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Short communication

Evaluation of papaya varieties under North Gujarat conditions

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ABSTRACT

An experiment was conducted to evaluate five varieties, *viz.* Pusa Delicious, Pusa Nanha, Pant Papaya-1, Madhu Bindu and hybrid Surya under north Gujarat during 2007-08. Results revealed that the highest plant height at all the growth stages, stem girth at 240 days after planting (DAP),were recorded in Pant Papaya-1 but at 60, 120 and 180 DAP the highest stem girth was observed in Pusa Delicious. The maximum number of fruits per plant, average weight of fruits, fruit yield per plant, number of fruits per plant and fruit yield per ha, gross and net return as well as B:C ratio were recorded in Pusa Nanha followed by Pant Papaya-1. Higher fruit diameter, fruit length and pulp thickness was observed in Pusa Nanha whereas, significantly the highest reducing and non reducing sugar was recorded in Madhu Bindu but TSS was observed the highest in Pusa Delicious. The higher score for appearance, aroma, taste, flavour and over all acceptability was accorded to Pusa Delicious followed by Madhu Bindu. Thus, on the basis of yield, net return and B:C ratio Pusa Nanha is the best variety but with respect to taste, flavour and overall acceptability Pusa Delicious is a preferred variety under North Gujarat agro-climatic conditions.

Key words: Aroma, flavour, organoleptic, papaya, physico-chemical, quality.

Papaya is one of the major fruit crops of world having production of more than 3 million metric tonnes per annum. (National Horticulture Board, 6). It is an important fruit crop of tropical and subtropical regions of our country, which contributed 30 per cent of total world production in 2008. Hence, India is largest producer of papaya in the world. In India, it is cultivated in an estimated area of 73,000 ha with 25.68 lakh tonnes of production (Anon, 1). It is mainly cultivated in A.P., Gujarat, W.B., Karnataka and Chhattisgarh (National Horticulture Board, 6). These states cover more than 75 per cent of total area and contributes about 85 per cent of country's total papaya production (Ray *et al*., 9; Shyamal *et al*., 11). In Gujarat it is cultivated in an estimated area of 11,192 ha with 4.88 lakh tonnes (Anon, 2). It is a cheap source of vitamin and mineral in the daily diet of people. Unripe fruit is a rich source of papain an photolytic enzyme, which is very helpful in digestion of protein, used as meat tenderizer and for medicinal and industrial purpose. Mature fruits are being utilized in the preparation of candy, tooty fruity and jam. Ripe fruits are also used in the preparation of ready-to-serve papaya juice and for table purpose. The local papaya varieties grown are poor in yield, quality and physico-chemical properties. Therefore, the present investigation was undertaken with an objective to find out the suitable variety having higher yield, net return and B:C ratio as well as better physico-chemical properties, qualities and acceptability among consumer.

The experiment was carried out at Horticultural Demonstration farm, S.D. Agricultural University, Sardarkrushinagar during 2007-08. The treatments of five varieties, *viz.*, Pusa Delicious, Pusa Nanha, Pant Papaya-1, Madhu Bindu and Arka Surya were undertaken with six replications under randomized block design. The seedlings of all varieties under study were prepared in nursery under controlled conditions and standard cultural practices were adopted to raise healthy seedlings. The seedlings at 45 days were transferred in the field in pre- prepared pits at a distance of 1.8 m × 1.8 m. Two plants in each pit were planted and after identification of sex only female plant was retained and rest of the plants were removed. Standard sex ratio of each variety was maintained. Five plants of each variety from every replication were randomly selected for observations on growth, yield and yield parameters. The chemical analysis for estimating reducing, non-reducing and total sugars was done by titrimetric methods of Lane and Eynon described by Ranganna (6). Total soluble solids were determined by hand refrectometer. The various parameters for knowing acceptability of papaya varieties were determined by mean score procedure of orgenoleptic test. The statistical analysis was done as per procedure described by Panse and Sukhatme (7).

Growth and development of papaya was significantly influenced by different varieties. The highest plant height at all the growth stages and stem

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girth at 240 days after planting (DAP) were recorded in Pant Papaya-1 but at 60, 120 and 180 DAP the highest stem girth was observed in Pusa Delicious (Table 1). The fruit diameter, fruit length and pulp thickness was recorded significantly higher in Pusa Nanha, whereas total soluble solids was observed in Pusa Delicious (Table 2). The variation in fruit diameter, fruit length and pulp thickness might be based on the fact that every genotypes has its own nature in development of fruits which may be varied due to various physiological phenomenon, *viz.* photosynthetic efficiency, rate of translocation of photosynthates from source to sink and photo-respiration that takes place in the plant body. These results are in close conformity with the findings of Dinesh *et al*. (5). The total soluble solids were found in Pusa Delicious followed by Pant Papaya-1, whereas minimum TSS was found in Pusa Nanha. The variation in TSS in varieties might be due to their genetic makeup and its own nature of variety which govern the chemical composition of the fruits. These results are in accordance with the findings of Singh *et al.* (10). Madhu Bindu being statistically at par with Pusa Delicious performed better in respect to reducing, non-reducing and total sugars was also obtained highest in Madhu Bindu followed by Pusa Nanha and Pusa Delicious. Unnitham (12) also observed similar findings. Papaya varieties significantly influenced the yield attributes and yield under North Gujarat agro-climatic conditions. Significantly, the highest number of fruits per plant, average fruit weight, yield of fruits per plant, number of fruits per ha and yield of fruit per ha were given by Pusa Nanha followed by Pant Papaya-1. The lowest values of these parameters were observed in Madhu Bindu among evaluated varieties. The hybrid Surya could not come upto fruit bearing stage due to unfavourable climatic conditions. The variations in yield attributes of papaya might be due to various physiological phenomenon, *viz*. photosynthetic efficiency, rate of translocation of photosynthates from source to sink and photo-respiration that took place in the plant body and different genetic constitution of varieties, which are responsible for expression of genetic characters under a particular set of environment. Moreover, yield performance of any variety is considered as a cumulative effect of yield attributes. These results are in accordance with the findings of Biswas *et al.* (4), and Unnithan (12). The maximum average score for appearance, texture, taste of pulp, and flavour and overall acceptability was accorded to Pusa Delicious followed by Madhu Bindu (Table 3). Thus, variety Pusa Delicious was the most acceptable with a highest mean score followed by Madhu Bindu and Pusa Nanha, whereas, the least mean score for overall acceptability was accorded to Pant Papaya-1. The highest gross return, net return and C:B ratio was obtained in Pusa Nanha followed by Pant Papaya-1.

Thus, varieties Pusa Nanha and Pant Papaya-1 were found more profitable as compared to other

Table 1. Plant height and girth at different growth stages in different papaya varieties.

Treatment	Plant height (cm)				Plant girth (cm)			
	60 DAP	120 DAP	180 DAP	240 DAP	60 AP	120 DAP	180 DAP	240 DAP
V_1: Pusa Delicious	22.07	33.59	59.32	91.13	0.89	2.21	3.85	5.90
V_2: Pusa Nanha	24.51	35.22	57.51	77.03	0.67	1.37	3.05	5.76
V_3: Pant Papaya-1	27.88	40.91	66.76	102.84	0.78	1.97	3.82	6.92
V_4: Madhu Bindu	26.08	39.14	61.20	91.92	0.85	1.73	3.66	5.54
V_5: Surya	20.25	32.14	52.26	81.46	0.43	1.16	2.61	4.29
CD (P = 0.05)	2.76	3.86	6.15	8.01	0.13	0.28	0.54	0.65

Table 2. Physico-chemical properties, yield attributes and yields of different papaya varieties.

Treatment	Fruit diameter (cm)	Fruit length (cm)	Pulp thickness (cm)	TSS (°Brix)	Reducing sugar (%)	Non reducing sugar (%)	Total sugars (%)	No. of fruits/ plant	Av. weight of fruit (g)	Yield/ plant (kg)	Yield ha (q)
Pusa Delicious	9.43	17.39	2.72	12.23	7.94	0.92	8.86	21.53	582.13	12.53	386.79
Pusa Nanha	11.67	19.21	3.29	10.15	7.85	0.96	8.81	33.56	704.96	23.67	657.55
Pant Papaya-1	9.44	18.02	2.81	11.30	7.91	0.91	8.82	31.54	653.36	20.61	572.54
Madhu Bindu	9.67	16.90	1.80	10.28	8.14	1.01	9.14	20.25	548.61	11.16	310.02
CD (P = 0.05)	0.63	0.83	0.21	0.63	0.48	0.09	0.41	2.44	65.83	2.55	48.05

Table 3. Gross and net return B:C ratio and organoleptic properties as influenced by papaya varieties.

Treatment	Total cost (Rs./ha)	Gross return (Rs./ha)	Net return (Rs./ha)	C:B ratio	Appea-rance	Texture	Taste	Fla vour	Aroma	Overall acceptability
Pusa Delicious	68,050	2,32,074	1,64,024	1:3.4	15.68	14.96	15.74	14.84	14.42	75.64
Pusa Nanha	73,000	3,28,775	2,55,775	1:4.5	12.84	12.28	12.17	12.56	12.00	62.38
Pant Papaya-1	67,200	2,86,270	2,19,070	1:4.2	12.2	11.96	12.00	12.40	12.16	60.72
Madhu Bindu	64,050	1,55,010	90,960	1:2.4	14.50	14.24	15.32	14.26	13.82	72.16
Surya Arka	69,300	-	-	-	0.00	0.00	0.00	0.00	0.00	0.00

Price of fruit of Pusa Delicious @ Rs. 6 per kg and of rest of the varieties was Rs. 5 per kg

varieties. Therefore, is inferred that Pusa Nanha and Pant Papaya-1 varieties are more economical but based on quality and organoleptic assessment, Pusa Delicious was more acceptable followed by Madhu Bindu.

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