



Short communication

Evaluation of varieties and hybrids for physico-chemical characters in papaya (*Carica papaya* L.)

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ABSTRACT

Papaya (*Carica papaya* L., Caricaceae) is a fruit crop of commercial significance in tropical and subtropical regions of the world. The present investigation was carried out to assess physico-chemical characteristics of 10 genotypes of papaya under Bengaluru conditions. Results revealed that the varieties, Sunrise Solo, Waimanalo and the hybrids, H-39 and H-57 had medium-sized fruits. Fruit cavity index was low in the varieties Sunrise Solo, Pink Flesh Sweet and in hybrids H-39 and H-57. Further, Sunrise Solo recorded the highest plant height while the shortest plants were observed in Pusa Dwarf. Weight of the fruits was found to vary from 486.67g in Sunrise Solo, to 1380.33g in Pusa Dwarf. Pulp thickness, TSS and ascorbic acid were found to be maximum in hybrids H-39 and H-57. Lowest titratable acidity too was observed in the hybrids H-39 and H-57.

Key words: *Carica papaya*, physico-chemical characteristics, varieties, hybrids

Papaya (*Carica papaya* L.) is one of the important fruits of the tropical and subtropical regions of our country. It has gained commercial importance due to high productivity and multipurpose use. Papaya is considered as the poor man's fruit. Aykroyd (1951) ranks it next to mango as a source of precursor of Vitamin A. While this vitamin is generally associated with carotene, the yellow pigment in papaya is not carotene, but caricaxanthin. Cultivar differences and geographic effects on carotenoid composition and Vitamin A values have been reported in papaya. Geographic effect had a greater influence than the cultivar on Vitamin A content (Kimura *et al.*, 1991). Physico-chemical characters play a very important role in selection of improved genotypes of papaya with superior quality. These are useful as breeding material for further improvement. The present investigation was undertaken to assess physico-chemical characteristics in papaya under Bengaluru conditions.

The experiment was conducted at Indian Institute of Horticultural Research, Bengaluru, using ten varieties of papaya (*Carica papaya* L.), viz., Coorg Honey Dew, Pink Flesh Sweet, Sunrise Solo, Waimanalo, Pant-2, Washington, Red Gold, Pusa Dwarf, PAU selection and CO-4, and, two hybrids, H-39 and H-57, in the years 1997-2000. The experiment was laid out in Completely Randomized Block Design, with three replications. Observations were recorded on plant height, stem circumference, plant spread (N-S &

E-W), fruit weight, fruit length, fruit breadth, fruit volume, fruit cavity index, pulp thickness, total soluble solids (TSS), total carotenoid content, ascorbic acid, titratable acidity and hundred seed weight. Data were statistically analyzed using standard procedures of Ranganna (1994).

Marked variation in growth parameters in different varieties and hybrids for various characters were observed. Among the varieties and hybrids studied (Table 1), Sunrise Solo recorded the highest plant height, while, the least was seen in the variety, Pusa Dwarf. Hybrids H-39, H-57 and varieties Washington, Pant-2, PAU-selection and CO-4, showed medium plant height and plant spread. Least plant spread was recorded in Pusa Dwarf. Fruit weight was found to vary from 486.67g in Sunrise Solo, to 1380.33g in Pusa Dwarf. Varieties Coorg Honey Dew, Waimanalo, Pant-2, Washington, Red Gold and CO-4 had medium-sized fruits. Small-sized fruits were noticed in the variety Sunrise Solo, and in the hybrid H-39. Dinesh and Yadav (1998) reported fruit weight to be 600-800g in the variety 'Surya'. Cavity index of the fruit was found to vary from 15.33% in Sunrise Solo, to 39.70% in CO-4. Varieties Washington, Waimanalo, Pusa Dwarf and Pink Flesh Sweet had medium cavity index, whereas hybrids H-39 and H-57 had a low cavity index. Similar observation was recorded in a previous study in 'Surya' (Anon., 1999). Highest pulp thickness was recorded in H-39, followed by Pink Flesh Sweet. Dinesh and Yadav (1998) reported pulp thickness of 3.0-3.5cm in 'Surya'.

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Table 1. Physico-chemical characters of varieties and hybrids of papaya

| Variety/ Hybrid | X ₁ | X ₂ | X ₃ | X ₄ | X ₅ | X ₆ | X ₇ | X ₈ | X ₉ | X ₁₀ | X ₁₁ | X ₁₂ | X ₁₃ | X ₁₄ | X ₁₅ |
|------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Coorg Honey Dew | 198.83 | 32.67 | 191.00 | 192.00 | 1089.33 | 1071.67 | 22.05 | 28.33 | 13.00 | 2.73 | 11.83 | 2.00 | 0.17 | 67.13 | 1.37 |
| Sunrise Solo | 237.77 | 37.77 | 189.00 | 184.67 | 486.67 | 443.33 | 13.64 | 15.33 | 7.97 | 2.83 | 13.47 | 3.00 | 0.18 | 50.67 | 1.37 |
| Waimanalo | 180.00 | 32.47 | 167.00 | 170.67 | 803.33 | 656.67 | 12.33 | 25.60 | 10.17 | 2.10 | 11.73 | 2.00 | 0.33 | 36.27 | 1.40 |
| Pant-2 | 166.67 | 33.47 | 207.67 | 207.67 | 1047.33 | 1028.00 | 20.20 | 36.33 | 13.13 | 2.77 | 11.69 | 2.00 | 0.17 | 56.47 | 1.47 |
| Washington | 181.67 | 30.70 | 236.67 | 231.67 | 827.33 | 796.67 | 15.59 | 27.90 | 10.12 | 2.13 | 12.30 | 2.57 | 0.22 | 61.77 | 1.20 |
| Red Gold | 206.67 | 35.67 | 213.00 | 213.00 | 1027.33 | 965.67 | 19.57 | 39.50 | 12.70 | 2.27 | 10.77 | 2.20 | 0.16 | 68.00 | 1.40 |
| Pusa Dwarf | 139.47 | 29.23 | 157.33 | 156.33 | 1380.33 | 1367.00 | 19.27 | 27.20 | 15.23 | 2.37 | 9.53 | 1.53 | 0.16 | 66.63 | 1.30 |
| PAU Selection | 159.22 | 31.57 | 189.00 | 191.00 | 1064.00 | 1056.33 | 18.43 | 37.23 | 14.17 | 2.70 | 10.87 | 2.20 | 0.15 | 65.93 | 1.40 |
| Pink Flesh Sweet | 192.22 | 34.33 | 200.00 | 199.67 | 1060.00 | 1041.33 | 23.80 | 25.17 | 12.10 | 3.20 | 13.41 | 3.03 | 0.18 | 52.77 | 1.43 |
| CO-4 | 191.67 | 34.57 | 194.33 | 193.00 | 901.00 | 825.67 | 16.00 | 39.70 | 11.40 | 2.23 | 9.87 | 2.93 | 0.14 | 51.30 | 1.47 |
| H-39 | 206.13 | 33.97 | 198.00 | 195.67 | 703.33 | 857.67 | 16.57 | 15.43 | 10.65 | 3.27 | 14.83 | 3.27 | 0.13 | 69.00 | 1.30 |
| H-57 | 212.77 | 36.20 | 166.67 | 169.00 | 943.33 | 716.67 | 13.50 | 23.53 | 10.65 | 2.57 | 10.77 | 2.70 | 0.13 | 59.93 | 1.40 |
| Grand Mean | 189.43 | 33.52 | 192.47 | 192.02 | 944.78 | 902.22 | 17.58 | 28.44 | 11.76 | 2.59 | 11.75 | 2.47 | 0.18 | 58.82 | 1.39 |
| F-test | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| SEm+ | 5.67 | 1.37 | 8.79 | 8.67 | 95.95 | 96.55 | 0.61 | 3.08 | 0.51 | 0.08 | 0.41 | 0.12 | 0.03 | 2.33 | 0.03 |
| CD ($P=0.05$) | 16.63 | 4.03 | 25.76 | 25.41 | 281.37 | 283.18 | 1.78 | 9.01 | 1.50 | 0.25 | 1.19 | 0.35 | 0.08 | 6.85 | 0.08 |

| | | | |
|---------------------------|----------------------------|---|------------------------------|
| X1: Plant height (cm) | X5: Fruit weight (g) | X9: Fruit breadth (cm) | X13: Titrable acidity (%) |
| X2: Stem diameter (cm) | X6: Fruit volume (ml) | X10: Pulp thickness (cm) | X14: Ascorbic acid (mg/100g) |
| X3: Plant spread E-W (cm) | X7: Fruit length (cm) | X11: TSS ($^{\circ}$ Brix) | X15: Hundred seed weight (g) |
| X4: Plant spread N-S (cm) | X8: Fruit cavity index (%) | X12: Total carotenoid content (mg/100g) | |

Ghanta (1994) recorded a pulp thickness of 3.10cm in the variety 'Ranchi'. Highest TSS was observed in the hybrid H-39, and the lowest in the variety 'Pusa Dwarf'. Dinesh and Yadav (1997) recorded TSS of 13.5 $^{\circ}$ Brix in H-39. Similar observation was reported by Auxilia and Sathiamoorthy (1999). Highest total carotenoid content was observed in H-39, and the least in 'Pusa Dwarf'. Ahmad Shah and Shanmugavelu (1975) reported high total carotenoids (1.250 to 2.558mg/100g) in the first generation hybrid (CO-1 X Coorg Honey Dew). Auxilia and Sathiamoorthy (1999) also recorded similar observation. Highest titrable acidity was observed in Waimanalo and the lowest in the hybrids H-39, H-57 and in CO-4. Ghanta (1994) recorded titrable acidity to be 0.003% in cv. Ranchi. Highest ascorbic acid content was recorded in hybrid H-39 and in Red Gold, and lowest in the variety 'Waimanalo'. Therefore, it is seen that the season and agro-climatic region in which plants grow influence Vitamin C (ascorbic acid) content of the fruit. Auxilia and Sathiamoorthy (1999) observed a range (27.65 to 71.89mg/100g) in cv. Ranchi. Similar observation was also reported by Ahmed Shah and Shanmugavelu (1975) in their first generation hybrids. Highest carotenoid content was found in hybrid H-39, followed by Pink Flesh Sweet and Sunrise Solo. Lowest titrable acidity was observed in the hybrids H-39 and H-57, while, highest ascorbic acid content was reported in hybrid H-39. The hybrids and varieties mentioned above can be used as potential parents to breed for their respective quality characters enumerated above.

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