breadth and thickness were 12.92, 14.73 and 14.91, respectively in the evaluated trees and 8.31, 8.75 and 7.64 in selected trees, respectively. In the evaluated trees fruit weight and volume ranged from 5.03 to 32.53 g and 5.00 to 33.00 cc with the mean values of 13.24 g and 12.94 cc, respectively. The corresponding co-efficient of variation values were recorded 41.49 and 42.05, respectively. However, in the selected trees, fruit weight and volume varied from 17.60 to 32.53 g and from 15.50 to 33.00 cc with the mean values of 24.34 g and 23.96 cc, respectively. The co-efficient of variation for these two parameters were 19.90 and 22.73, respectively. The specific gravity and fruit firmness in the evaluated trees varied from 0.85 to 1.19 and 0.40 to 2.70 (kg/cm^2) with the mean values of 1.02 and 1.03, respectively.

Table 1. Variation in yield and physico -chemical characteristics of fruits in evaluated wild apricot trees in district Shimla of Himachal Pradesh

Fruit characters	Range	Mean	S.E.	Var.	COV
Yield (kg tree^{-1})	5.0-180.0	53.76	3.230	1168.73	63.59
Fruit length (cm)	2.20-4.15	2.90	0.035	0.14	12.92
Fruit breadth (cm)	2.10-4.34	2.83	0.039	0.17	14.73
Fruit thickness (cm)	1.74-3.59	2.50	0.035	0.14	14.91
Fruit weight (g)	5.03-32.53	13.24	0.519	30.17	41.49
Fruit volume (cc)	5.00-33.00	12.94	0.514	29.61	42.05
Specific gravity	0.85-1.19	1.02	0.006	0.004	6.20
Firmness (Kg/cm^2)	0.40-2.70	1.03	0.038	0.161	38.96
TSS (°Brix)	9.8-17.1	13.1	0.131	1.91	10.55
Acidity (%)	1.13-4.35	2.60	0.067	0.51	27.40
TSS /acid ratio	2.66-14.00	5.44	0.157	2.75	30.48
Reducing sugars (%)	1.27-4.19	2.07	0.058	0.37	29.39
Non-reducing sugars (%)	0.5-6.40	2.73	0.130	1.90	50.49
Total sugars (%)	1.65-8.22	4.94	0.139	2.15	29.68
Ascorbic acid (mg/100g)	3.53-13.03	6.29	0.148	2.46	24.94
Pulp (%)	76.44-94.79	87.82	0.308	10.62	3.72
Pulp /stone ratio	3.24-18.21	7.88	0.265	7.87	35.60

However, in the selected trees, specific gravity and fruit firmness ranged from 0.94 to 1.14 and 0.60 to 1.90 (kg/cm^2) with the mean values of 1.03 and 1.04, respectively.

Chemical characters

Total soluble solids exhibited a variation from 9.8 to 17.1° B with a mean value of 13.1°B in the evaluated trees and from 11.0 to 15.8°B with mean value of 13.2°B in selected trees. The co-efficient of variation was calculated 10.55 in evaluated trees and 11.79 in selected trees. Titratable acidity in fruit samples ranged from 1.13 to 4.35 per cent with a mean value of 2.60 per cent in total evaluated trees and co-efficient of variation was 27.40. However, in selected trees, titratable acidity in fruits varied from 1.37 to 3.85 per cent with a mean value of 2.34 percent and co-efficient of variation was 30.82. TSS/acid ratio ranged from 2.66 to 14.00 with a mean value of 5.44 and co-efficient of variation value of 30.48 in the evaluated trees, whereas, in the selected trees this ratio varied from 3.90 to 8.39 with a mean value of 5.98 and co-efficient of variation value of 22.56. Reducing, non-reducing and total

Table 2.Variation in different fruit characteristics of wild apricot trees selected from Shimla district of Himachal Pradesh

Sample No SB/HPKV/ SH/	Yield (kg/ tree)	Fruit size cm)			Fruit weight (g)	Fruit volume (cc)	Specific gravity	Fruit firmness (kg/cm^2)	TSS (°Brix)	Acidity (%)	TSS /acid ratio	Reducing sugars (%)	Non-reducing sugars	Total sugars (%)	Ascorbic acid (mg/100g fruit pulp)	Pulp (%)	Pulp/ stone ratio
		length	breadth	thickness													
Ss-12	100.00	3.68	**4.34**	3.48	**32.53**	**33.0**	0.99	0.80	14.0	2.95	4.75	**1.27**	**6.40**	**8.01**	5.60	90.00	9.00
Shl-8	95.00	**4.15**	3.93	**3.59**	30.01	30.0	1.00	0.80	11.5	1.54	7.46	2.06	4.79	7.10	**8.40**	93.03	13.35
Kh-1	**160.00**	3.71	3.71	3.17	24.07	23.0	1.05	0.80	11.5	**1.37**	**8.39**	2.35	2.57	5.06	**4.48**	91.32	10.59
Bd-2	65.00	3.49	3.77	3.39	29.80	29.0	1.03	1.40	15.0	**3.85**	**3.90**	1.42	6.12	7.86	8.40	90.10	9.10
Sh-29	**45.00**	3.49	3.80	3.43	28.06	30.00	**0.94**	0.90	**15.8**	2.61	6.05	2.38	1.96	**4.44**	6.78	91.80	11.20
Mu-3	150.00	**3.17**	3.43	3.07	20.86	20.0	1.04	1.20	12.5	1.91	6.54	1.68	4.97	6.91	6.72	91.61	10.92
La-12	50.00	3.68	3.71	3.24	24.30	23.00	1.06	**1.90**	14.0	2.14	6.54	**3.52**	**1.63**	5.24	4.89	92.59	12.50
Da-07	85.00	3.20	3.39	3.00	**17.60**	**15.50**	**1.14**	**0.60**	15.0	2.41	6 22	2.44	3.68	6.31	7.60	89.89	8.89
Bd-6	80.00	3.28	3.52	3.17	24.83	25.0	0.99	0.70	13.0	2.98	4.36	1.82	3.57	5.58	5.04	90.57	9.60
Sa-3	50.00	3.56	3.49	3.02	20.40	19.0	1.07	1.30	12.5	2.61	4.79	1.79	3.90	5.90	6.16	92.89	13.06
Kt-3	75.00	3.25	3.39	3.03	19.10	20.0	0.96	0.70	**11.0**	1.54	7.14	1.60	3.73	5.53	5.04	**88.21**	**7.48**
Kt-6	55.00	3.21	**3.11**	**2.74**	20.56	20.0	1.03	1.40	12.5	2.21	5.66	1.75	4.19	6.16	6.16	**93.14**	**13.58**
Min.	45.00	3.17	3.11	2.74	17.60	15.50	0.94	0.60	11.0	1.37	3.90	1.27	1.63	4.44	4.48	88.21	7.48
Max.	160.00	4.15	4.34	3.59	32.53	33.00	1.14	1.90	15.8	3.85	8.39	3.52	6.40	8.01	8.40	93 14	13.58
Mean	84.17	3.49	3.63	3.19	24.34	23.96	1.03	1.04	13.2	2.34	5.98	2.01	3.96	6.18	6.27	91.26	10.78
S.E.	10.89	0.08	0.09	0.07	1.398	1.572	0.016	1.114	0.499	0.207	0.389	0.175	0.427	0.321	0.388	0.445	0.580
Var.	1421.97	0.08	0.10	0.06	23.45	29.66	0.003	0.16	2.42	0.52	1.82	0.37	2.18	1.24	1.81	2.37	4.04
COV	44.80	8.31	8.75	7.64	19.90	22.73	5.32	38.46	11.79	30.82	22.56	30.26	37.28	18.02	21.46	1.69	18.65

sugars in the fruit samples ranged from 1.27 to 4.19, 0.50 to 6.40 and 1.65 to 8.32 % with the mean values of 2.07, 2.73 and 4.94 %, respectively. The coefficient of variation values were 29.39, 50.49 and 29.68, respectively. However, in selected trees, fruit samples showed a variation from 1.27 to 3.52, 1.63 to 6.40 and 4.44 to 8.01 per cent with mean values of 2.01, 3.96 and 6.18 per cent and co-efficient of variation of 30.26, 37.28 and 18.02 for reducing, non-reducing and total sugars, respectively. Ascorbic acid content in the fruits ranged from 3.53 to 13.03 mg/100 g fruit pulp in the evaluated trees and 4.48 to 8.40 mg/100 g fruit pulp selected trees. The pulp recovery varied from 76.44 to 94.79 per cent with a mean value of 87.82 per cent in the evaluated trees and from 88.21 to 93.14 percent with mean value of 91.26 percent in selected trees. The co-efficient of variation values were 3.72 and 1.69 for evaluated and selected trees, respectively. Pulp/stone ratio ranged from 3.24 to 18.21 with a mean value of 7.88 and co-efficient of variation value of 35.60 in the evaluated trees, whereas, in the selected trees this ratio varied from 7.48 to 13.58 with a mean value of 10.78 and co-efficient of variation value of 18.65.

The marked variability for above studied characters especially in yield, fruit weight, titratable acidity, sugar content and total soluble solids/acid ratio in the selected trees might be due to their seedling origin and wild nature. Results of present studies are in line with those of Parmar and Sharma (1992) and Sharma (1995) who had also recorded large variation in fruit characters of wild apricot. Similarly, Mehmet *et al.* (1995) had also observed a variation in fruit weight from 42.53 to 53.13 g and in total soluble solids content from 9.50 to 20.12 percent. Salova (1986) had observed a variation from 8.5 to 9.3 per cent in sugars and from 14.9 to 19.2 mg/100 g in ascorbic acid content in wild populations of *Prunus armeniaca* in Kazakh SSR.

Though fruits from selected forms were small in size and low in weight but they are comparable with some of commercial apricot cultivars in yield, fruit size, weight, total soluble solids and sugar content. This may be due to differences in agro- climatic conditions and genetic constitution of the seedling trees which are growing wild under least or no cultural and management practices in Himachal Pradesh.

On the basis of above results it can be concluded that there was a marked variation in selected trees for various fruit characters and these traits can be considered as good selection criteria. The wild apricot can be best utilized for breeding programme and some of these selections can be commercialized as there is great potential for this crop in temperate zones of the country.

Acknowledgement

The authors are grateful to National Oil Seed and Vegetable Oil Development Board for providing financial assistance as this paper is a part of NOVOD Board sponsored research project.

References

AOAC 1984. *Official Methods of Analysis of the Association of Official Analytical Chemists.* Benjamin Franklin Station, Washington, D. C.

Mehmet S, Sen SM, Tekintas FE, Askin MA, Cangi R, Bostan SZ, Balta F, Oguz HI, Akca Y, Karadeniz T, Kazankaya A, Beyhan O, Nas M and Gulcan R 1995. Research on breeding by selection of wild apricot (*Prunus armeniaca* L.) forms on Adilcevaz plain. Acta Horticulturae. **384**: 201-04.

Parmar C and Sharma AK 1992. 'Chulli' - a wild apricot from Himalayan cold desert region. Fruit Varieties J. **46** (1): 35-36.

Rangana S 1986. *Handbook of Analysis of Quality Control for Fruit and Vegetable Products.* 2nd ed. Tata McGraw Hill Publ. Co., New Delhi.

Salova TN 1986. Wild apricot of Kazakhstan as an object of introduction. Ratsional'noe ispol'zovanie rastitel'nykh resursov Kazakhstan. 220-23.

Sharma SD 1995. Variability in physical characters of wild apricot. Indian J. Pl. Gen. Resources (Spl. issue) **28** (2): 291-92.