Indian Journal of Agricultural Sciences **80** (5): 413–6, May 2010

Genotypic variation in quince (*Cydonia oblonga*) population from Budgam district of Kashmir valley*

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Received: 25 December; Accepted: 10 January 2010

Key words: Ca. pectate, *Cydonia oblonga*, Fruit quality, Genotypic diversity, Quince, Yield efficiency

Quince (*Cydonia oblonga* Mill) is one of the pome fruits of temperate regions, which belongs to family Rosaceae and subfamily Pomoidae. It is native to the warmer regions of south-eastern Europe and Asia minor (Westwood 1988). Commercial production seems to be mostly in eastern Europe and Asia minor (Chadha 2001). Quinces have long been used as an infusion to treat sore throat, diarrhoea and haemorrhage of the bowl, besides stem bark is used as an astringent for ulcers. Quince is known to possess beneficial properties in Unani medicine. In India, quince is mostly grown in Jammu and Kashmir and some parts of Himachal Pradesh. It is popularly known as *bumchunt* in Kashmir valley and is not grown extensively as a commercial crop although a number of home gardens do have trees. The principle cultivars grown in other parts of the world are Orange, Champion, Vandeman, Portugal, Bencikli and Smyrna Pineapple but none of the standard variety is in cultivation in our country (Ahmad *et al.* 2004). In Jammu and Kashmir, the profile of fruit industry has long been dominated by apple. There is need to diversify fruit industry which calls for extension of cultivars of fruits including quince. This can be achieved by capitaliszing the available varietal diversity. So far, no attempt has been made to tap the variability existing in quince in Jammu and Kashmir. To identify superior genotypes and their future conservation, an extensive survey and exploration of Budgam district of Kashmir valley was carried out during September–October 2005.

Budgam district of Kashmir valley was surveyed for evaluation of quince germplasm. Thirtythree bearing trees of quince were selected and individual tree was assigned separate accession number as SKAUQ-026 to SKAUQ-058. Every accession was evaluated for different parameters and recorded as per IBPGR standard format. Tree height, tree spread, leaf shape, tree habit, fruit yield/tree, fruit weight, fruit length and fruit diameter was observed as per standard methods. Yield efficiency of tree was calculated and expressed in kg/cm^2 using the formula given by Westwood (1993). Quality parameters of quince fruits were analyzed as per AOAC (1998). The data was analyzed in R-software as suggested by Gomez and Gomez (1984).

Data pertaining to tree characters of various accessions of quince of Budgam district are presented in Table 1. Tree height ranged from 1.32 to 4.57 m with mean of 3.21 m and co-efficient of variation of 21.15%. The maximum height of tree was recorded in accession SKAUQ-033 (4.57 m), followed by SKAUQ-034 (4.11 m). Tree spread was recorded in the range of 0.91–4.11 m with mean and co-efficient of variation of 2.22 m and 37.86% respectively. Tree habit of 19 accessions was observed to be spreading type and 13 accessions were upright, whereas single accession was drooping type (SKAUQ-054). The high range of variation in case of tree characteristics may be attributed to genetic make-up of individual seedling tree, variation in soil condition, age and environmental conditions. Similar type of variation in plant height, plant spread has been reported by Ahmad *et al.* (2004) in quince. Leaf shape of 32 accessions was ovate oblong, while accession SKAUQ-028 had oblate leaf shape. Yield per tree ranged from 15 to 340 kg with mean value of 59.36 kg and recorded highest co-efficient of variation 107.94%. Accession SKAUQ-032 recorded highest yield of 340 kg/tree, whereas lowest yield/tree was observed

Short note*

Based on complete information of M Sc thesis of the first author submitted to Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir during 2006

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Table 1 Plant characteristics of various quince genotypes of Budgam district in Kashmir valley

Accession no.	Leaf shape	Tree habit	Tree height (m)	Tree spread (m)	Yield (kg tree-1)	Yield efficiency (kg/cm^{-2})
SKAUQ-026	Ovate oblong	Upright	2.50	0.91	03	0.20
SKAUQ-027	Ovate oblong	Upright	2.94	2.57	15	0.18
SKAUQ-028	Oblate	Upright	2.54	1.93	25	0.30
SKAUQ-029	Ovate oblong	Upright	1.32	2.31	22	0.30
SKAUQ-030	Ovate oblong	Upright	3.02	1.13	18	0.20
SKAUQ-031	Ovate oblong	Upright	3.50	1.32	35	0.40
SKAUQ-032	Ovate oblong	Spreading	2.43	1.06	340	1.47
SKAUQ-033	Ovate oblong	Spreading	4.57	4.11	136	5.56
SKAUQ-034	Ovate oblong	Spreading	4.11	2.28	51	0.70
SKAUQ-035	Ovate oblong	Spreading	2.74	2.13	34	0.53
SKAUQ-036	Ovate oblong	Spreading	4.26	3.96	170	1.40
SKAUQ-037	Ovate oblong	Upright	4.11	1.06	34	0.29
SKAUQ-038	Ovate oblong	Spreading	3.35	3.65	136	0.27
SKAUQ-039	Ovate oblong	Upright	4.11	1.52	34	0.75
SKAUQ-040	Ovate oblong	Upright	3.65	1.37	17	0.60
SKAUQ-041	Ovate oblong	Upright	3.35	1.06	34	0.17
SKAUQ-042	Ovate oblong	Spreading	3.65	2.28	34	0.54
SKAUQ-043	Ovate oblong	Spreading	2.74	2.59	34	0.80
SKAUQ-044	Ovate oblong	Spreading	2.74	2.13	51	0.18
SKAUQ-045	Ovate oblong	Spreading	3.04	2.13	17	0.60
SKAUQ-046	Ovate oblong	Spreading	3.65	1.98	68	1.30
SKAUQ-047	Ovate oblong	Spreading	3.65	2.43	85	2.40
SKAUQ-048	Ovate oblong	Spreading	2.74	2.78	90	0.78
SKAUQ-049	Ovate oblong	Spreading	3.35	1.82	34	0.54
SKAUQ-050	Ovate oblong	Upright	3.96	2.89	102	1.05
SKAUQ-051	Ovate oblong	Upright	3.65	2.59	17	0.68
SKAUQ-052	Ovate oblong	Spreading	2.43	1.37	51	3.00
SKAUQ-053	Ovate oblong	Spreading	3.04	2.81	51	1.20
SKAUQ-054	Ovate oblong	Drooping	2.59	1.82	34	0.90
SKAUQ-055	Ovate oblong	Upright	3.20	2.89	68	1.17
SKAUQ-056	Ovate oblong	Spreading	2.59	3.50	17	0.48
SKAUQ-057	Ovate oblong	Spreading	3.65	2.28	17	0.32
SKAUQ-058	Ovate oblong	Spreading	3.04	2.59	85	0.66
Mean ±SE			3.21±0.11	2.22±0.14	59.36±11.15	1.07±0.18
Range			1.32-4.57	0.91-4.11	3.0-340	0.17-5.56
CV (%)			21.15	37.84	107.94	100.03

in accession SKAUQ-026. Yield efficiency ranged from 0.17 (SKAUQ-041) to 5.56 kg/cm^2 (SKAUQ-033) with mean value of 1.07 kg/cm^2 and co-efficient of variation 100.03%. The high co-efficient of variation obtained in case of yield ad yield efficiency may be due to variation in the age of the plant and other yield-attributing characters like tree height, tree spread, trunk girth etc. Genetic constitution of individual also influences the yield resulting in variation in yield. Wide yield variation in seedling origin tree of pecan nut has also been reported by Kaushal and Sharma (2004).

The data presented in Table 2 reveal wide variation in physico-chemical composition of the fruit of all the 33 accessions. Maximum fruit weight was recorded in accession SKAUQ-028 (274.5 g) and minimum fruit weight was recorded in accession SKAUQ-026 (62.5 g). Ovate oblong fruit shape was dominant and few of them also exhibited globose, flat and pyriform type of fruit shape. TSS ranged from 5 to 18^{0}B with mean of 12.21^{0}B and co-efficient of variation 18.42%. TSS was found to be maximum in accession SKAUQ-031 (18%). Acidity ranged from 0.13 (SKAUQ-026) to 2.66% (SKAUQ-048) with mean of 0.70% and co-efficient of variation 69.65%. Ascorbic acid ranged from 3.02 (SKAUQ-027) to 18.3 mg/100g (SKAUQ-034) with mean of 6.12 mg/100g. Pectin content, which is one of the most important chemical constituents of quince fruits, ranged from 1.2% as Ca pectate to 10.6% with mean of 6.19%. The accession no SKAUQ-31 was found to have the highest content of pectin, followed by SKAUQ-27, SKAUQ-028. TSS/acidity ratio ranged from 5.75 (SKAUQ043) to 63.50 (SKAUQ028) with mean of 22.43. Ahmad *et al.* (2004) also reported similar types of variation in physico-chemical composition of quince fruits. Variation in acidity, ascorbic

Table 2 Descriptive statistics for fruit characters of various quince genotypes of Budgam district in Kashmir valley

Accession no.	Fruit weight (g)	Fruit length (cm)	Fruit diameter (cm)	TSS (%)	Acidity (%)	TSS/acid ratio	Ascorbic acid (mg 100 g-1)	Pectin (Ca. pectate %)
SKAUQ-026	62.50	5.3	4.8	5.00	0.13	38.46	4.23	10.6
SKAUQ-027	190.0	6.7	7.4	9.00	0.80	11.25	3.02	10.2
SKAUQ-028	274.5	6.9	7.9	12.7	0.20	63.5	4.13	10.0
SKAUQ-029	242.5	6.7	7.9	11.2	0.30	37.33	4.10	3.80
SKAUQ-030	187.5	6.9	7.2	12.2	0.53	23.00	12.3	7.60
SKAUQ-031	242.5	6.5	6.4	18.0	0.70	25.71	6.20	10.5
SKAUQ-032	177.5	6.5	6.9	13.2	0.26	50.76	4.26	10.0
SKAUQ-033	187.5	6.8	7.2	16.0	0.88	18.18	8.20	3.00
SKAUQ-034	157.5	6.9	6.4	15.1	0.57	26.49	18.3	7.40
SKAUQ-035	157.5	6.6	6.8	10.9	0.67	16.26	3.84	9.60
SKAUQ-036	132.5	5.7	6.3	13.2	0.73	18.08	4.20	3.40
SKAUQ-037	210.0	6.9	7.9	12.4	0.40	31.00	6.56	3.60
SKAUQ-038	80.00	5.3	5.7	11.9	0.53	22.45	4.26	9.40
SKAUQ-039	102.5	5.3	6.2	11.5	0.33	34.84	7.84	7.78
SKAUQ-040	85.00	5.4	5.9	13.2	0.67	19.70	4.26	9.80
SKAUQ-041	135.0	5.9	6.8	12.0	0.60	20.00	5.60	4.40
SKAUQ-042	97.50	5.8	5.9	15.0	0.33	45.45	14.7	7.00
SKAUQ-043	142.5	7.1	6.9	11.0	1.91	5.750	4.20	1.20
SKAUQ-044	135.0	6.6	6.7	15.0	1.67	9.98	3.84	4.20
SKAUQ-045	155.0	6.1	7.2	14.0	0.75	18.66	8.20	4.40
SKAUQ-046	92.50	5.1	5.7	12.8	0.53	24.15	4.80	2.00
SKAUQ-047	80.00	6.1	5.6	10.2	0.60	17.00	4.48	4.00
SKAUQ-048	150.0	5.9	7.2	12.5	2.66	4.69	4.42	7.60
SKAUQ-049	97.50	5.9	5.9	11.9	0.40	29.75	4.20	2.80
SKAUQ-050	80.00	5.2	5.4	10.9	0.80	13.62	9.28	6.80
SKAUQ-051	210.0	8.7	7.3	12.9	0.53	24.33	8.70	7.80
SKAUQ-052	107.5	5.7	6.5	10.0	0.40	25.00	9.28	3.80
SKAUQ-053	105.0	5.3	5.9	11.8	1.34	8.80	4.20	3.40
SKAUQ-054	152.5	6.6	6.8	11.5	0.53	21.69	3.60	5.80
SKAUQ-055	120.0	6.5	6.7	11.1	0.75	14.80	4.00	4.40
SKAUQ-056	132.0	5.3	6.3	11.0	0.67	16.56	3.60	9.00
SKAUQ-057	212.5	7.9	7.8	11.0	1.20	9.160	3.50	2.00
SKAUQ-058	117.5	6.5	6.3	13.0	0.73	17.80	5.40	7.20
Mean ±SE	138.08±6.34	6.24±0.10	6.45±0.11	12.69±0.37	0.65±0.05	24.45±1.76	7.68±0.59	6.10±0.35
Range	35-247.5	4.2-7.9	4.1-7.9	5-20	0.13-2.66	5.75-63.53	3.02-20.58	1.2-10.6
CV (%)	35	13.17	12.93	22.59	62.20	55.064	58.55	44.62

acid and pectin in quince has also been reported by Michal (2001). Keeping in view different parameters studied for evaluation of quince, it can be concluded that accession no. SKAUQ-032, SKAUQ-033, SKAUQ-036, and SKAUQ-038 and SKAUQ-050 are superior with respect to yield and accession number SKAUQ-027, SKAUQ-028 and SKAUQ-029, SKAUQ-030, SKAUQ-037, SKAUQ-051 and SKAUQ-057 are superior in qualitative characteristics with special reference to pectin content which are the most important parameters for making processed food product. Therefore, said genotype will be raised through clonal propagation for evaluation in replicated trail to release best varieties for commercial cultivation.

SUMMARY

As many as 33 quince (*Cydonia oblonga* Mill) genotypes from Budgam district of Kashmir valley were collected and evaluated for tree characteristics and physico-chemical composition of fruit. Tree habit of 19 accessions was observed to be spreading type and 13 accessions were upright, whereas single accession was drooping type. Leaf shape of 32 accessions was ovate oblong while as one accession had oblate leaf shape. Yield per tree ranged from 15 to 340 kg with mean value of 59.36 kg. Wide range of yield efficiency (0.17–5.56 kg/cm^2), fruit weight (62.50–247.50 g), TSS (5–18^{0}B), acidity (0.70–0.08%), TSS: acid ratio (5.75 : 63.50), ascorbic acid (3.02–18.30 mg/100 g pulp) and pectin (1.2–10.6% as Ca pectate) with the mean of 1.07±0.18 kg/cm^2, 145.0±9.06 g, 12.21±0.39^{0}B, 0.70±0.08%, 22.43±2.36, 6.12±0.60 mg/100 g pulp, 6.19±0.50 % as calcium pectate, respectively. The accession number SKAUQ-032, SKAUQ-033, SKAUQ-036, and SKAUQ-38 and SKAUQ-050 were

found to be superior with respect to yield, whereas accession number SKAUQ-027, SKAUQ-028 and SKAUQ-029, SKAUQ-030, SKAUQ-037, SKAUQ-051 SKAUQ-051 and SKAUQ-057 were superior in qualitative characteristics with special reference to pectin content and other qualitative attributes.

REFERENCES

Ahmad M F, Sharma A K and Jabeen A. 2004. Genetic diversity in quince (*Cydonia oblonga* Mill). *Indian Horticulture* **48**: Cover II

AOAC (Association of Official Analytical Chemists). 1998. *Official Methods of Analysis*, 16th edition, *Association of Official Analytical Chemists*, Washington D.C. USA

Chadha T R. 2001. Origin, Classification, Nomenclature and cultivars. (*in*) *Textbook of Temperate Fruits,* ICAR, New Delhi.

Gomez K A and Gomez A A. 1984. *Statistical Procedures for Agriculture Research*, 2nd Edn, John Wiley and Sons Inc, New York.

Kaushal K and Sharma S D. 2004. Survey, collection and conservation of genetic resources of pecan from Himachal Pradesh. *Progressive Horticulture* **36**(2): 187–91.

Michal A. 2001. Quince (*Cydonia oblonga* Mill) and its growing and economic description. *Proceedings of 9th International Conference of Horticulture*, pp 3–7.

Westwood M N and Roberts A N. 1970. The relationship between trunk cross sectional area and weight of apple. *Journal of American Society of Horticulture Sciences* **95**: 23–30.