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Characterization of Fig (*Ficus carica* L.) Germplasm in Central Kashmir of North Western Himalayan Region

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The present study was focused on collecting, evaluating and characterization of fig germplasm, aiming for the establishment of long term *in-situ* and *ex-situ* conservation. Morphological and chemical characters were evaluated for 13 individual fig accessions grown in two districts of Central Kashmir. The results revealed that fig accessions have a vast diversity in terms of morphological (metric and non-metric) and chemical characters. Intermediate and high plant vigour, open to erect growth habit and dense and intermediate relative degree of branching was observed in the studied accessions. Maximum yield (kg/plant) along with maximum yield efficiency (kg/cm^2) was recorded in ML-G-17 accession closely followed by JN-S-09 (32.82 kg/plant) for yield. Fruit weight varied from 24.40 (B-G-07) to 74.25g (DH-S-06) while width/length ratio ranged between 0.887 (CH-S-03) and 1.150 (YL-G-01). Total soluble solids varied from 9.20 to 20.20 per cent and total sugars from 6.70 to 16.60 per cent in B-G-14 and AH-S-06, respectively. Oblate, oblong and globose fruit shape was recorded. External fruit colour varied from yellowish green to dark purple while internal colour of pulp ranges between light pink and dark red. On the basis of the studied parameters ML-G-17, AH-S-06 and DH-S-04 accessions are found to be promising. These valuable and superior fig accessions have potential for raising the new plants through propagation techniques, deserve further characterization and conserve under *in-situ* conservation for future breeding programmes.

Key Words: Conservation, Fig, Morphological characters, Selection, Survey

Introduction

Ficus carica L., commonly known as Fig is one of the earliest cultivated deciduous fruit tree belonging to the family Moraceae (Watson and Dallwitz, 2004), which is a fruit of warm sub tropical to temperate zone (Westwood, 1993; Murli and Balachandran, 1997). Although, origin of fig is not entirely known, *F. carica* is thought to have originated in Western Asia (Stover *et al*., 2007) to northern India and its local varieties are cultivated in most Mediterranean countries (Zohary and Hopf, 2000). Fig fruit is well known for its attractive taste, nutritive value due to its antioxidant properties and is consumed in fresh or dried form (Solomon *et al*., 2006). It is cultivated for its sweet and fresh fruits and are rich source of amino acids, proteins, carbohydrates, minerals (Wang *et al*., 2003) and vitamins, fibre, potassium, calcium and iron (Chessa, 1997) which are present in higher levels than in other common fruits and are also free of sodium, fat and cholesterol level. Its fruit has also importance in the food industry since it is processed into several products such as preserved fruits, jam, juice, wine and powder. Other parts of the fig tree (leaves, bark, root and latex) are also used traditionally for their medicinal properties.

Total fig production in the world is about 10,31,391 MT and Turkey alone produces about 2,98,914 MT and is also the biggest exporter of fig in the world (FAO, 2014). Fig trees are mostly located on the marginal lands, in mixture with other fruit trees or scattered at the periphery of orchards and in home gardens. In India, the total fig production is estimated to be around 19,000 MT (FAO, 2014) and is largely grown in Pune, Bangalore, Bellary and some isolated patches in Tamil Nadu, Andhra Pradesh. In North India, its cultivation is scattered over some parts of Uttar Pradesh, Uttarakhand, Punjab and Himachal Pradesh (Sharma and Badiyala, 2006). In India, it is considered as an underutilized fruit crop and is a great potential fruit crop to be grown on the wastelands of Indian subcontinent.

Fig tree is an important ethno botanical plant widely spread on kitchen gardens in some pockets of Kashmir valley. Due to perishable nature of fig, they are naturally

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dried under sunlight in Kashmir, which are sweet, soft, chewy with crunchy edible seeds which makes it more tasty. Kashmir figs are high in fiber, providing 20 per cent of the daily value more dietary fiber per serving than any other common dried or fresh fruit. Kashmiri dried figs are good source of calcium, which maintains the bone density and prevents osteoporosis. Moreover they are rich in potassium which regulates the blood pressure and maintain the high blood pressure. Dried Kashmiri figs contain omega 3 and omega 6 fatty acids which prevent heart diseases and are known to heal sore throats due to its high mucilage content. Customers from various regions of India and outside country are placing bulk orders for the dried figs due to their delectable taste and freshness.

Due to an increasing demand of fresh fig production in the country, a number of superior varieties have been cultivated accompanied by advanced handling, attractive packaging and efficient transportation facilities. Therefore, the present study was undertaken as an initiative measure in fig crop which could significantly contribute to the diversification of horticulture in the valley. The inventory study was conducted with the aim to identify promising fig accessions in two districts of Kashmir valley in terms of pomological properties.

Materials and Methods

Experimental Material and Area

Survey and selection studies carried out during 2013 and 2014 in Srinagar and Ganderbal areas of Kashmir valley located in the North Western side of Indian Himalayas aimed to find out fig genotypes which had high productivity capacity and better fruit characteristics. The area under survey had latitude of 34^{o}5'N, longitude of 74^{o}49'N with annual rainfall of 710 mm. The maximum and minimum temperature of the area surveyed was 34^{o}C and -6^{o}C, respectively. Out of a total population of more than two hundred plants, thirteen promising selections (Table 1) were selected and evaluated for various pomological parameters. A total of 41 quantitative and qualitative traits (26 pomology and 15 leaf morphology) were determined according to the fig descriptors prepared by IPGRI and CIHEAM (2003); Aljane and Ferchichi (2009) with some minor modifications that showed high discrimination value depending on our study.

Observations Recorded

Observations were recorded on vegetative, foliage, fruit physical and chemical characters.

Table 1. Full name of the accessions

S.No.	Code	Accession name
1	ML-G-02	Manigam Lar Ganderbal
2	B-G-07	Babawayil Gandebal
3	YL-G-01	Youngura Ganderbal
4	B-G-04	Babawayil Gandebal
5	B-G-14	Babawayil Gandebal
6	JN-S-09	Jawahar Nagar Srinagar
7	ML-G-17	Manigam Lar Ganderbal
8	DH-S-08	Dara Harwan Srinagar
9	DH-S-02	Dara Harwan Srinagar
10	AS-S-06	Arabal Shalimar Srinagar
11	CH-S-03	Chandpura Srinagar
12	DH-S-04	Dara Harwan Srinagar
13	MB-S-05	Meebagh Brain Srinagar

Vegetative and Foliage Characters

Data was recorded on the parameters viz. plant height (m), plant spread (N-S and E-W m), trunk girth (cm), yield (kg/plant). Yield efficiency and trunk cross sectional area was calculated as per Westwood (1993).

$$\text{Yield efficiency (kg/cm}^2\text{)} = \frac{\text{Yield}}{\text{Trunk cross sectional area}}$$

Trunk cross sectional area (TCSA) = r^2 where 'r' is the radius of the tree. Under non-metric traits vigour of the tree (low, intermediate, high), growth habit of the tree (erect, semi-erect, open, spreading, weeping), relative degree of branching (sparse, intermediate, dense) and tendency to form suckers (low= < 3; medium= 3-7; high= > 7) were taken. Maturity of the fruit was recorded when 50 per cent of the fruits were mature and classified them into Breba i.e. first crop bears in the spring on wood from the previous year and Main crop i.e. second crop is borne in the current seasons growth (Stover *et al*., 2007).

For foliage or leaf characters ten leaves of a predominant shape were taken. Number of lobes per leaf, number of leaf per shoot were counted and averaged. Leaf length was measured with the help of scale from the base of the petiole to the tip of the central lobe while leaf width was measured from the left to right of the leaf and both was expressed in centimeter. Leaf area was worked out by length x width (cm^2). Petiole length (mm) was measured with the help of vernier caliper from the base of the stalk attached with the shoot or branch to the tip of the stalk.

Fruit (Physical and Chemical) Characters

For all the fruit physical characters fifteen fresh fruits

Table 2. Vegetative, yield and leaf characters of selected accessions of fig from Central Kashmir

Accession number	Plant height (m)	Plant spread (m)		Trunk girth (cm)	TCSA (cm^2)	Yield (kg/ plant)	Yield efficiency (kg/cm^2)	Number of lobes/ leaf	Petiole length (mm)	Leaf length (cm)	Leaf width (cm)	Leaf area (cm^2)	Number of leaf/ shoot
		N-S	E-W										
ML-G-02	4.74	3.71	3.80	51.0	207.08	25.64	0.124	5.0	4.55	29.45	25.42	748.62	6.0
B-G-07	3.92	3.65	4.21	41.5	137.12	30.32	0.221	4.0	4.04	30.05	26.10	784.31	5.8
YL-G-01	4.91	3.45	3.56	47.0	175.87	28.16	0.160	5.0	6.37	22.57	19.60	374.66	6.3
B-G-04	5.13	3.34	2.98	55.0	240.84	22.40	0.093	5.0	6.50	21.97	19.33	424.68	6.9
B-G-14	4.29	3.97	4.36	46.0	168.47	26.80	0.159	4.0	5.21	21.06	19.23	404.98	5.4
JN-S-09	3.98	3.71	4.49	40.7	131.89	32.82	0.248	6.0	2.33	16.71	16.10	269.03	6.6
ML-G-17	3.92	4.04	4.10	36.8	107.82	34.12	0.316	6.0	3.06	20.08	18.07	362.84	5.7
DH-S-08	4.67	4.37	3.64	40.5	130.59	26.00	0.199	4.0	5.66	20.34	17.53	356.56	6.3
DH-S-02	3.78	4.02	3.95	44.6	158.37	25.50	0.161	4.0	6.30	21.21	19.52	414.02	5.1
AH-S-06	5.21	3.15	2.71	38.1	115.57	30.60	0.265	5.0	5.45	21.36	19.04	406.69	4.9
CH-S-03	4.10	3.84	3.94	45.4	164.10	27.50	0.167	5.0	6.12	20.63	18.86	389.08	5.0
DH-S-04	4.50	3.35	3.66	44.3	156.24	26.00	0.166	4.0	4.94	23.23	20.03	465.30	7.2
MH-S-05	5.00	4.19	4.00	51.2	208.71	25.20	0.121	5.0	5.36	18.20	17.26	314.13	5.6
Mean	4.42	3.71	3.76	44.78	161.74	27.77	0.18	4.77	5.07	22.07	19.70	439.61	5.91
SD	0.52	0.36	0.51	5.37	39.07	3.33	0.06	0.75	1.29	3.82	2.91	153.44	0.73
CoV	11.76	9.70	13.56	11.99	24.16	11.99	33.33	17.40	25.44	17.30	14.77	34.90	12.35

were taken and fruit weight (g) was taken with digital weighing balance, fruit length (mm) and fruit width (mm) was measured with the help of vernier caliper and average was worked out. Neck length (mm) and skin thickness (mm) of the fruit was also measured with the help of vernier caliper. Under non-metric traits external fruit colour, internal pulp colour and fruit shape was taken as per the guidelines of the fig descriptors prepared by IPGRI and CIHEAM (2003). Chemical characters of fruits viz. TSS (%), acidity as per cent citric acid and total sugars (%) were calculated as per the methods given in AOAC (1995). Ascorbic acid (mg/100g) was determined by titration with 2,6 dichloro phenol endophenol blue dye as per the methods given in AOAC (1995).

Statistical Analysis

The average values of measured and calculated parameters were used for analysis and were statistically analyzed as per OPSTAT method.

Results and Discussion

Vegetative Characters

Data on different vegetative characters were presented in the Table 2 which showed wide variability among the studied accessions. Plant height varied from 3.78 m (DH-S-02) to 5.21 m (AH-S-06) closely followed by 5.13 m (B-G-04) and 5.00 m (MH-S-05) with a coefficient of variation of 11.76 per cent. Maximum plant spread in the north-south directions was recorded in DH-S-08 (4.37 m) accession closely followed by MH-S-05 (4.19 m) and ML-G-17 (4.04 m) accessions however maximum plant spread in east-west directions was recorded in JN-S-09 (4.49 m) closely followed by B-G-14 (4.36 m) and B-G-07 (4.21 m). Minimum plant spread in north-south direction (3.15 m) and east-west direction (2.71 m) was recorded in AH-S-06 accession. Accession number B-G-04 recorded maximum trunk girth (55.0 cm) and TCSA (240.84 cm^2) closely followed by MH-S-05 and ML-G-02. Coefficient of variation for trunk girth and TCSA was 11.99 per cent and 24.16 per cent. Maximum yield (34.12 kg per plant) along with maximum yield efficiency (0.316 kg/cm^2) was recorded in ML-G-17 closely followed by JN-S-09 (32.82 kg/plant and 0.248 kg/cm^2, respectively) (Table 2 and Fig 1). Minimum values for both the characters were recorded in accession B-G-14 (22.40 kg per plant and 0.093 kg/cm^2). Similar values for marketable yield were also reported by (Irget *et al*., 2008).

Out of thirteen accessions, eight accessions recorded Intermediate plant vigour while only five accessions have high plant vigour, none of the accessions showed low vigour of plant (Table 3). Among 38 accessions, 19 accessions have intermediate plant vigour, 11 accessions

Table 3. Vegetative and fruit (non-metric) characters of selected accessions of fig from Central Kashmir

Accession number	Vigour	Growth habit	Relative degree of branching	Tendency to form suckers	External (fruit) colour	Internal (pulp) colour	Fruit Maturity		Fruit shape
							Breba Crop	Main Crop	
ML-G-02	Intermediate	Open	Dense	High (>7)	LP	Pink Red	Very late	Late	Oblate
B-G-07	Intermediate	Spreading	Intermediate	High (>7)	LPGB	Pink Red	Very late	Late	Oblate
YL-G-01	High	Semi-erect	Dense	High (>7)	DP	Dark Red	Very late	Mid Season	Oblate
B-G-04	High	Erect	Intermediate	Low (<3)	YG	Pink Red	Late	Early	Globose
B-G-14	High	Spreading	Dense	Medium (3-7)	GYP	Pink Red	Very late	Early	Globose
JN-S-09	High	Spreading	Dense	Medium (3-7)	LP	Pink Red	Very late	Early	Globose
ML-G-17	High	Spreading	Dense	Medium (3-7)	DP	Dark Red	Late	Early	Oblong
DH-S-08	Intermediate	Spreading	Dense	Medium (3-7)	LP	Light Pink	Late	Early	Globose
DH-S-02	Intermediate	Spreading	Dense	High (>7)	PSDG	White Yellow	Late	Early	Oblong
AH-S-06	Intermediate	Erect	Intermediate	Medium (3-7)	LP	Light Pink	Late	Early	Oblong
CH-S-03	Intermediate	Spreading	Intermediate	Medium (3-7)	LP	Pink Red	Late	Early	Oblong
DH-S-04	Intermediate	Semi-erect	Intermediate	Medium (3-7)	PDG	White Yellow	Late	Early	Globose
MH-S-05	Intermediate	Spreading	Intermediate	Medium (3-7)	DP	White Yellow	Late	Early	Globose

Berba crop (Late: 16-30 June, Very Late: > 1 July), Main crop: (Early: 1-10 August, Mid season: 11-31 August, Late: 1-30 Sep),
LP: Light Purple LPGB: Light purple with Green Base DP: Dark purple YG: Yellowish Green
GYP: Greenish Yellow with light purple tinge, PSDG: Purple streaks with dark green base, PDG: Purple with Dark Green Base

have high and 8 accessions have low plant vigour (Podgornik *et al*., 2010). With respect to growth habit among thirteen accessions ML-G-02 showed open, YL-G-01 and DH-S-02 showed semi-erect, BGG-04 and AHS-06 showed erect growth habit while rest of eight observed spreading growth habit. Dense and intermediate type of branching was recorded among the studied accessions. Earlier Podgornik *et al*., 2010 also reported open (16), semi-erect (5), erect (4) and spreading (13) growth habit in 38 accessions while abundant (9), frequent (13) and rare (16) type of branching was noticed. Low i.e. less than three, tendency to form suckers was recorded in BGG-04 accession while ML-G-02, B-G-07, YL-G-01 and DH-S-02 recorded high (> 7) tendency of suckers formation, rest accessions recorded medium (3-7) type of tendency to form suckers. Similar results have also been reported for growth and vegetative characters (Caliskan and Polat, 2012).

Foliage Characters

Number of lobes in leaf ranged between 4.0 (B-G-07, B-G-14, DH-S-08, DH-S-02 and DH-S-03) and 6.0 (JN-S-09 and ML-G-17) while number of leaves per shoot varied from 4.9 (AH-S-06) to 7.2 (DH-S-03) (Table 2). Coefficient of variation for the number of lobes per leaf and number of leaves per shoot was 17.4 per cent and 12.35 per cent, respectively. Petiole length among the thirteen accessions varied from 2.33 (JN-S-09) to 6.50 (B-G-04). Maximum leaf length (30.05 cm), leaf width (26.10 cm) and leaf area (784.31 cm^2) was recorded in accession number B-G-07 closely followed by ML-G-02 (29.45 cm, 25.42 cm and 748.62 cm^2). JN-S-09 recorded minimum values for leaf length (16.71 cm), leaf width (16.10 cm) and leaf area (269.03 cm^2). Coefficient of variation for leaf length, leaf width and leaf area was 17.30 per cent, 14.77 per cent and 34.90 per cent, respectively. Low values as compared to present study was recorded by Podgornik *et al*., 2010 for number of lobes in leaf (3 to 7), leaf length (16 to 23 cm), leaf width (13 to 23 cm) and leaf area (136 to 300 cm^2). However, a marked variation in all the foliage parameters was also reported (Abo-El-Ez *et al*., 2013 and Salimia *et al*., 2013)

Physical Characters

Various physical characters of the fruit were depicted in the Table 4 which shows clear variation for all the studied characters. Fruit weight varied from 24.40 g (B-G-07) to 74.25 g (DH-S-04) followed by 67.11 g (AH-S-06), 63.80 g (MH-S-05) and 62.27 g (CH-S-03) (Table 3 and Fig 1). Accession B-G-07 recorded minimum values for fruit length (35.68 mm) as well as fruit width (40.20 mm) however accession AH-S-06 scored maximum fruit length (60.45 mm) followed by CH-S-03 (56.58 mm), DH-S-04 (53.49 mm) and B-G-14 (53.20 mm). Maximum fruit width was registered in accession DH-S-04 (56.81 mm) followed by MH-S-05 (55.66 mm) and AH-S-06 (54.00 mm). Coefficient of variation for fruit weight, fruit length and fruit width was 38.40 %, 14.39 % and 9.89 %, respectively. Width/length ratio ranged between 0.882 (ML-G-17) to 1.150 (YL-G-01). While working on five cultivars and twenty four selections of

Table 4. Fruit physical and chemical characteristic of selected accessions of fig from Central Kashmir

Accession number	Fruit weight (g)	Fruit length (mm)	Fruit width (mm)	W/L ratio*	Neck length (mm)	Skin thickness (mm)	TSS (%)	Acidity (%)	Total sugars (%)	Vitamin C (mg/100g)
ML-G-02	28.40	40.50	45.20	1.116	6.05	0.95	12.70	0.31	9.00	0.17
B-G-07	24.40	35.68	40.20	1.126	6.40	1.27	15.40	0.22	11.70	0.16
YL-G-01	27.00	40.00	46.00	1.150	3.20	0.88	16.00	0.26	12.80	0.24
B-G-04	43.60	48.41	46.35	0.957	6.12	0.66	13.50	0.28	9.20	0.23
B-G-14	47.25	53.20	51.64	0.970	5.96	0.79	9.20	0.44	6.70	0.21
JN-S-09	37.00	50.00	48.65	0.973	2.08	0.87	11.20	0.40	8.50	0.15
ML-G-17	32.60	50.58	44.66	0.882	8.94	1.03	13.50	0.43	10.60	0.18
DH-S-08	29.27	44.75	46.22	1.032	4.91	1.15	17.60	0.17	14.50	0.22
DH-S-02	41.40	51.98	46.56	0.895	5.12	0.70	13.90	0.16	9.70	0.20
AH-S-06	67.11	60.45	54.00	0.893	3.44	0.85	20.20	0.09	16.60	0.24
CH-S-03	62.27	56.58	50.24	0.887	4.01	0.81	15.50	0.10	12.20	0.20
DH-S-04	74.25	53.49	56.81	1.062	3.87	0.87	19.60	0.07	16.40	0.18
MH-S-05	63.80	52.18	55.66	1.066	3.71	0.79	19.70	0.38	15.40	0.35
Mean	44.49	49.06	48.63	1.00	4.91	0.89	14.88	0.25	11.79	0.21
SD	17.08	7.06	4.81	0.10	1.80	0.17	3.42	0.13	3.20	0.05
CoV	38.40	14.39	9.89	10.00	36.66	19.10	23.00	51.73	27.14	24.44

*W/L ratio = width/length ratio (IPGRI and CIHEAM, 2003)

five year old Caliskan and Polat (2008) reported fruit weight, fruit diameter, fruit length, fruit width/length ratio ranged from 22 g to 52 g, 31.9 mm to 44.2 mm, 30.2 mm to 45.8 mm and 0.84 to 1.30, respectively. Gozlekci (2011), Aljane *et al*. (2012) and Salimia *et al*. (2013) noticed a great variability for fruit weight, fruit length, fruit diameter in different fig accessions.

Among thirteen accessions only three accessions registered oblate (ML-G-02, B-G-07 and YL-G-01) shape, four accessions have oblong (ML-G-17, DH-S-02, AH-S-06 and CH-S-03) shape and fruits are of six accessions are of globose (B-G-04, B-G-14, JN-S-09, DH-S-08, DH-S-04 and MH-S-05) shape (Table 3). Neck length of fruit was varied from 2.08 mm (JN-S-09) to 8.94 mm (ML-G-17) followed by B-G-07 (6.40 mm) and B-G-04 (6.12 mm) while skin thickness of the fruit ranged between 0.66 mm (B-G-04) to 1.27 mm (B-G-07) with a coefficient of variation of 36.66 per cent and 19.10 per cent, respectively (Table 4). Caliskan and Polat (2008) reported among twenty-nine cultivar/selections majority of cultivars have globose shape of fruit and neck length varied from 1.0 mm to 8.9 mm. Polat and Ozkaya (2005), Aljane *et al.* (2012) and Caliskan and Polat (2012) also reported vast variability with respect to fruit shape, neck length and skin thickness.

A great variation was recorded among accessions with respect to non metric traits like external and internal fruit colour, fruit maturity. The external fruit colour among the various accessions ranged from light purple to the dark purple colour (Table 3). The most frequent colour of the skin was light purple in the five accessions (ML-G-02, JN-S-09, DH-S-08, AH-S-06 and CH-S-03) while three accessions (YL-G-01, ML-G-17, MH-S-05) had dark purple colour. Ercisli (2004) and Aljane *et al*. (2012) also reported great variability for skin colour in fig genotypes and cultivars. Internal pulp colour ranges from white yellow (DH-S-02, DH-S-04 and MH-S-05), light pink (DH-S-08 and AH-S-06), pink red (ML-G-02, B-G-07, B-G-04, B-G-14, JN-S-09 and CH-S-03) to dark red (YL-G-01 and ML-G-17). Aljane *et al*. (2012) also reported a great variability for external and internal colour of the fruits while evaluating seventeen fig accessions in Tunisia.

Breba crop of accessions (B-G-04, ML-G-017, DH-S-08, DH-S-02, AH-S-06, CH-S-03, DH-S-04 and MB-S-05) matures late i.e. from 16 to 30 June while accessions (ML-G-02, B-G-07, YL-G-01, B-G-14 and JN-S-09) matures very late i.e. > 1 July (Table 3). Main crop of the accession studied matures late as compared to Breba crop because breba crop develops in the spring on the previous year's shoot growth while main crop develops on the current year's shoot growth and ripens in late summer or fall. With respect to main crop mid season (11-31 August) maturity was noticed in accessions YL-G-01 while accessions ML-G-02 and B-G-07 matures late i.e. from 1st September to 30th September. Rest all the accessions registered early maturity i.e. 1st to 10th August. With five cultivars and twenty four selections

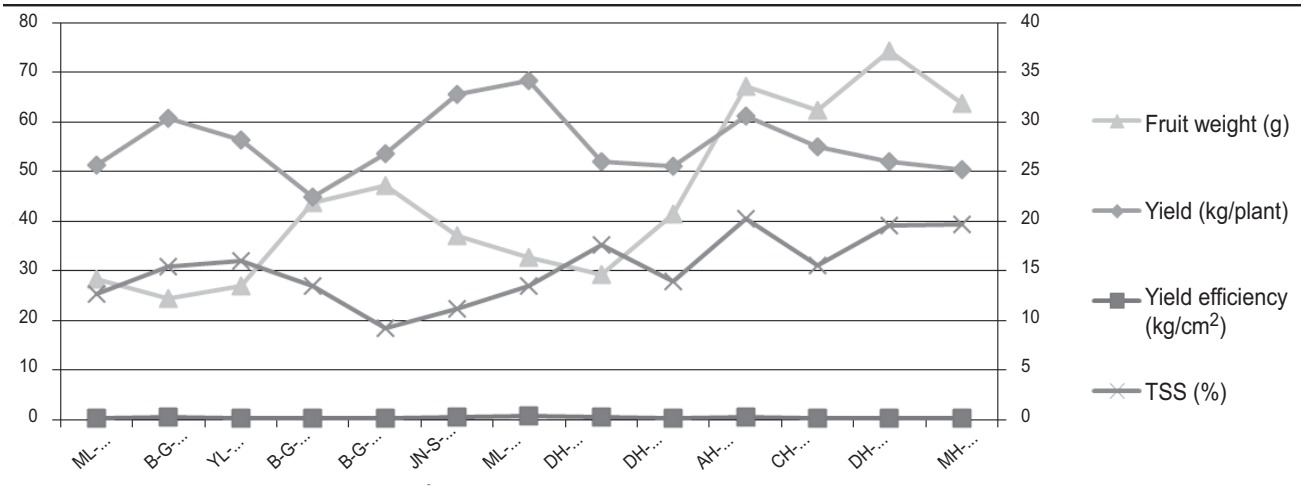

Fig 1. Fruit weight, yield, yield efficiency and TSS of selected accessions of fig from Central Kashmir

having five years of age under Turkey conditions Caliskan and Polat (2008) reported that majority of cultivars and selections matures between 1st to 15th August. Polat and Ozkaya (2005) and Salimia *et al*. (2013) also reported similar timings for the maturity period in twelve fig accessions in Palestine.

Chemical Characters

A great variation was noticed among all the accessions for the studied chemical characters (Table 4). B-G-14 (9.00 %) scored minimum total soluble solids however maximum TSS was recorded in AH-S-06 (20.20 %) followed by MH-S-05 (19.70 %) and DH-S-04 (19.60 %) with a coefficient of variation of 22.19 per cent (Fig 1). Minimum values for acidity was recorded in accession DH-S-04 (0.07 %) closely followed by AH-S-06 (0.09 %) and CH-S-03 (0.10 %) whereas maximum acidity was recorded in B-G-14 (0.44 %). Crisosto *et al*. (2010) reported 15.7 to 19.3 per cent to 0.22 to 0.65 per cent of range for soluble solid contents and acidity, respectively, while Caliskan and Polat (2008) observed a range of 20.1 per cent to 27.4 per cent for soluble solid contents and 0.09 per cent to 0.26 per cent for acidity. Similar variation was noticed by Aljane *et al.* (2012) and Salimia *et al*. (2013) for TSS and acidity among seventeen accessions. Total sugar ranged between 6.70 per cent (B-G-14) and 16.65 per cent (AH-S-06) closely followed by 16.46 per cent (DH-S-04) with a coefficient of variation of 27.14 per cent. Maximum values for ascorbic acid was registered in the accession MB-S-05 (0.35 mg/100 g) and minimum in B-G-14 (0.15 mg/100 g) (Table 4). Similar findings with most of the chemical characters was observed by Polat and Ozkaya (2005), Gozlekci (2011) and Abo-El-Ez *et al*. (2013).

In the present study, high percentage of variation was noticed among the accessions. Maximum genetic diversity was detected in Gutlibagh area of district Ganderbal. Palmer (1981) reported that plant height and number of branches are greatly influenced by location, soil and climatic factors. Caliskan and Polat (2008) reported that random selection from natural populations increases the genetic diversity, whereas cultivars of different geographic origins exhibit high genetic similarity. With a large number of accessions, traits which are dependent on environmental conditions, such as morphological and fruit quality characteristics were not found to be very useful (Papadopoulou *et al.*, 2002; Khadari *et al*., 2003; Baraket *et al*., 2009).

Conclusion

Fig plant is an important ethno botanical plant widely spread on home gardens of the valley. In view of the fact that figs could significantly contribute to the diversification of horticulture in the region, the inventory of fig genetic resources and morphological characterization has been performed with the aim to identify the existing diversity and to plan its conservation strategy. According to above evaluations ML-G-17, AH-S-06 and DH-S-04 accessions of fig were found as the promising type. However, these types need further trials under the same climatic and soil conditions before they can be recommended to growers.

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