Himachal Journal of Agricultural Research 37 (1):45-49, 2011

Evaluation of prunes in the dry temperate region of Himachal Pradesh

N. Sharma, D.P. Sharma and D.D. Sharma
Department of Fruit Science
Dr Y.S. Parmar University of Horticulture and Forestry, Solan-173 230, India.

Manuscript Received: 04.04.2011; Accepted: 17.07.2011

Abstract

Seven selection of prunes introduced in 1988 from different parts of the state and planted at 3 x 3 m spacing at the Regional Horticulture Research Station, Sharbo were evaluated for different growth and production traits during the years 1999 and 2000. A wide variability was observed in vegetative growth of different selections. Trees of Sharbo Selection I and Sharbo Selection 7 were lower in vigour and more compact while, trees of Sharbo Selection 2 were most vigorous. Sharbo Selection 1 was identified as early ripening (third week of July), Sharbo Selection 2, Sharbo Selection 3 and Sharbo Selection 4 as mid-season (first to second week of August) and Sharbo Selection 5, Sharbo Selection 6 and Sharbo Selection 7 as late ripening prunes. Highest average yield was recorded in Sharbo Selection 2. Colour of fruits was purple in Sharbo Selection 1 and Sharbo Selection 4 and purplish blue in other selections. Fruits of Sharbo Selection 2 and Sharbo Selection 5 were found as clingstone, while fruits of other selections were freestone. Average fruit weight and size in Sharbo Selection 1 and Sharbo Selection 3 were markedly higher than in other selections and lower in Sharbo Selection 2 and Sharbo Selection 5. Total soluble solids were considerably higher in Sharbo Selection 1 (20.1 %), followed by Sharbo Selection 7 (19.3%) and Sharbo Selection 6 (19.2%). Titratable acidity was in higher range in Sharbo Selection 1, Sharbo Selection 2 and Sharbo Selection 5 in comparison to other selections.

Key words: Prunes, *Prunus domestica*, evaluation, yield efficiency, fruit quality.

Introduction

Kinnaur district of Himachal Pradesh is situated (77°45-79°00 35E and 31°05-32°-05 15N) in the north western Himalayan region bordering with China. The district is characterized by peculiar arid temperate climate with a prolonged winter from October to May. Valley areas of the district are suitable for growing a number of crops including temperate fruits and nuts. Among different fruits, European plum (*Prunus domestica* Linn.), also known as prunes has potential for commercialization in this region. Prunes have high sugar contents and therefore, are suitable for drying. Regional Horticultural Research Station, Sharbo situated in the heart of Kinnaur has an evaluation programme for different fruit crops. A research trial on prunes was started in 1988 with the objective of exploring the possibilities of growing prunes in Kinnaur and to screen out the promising one suited to the prevailing conditions.

Materials and Methods

A trial on prunes with seven selections namely Sharbo Selection 1, Sharbo Selection 2, Sharbo Selection 3, Sharbo Selection 4, Sharbo Selection 5, Sharbo Selection 6 and Sharbo Selection 7, introduced from different parts of state and raised on wild apricot seedling rootstocks, was started at Sharbo in 1988. The trees had been planted at 3x3 m spacing and trained as modified leaders. The present experiment on these selections was undertaken in randomized block design with three replications.

The data on annual shoot growth (cm) and trunk girth (cm) measured 30 cm above the soil

surface was recorded at end of growing period. Tree volume of each experimental tree was worked out from tree height and spread measurements taken at the cessation of growth (Westwood, 1978). Average area (cm^2) of 20 leaves per tree was determined in August using LiCor 3100 leaf area meter. Time of fruit maturation of each genotype and their yield (kg/tree) and yield efficiency (kg/m^3 tree volume) were recorded. Observations on fruit surface and pulp colour, freeness of stone from pulp, fruit size in terms of length and breadth, fruit length/breadth ratio (fruit shape index), fruit weight and fruit pulp to stone ratio were taken as per standard methods. Fruit firmness was measured with Effegi Penetrometer-Ft 327, which recorded the pressure (lbs) required to force a plunger of 6 mm in diameter into the flesh of fruit. Total soluble solids were estimated with the help of hand refractometer. Titrable acidity was estimated by following standard procedure (AOAC, 1990).

Two years data recorded in 1999 and 2000 on different parameters of vegetative growth, fruit maturity, production and physico-chemical characteristics of fruits were taken, pooled and analysed in the present study.

Results and Discussion

Different selections or prunes showed variability in terms of annual shoot growth, trunk girth, tree volume and individual leaf area (Table 1). During the course of study, Sharbo Selection 2 showed highest shoot growth followed by Sharbo Selection 3 and Sharbo Selection 5, while lowest shoot growth was found in Sharbo Selection 7. Sharbo Selections 2 and 6 produced trees with higher trunk girth and volume, while trees of Sharbo Selection 1, 3 and 7 recorded lower trunk girth and volume. Average leaf area varied considerably among different selections, which was higher in Sharbo Selections 3 and 4 and lower in Sharbo Selections 5, 6 and 7.

Sharbo Selection 1 was identified as early maturing (3rd week of July), Sharbo Selections 2, 3 and 4 as mid season and Sharbo Selections 5, 6 and 7 as late maturing (3rd week of August) prunes. According to two years data, the observed variability in fruit productivity (Table 1) had no relation with vegetative traits. Highest average yield was recorded in Sharbo Selection 2, followed by Sharbo Selections 6, 5 and 7 in the decreasing order. Trees of Sharbo Selections 1 and 3 gave considerably lower yield. In general yield was lower in 1999 compared to 2000. During 2000, yield efficiency was greatest (1.63 kg m^{-3} tree volume) in Sharho Selection 7, followed by Sharbo Selection 4 and lowest in Sharbo Selection 3. Similar to our observations on vegetative and productive traits of different selections, Predieri (1997) also reported that trees appeared to carry interesting vegetative traits often showed low productivity.

Fruit skin coloration was purple in Sharbo Selection 1 and 4 and purplish blue in other selections, whereas colour of pulp was yellow in Sharbo Selection 4 and pale green in all other selections (Table 2). Fruits of Sharbo Selections 2 and 5 were found as clingstone, while in other selections as free stone. Fruit size and weight were noted higher in Sharbo Selections 1 and 3 and lower in Sharbo Selection 5 followed by Sharbo Selection 2. Fruit shape was also variable among different selections. Fruit shape index *(L/D* ratio) was maximum in Sharbo Selection 7 (1.37), followed by Sharbo Selections 1 and 6. Lowest fruit length/diameter ratio was observed in Sharbo

Table 1. Vegetative growth characteristics, fruit maturation and yield of prunes

Selection/cultivars	Shoot growth (cm)	Trunk girth (cm)	Tree volume (m^3)	Leaf area (cm^2)	Fruit maturation period	Fruit yield (kg/tree)			Yield efficiency (kg/m^3 tree volume)	
						1999	2000	Average	1999	2000
Sharbo Selection 1	26.3	22.7	6.4	15.5	3rd week of July	1.5	4.1	2.8	0.33	0.74
Sharbo Selection 2	43.9	39.2	27.4	14.8	1st week of August.	3.8	25.7	14.7	0.15	0.86
Sharbo Selection 3	34.8	25.0	8.2	19.5	2nd week of August	2.5	2.5	2.5	0.33	0.28
Sharbo Selection 4	26.6	27.2	9.5	19.9	2nd week of August	19	12.7	7.3	0.23	1.32
Sharbo Selection 5	34.3	32.8	15.1	12.6	3rd week of August	6.3	11.5	8.9	0.58	0.95
Sharbo Selection 6	29.8	41.0	24.1	11.7	3rd week of August	4.0	21.5	12.7	0.29	0.63
Sharbo Selection 7	23.0	26.8	7.3	13.5	3rd week of August	1.2	13.5	7.4	0.17	1.63
CD (P=0.05)	11.4	5.6	6.1	4.3		2.3	13.9	7.4	NS	0.06

VIR SOFTECH

Table 2. Physical characteristics of prunes

Selections/cultivars	Fruit skin colour	Pulp colour	Stone (cling/free)	Fruit length (cm)	Fruit diameter (cm)	Length/diameter ratio	Fruit weight (g)	Pulp/stone ratio
Sharbo Selection 1	Purple	Pale green	Free	4.27	3.37	1.29	29.3	1.85
Sharbo Selection 2	Purple blue	Pale green	Cling	3.61	3.12	1.16	16.5	1.49
Sharbo Selection 3	Purple blue	Pale green	Free	3.66	3.80	1.11	35.2	1.83
Sharbo Selection 4	Purple	Green	Free	3.62	3.41	1.07	25.8	1.31
Sharbo Selection 5	Purple blue	Pale green	Cling	2.77	2.89	0.96	13.3	1.22
Sharbo Selection 6	Purple blue	Pale green	Free	3.71	2.99	1.20	23.0	1.85
Sharbo Selection 7	Purple blue	Pale green	Free	4.02	3.09	1.37	21.1	1.31
CD (P=0.05)	-	-	-	0.68	0.07	0.01	1.2	0.39

VIR SOFTECH

Selection 5. Pulp to stone ratio was highest (1.85) in Sharbo Selection 1 and 6 and lowest in Sharbo Selection 5.

Data in table 3 revealed that flesh firmness was highest in Sharbo Selection 3 and lowest in Sharbo Selection 5, followed by Sharbo Selection 2. Total soluble solids were maximum in fruits from Sharbo Selection 1 (20.2%), followed by Sharbo Selections 7 and 6 and minimum in Sharbo Selection 3. Lower acidity was found in fruits from Sharbo Selections 3, 4, 6 and 7, while higher acidity in fruits was recorded in Sharbo Selection I and 5. Based on present findings, Sharbo Selections 6 and 7 outperformed other selections in terms of yield of quality fruits and may be considered suitable for commercial cultivation in arid temperate climate of Kinnaur.

Table 3. Flesh firmness, total soluble solids and titratable acidity of prunes

Selections/cultivars	Flesh firmness (lbs)	TSS (%)	Acidity (%)
Sharbo Selection 1	11.0	20.2	1.34
Sharbo Selection 2	10.4	17.0	1.08
Sharbo Selection 3	15.2	15.5	0.58
Sharbo Selection 4	11.5	18.7	0.57
Sharbo Selection 5	10.3	19.0	1.32
Sharbo Selection 6	13.0	19.2	0.60
Sharbo Selection 7	13.3	19.3	0.63
CD (P=0.05)	0.9	1.3	0.07

References

AOAC 1990. *Official and Tentative Methods of Analysis.* Assoc. of Official Agricultural Chemists, Washington, DC, USA.

Predieri 1997. Compact pears obtained through in vitro mutagenesis. *Acta Hortic.* **475**: 93-97.

Westwood MN 1978. Growth and yield measurement. Temperate Zone Pomology, W.H. Freeman and Company, San Francisco, USA, pp 200-28.