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EVALUATION OF MANGO (*MANGIFERA INDICA* L.) CULTIVARS FOR PREPARATION OF OSMO-DEHYDRATED PRODUCT

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ABSTRACT

The present study was carried out during the year 2012-13 at the Department of Horticulture, Narendra Deva University of Agriculture and Technology, Kumarganj Faizabad,(U.P.),India to evaluatethe suitable cultivar for preparation of osmo-dehydrated product (Candy) with four pulpy mango cultivars namely Amrapali, Mallika, Dashehari and Chausa. The experiment was laid outunder completely randomized design (CRD) along with three replication of each treatment. The entire mango cultivars were analysed with their physico-chemical attributes and organoleptic score of prepared Candy. Finally, it was observed that cultivar Mallika was found best in terms of fruit weight (320.0g), average fruit length (12.5cm) and width (2.6 cm), higher pulp: stone ratio (4.70: 1), total sugars (18.5%), β-carotene (5.3mg/100g), total phenol (41.8mg/100g) as well as fetching highest score in organoleptic test (9.00). Consequently, it can be finished that prepared candy of cultivar Mallika can be beneficial for mango growers, processors as well as consumers in relation to good taste, colour, flavour, medicinal properties, throughout year availability.

INTRODUCTION

Mango (*Mangifera indica* L.) is popular as king of fruits in India and globalized in world market as fresh due to its luscious taste captivating flavour and high nutritive quality. It belongs to the family Anacardiaceae and indigenous of Indo-Burma province (Mukherjee, 1958).Mango fruits are rich in vitamins and minerals. Young and unripe fruits are acidic in taste and utilized for culinary purposes as well as for preparing pickles, chutney, and amchoor while ripe fruits are utilized in preparing squash nectar, jam, cereal flakes, custard powder, baby food, mango leather (Aam Papar) toffee and candy. In contrast, fresh fruit have a very poor shelf life and more post harvest losses occur during the season because numbers of problem are comes in preserving the freshness of produce for longer duration (Soliva-Fortuny and Martýn-Belloso, 2003). So prevention from these losses can be minimising with the help of osmotic dehydration.

Osmotic dehydration is process of impregnation of fruit in concentrated sugar solution where both partial dehydration of the tissue and solid uptake take place (Ito *et al.,* 2007; Deng *et al.,* 2008; Moraga *et al.,* 2009). The concentrated sugar solution is an act as osmotic agent to the prevention of microbial attacks and keeps the product for longer duration (Giralado *et al.* 2003). Osmotic dehydration is greatly influences by temperature, concentration of osmotic medium (Barat *et al.*, 2001) thickness of slices and degree of agitation of solution. The principle sugar in mango is sucrose (Gil *et al.*, 2000) that is why, it is expected that osmotic treatments of this sugar are least alter the sensory quality. The fruit flavour and aroma is an essential quality issue that influences consumer acceptability. Therefore suitable technology like osmotic dehydration is one the way to preserving flavour and colour of processed product up to some extent. In India a thousands of mango cultivars are found but only few cultivars are grown commercially. Here need to evaluation of mango cultivars especially for candy making because suitable cultivar for osmo-dehydrated product is not standardised till now. Hence, present study was taken with four pulpy mango cultivars namely Amrapali, Mallika, Dashehari and Chausa to find out the appropriate cultivar for making better quality candy with high benefit and low cost.

MATERIALS AND METHODS

The present research was carried out in Post-harvest Technology Laboratory of the Department of Horticulture, Narendra Deva University of Agriculture and Technology, Kumarganj, Faizabad, U.P. India during the year 2012-13 on mango cultivars to conduct the experiment. The four cultivars of mango fruit Amrapali, Mallika, Dashehari, and Chausa were taken under Complete Randomized Design (CRD) as suggested (Raghuramula *et al.,* 1983) and individual treatment was

replicated thrice.

Standardization of mango candy

Fully matured mango fruits of each cultivar were selected for preparation of osmo-dehydrated product. The peeled and pricked slices of different cultivars were soaked separately with $CaCO_3$ (2 %) for 24 hour. Slices were washed thoroughly and blanched for 5 minutes. The sugar syrup solutions (40%, 50%, and 60% TSS) were prepared with the addition of citric acid (2%) and steeped the slices for 24 hours in each concentration of all cultivars separately whereas, in 70% TSS for 3 days. Slices were dried in to hot air oven at 50ºC for 12 hours. The dried products were packed in LDPE packet and stored at ambient temperature. No any work has been done on the preparation of osmo-dehydrated product of mango however, Singh (2012) in ber and Pathak (2011) in bael have standardized the process for this.

Physico-chemical analysis

The physico-chemical of all the cultivars as fresh and selected processed product were analysed by mentioned procedures viz., physical parameters of mango like weight, length, width, pulp, peel and pulp: stone ratio were recorded. The chemical analysis viz., TSS from Hand Refractometer, reducing sugars, non-reducing sugar and total sugars (Lane and Eynon, 1923), total acidity (A.O.A.C., 2002), ascorbic acid by (2, 6-dichlorophenol indophenols- Dye) titration method and β-carotene analyzed with the help of spectrophotometer at 452 nm (Rangana, 2010) and total phenols (Singleton and Rossi, 1965).

Organoleptic evaluation

Organoleptic evaluation was done for accessing the taste, colour, flavour and texture of prepared processed product by the panel of 10 judges on a 9 point hedonic scale (Amrine *et al.* 1965). Mango candy was evaluated by 10 judges amongst professors, postgraduate students including girls. The candies were scored on the basis of their appearance, colour, taste and aroma etc. On the whole acceptability was calculated by adding of the each member's scores.

RESULTS AND DISCUSSION

The results of the study have been presented and discussed for preparation of osmo-dehydrated product from various mango cultivars. The physico- chemical analysis and organoleptic score was taken during preparation of candy.

Physical attributes

The physical attributes of fruits like appearance, weight, size, peel percent and pulp: stone ratio, etc. also play integral role in marketing as well as processing for various goals. The data of physical attributes of fresh mango cultivars is depicted in Table 1. The hybrid cultivar Mallika was found significantly superior in term of fruit weight (320g) followed by Chausa (246g) and minimum in Dashehari (204g). Regarding the average fruit length (12.5cm) and width (2.6cm) of Mallika was established significantly higher in comparison to all cultivars. Another physical characteristic of Mallika like peel (10.67%) and stone (15.65%) per cent was significantly lower while, pulp (73.68%) and pulp: stone ratio (4.70:1) in significantly higher among all cultivars. The difference in the physical characters, especially average fruit weight, size and pulp:stone ratio may be due to differences in germplasm, climatic conditions, orchard management, age of tree and location. Similar findings were also reported by (Gowda and Huddar, 2004**;** Chanana *et al.,* 2005**;** Uddin *et al.,* 2006 and Shivanandam *et al.,* 2008).

Biochemical attributes

The biochemical constituents also portray a significant role in commercialization of fresh as well as processed product. The chemical characteristics of four cultivars of mango fruit has been observed *i.e.* total soluble solids (T.S.S.), acidity, ascorbic acid, β-carotene, total phenols, reducing sugars, non-reducing sugar and total sugars (Table 2). The highest TSS content was found in Chausa (21.5%) while the lowest in Mallika (19.0%). The acidity of cultivar Mallika (0.35%) is significantly higher whereas lower in Chausa (0.20).The maximum ascorbic acid content was found in Amrapali (21 mg/100g) followed by

Table 1: Physical attributes of different cultivars of mango

S. No.	Cultivars	Average fruit weight (g)	Average fruit length (cm)	Average fruit width(cm)	Peel (%)	Stone (%)	Pulp (%)	Pulp: stone ratio
1.	Amrapali	217.0	10.9	2.5	14.6	20.7	64.6	3.1:1
2.	Mallika	320.0	12.5	2.6	10.6	15.6	73.6	4.7:1
3.	Dashehari	204.0	11.2	2.4	14.4	20.4	65.1	3.1:1
4.	Chausa	246.0	10.8	2.3	13.1	19.5	67.3	3.4:1
SEm ±		7.21	0.38	0.06	0.34	0.52	1.91	0.10
CD at 5%		23.5	1.3	0.2	1.1	1.7	6.2	0.3

Table 2: Biochemical attributes of different cultivars of mango

S. No.	Cultivars	T.S.S. (%)	Acidity (%)	Ascorbic acid (mg/100g)	Reducing sugars (%)	Non reducing sugar (%)	Total sugars (%)	â-carotene (mg/100g)	Total Phenols (mg/100g)
1.	Amrapali	19.5	0.34	21.0	6.1	10.9	17.0	5.4	34.0
2.	Mallika	19.0	0.35	20.0	6.2	12.3	18.5	5.3	41.8
3.	Dashehari	20.0	0.25	19.5	5.0	10.2	15.2	3.7	34.3
4.	Chausa	21.5	0.20	16.0	5.8	10.6	16.5	3.2	27.9
SEm ±		0.56	0.01	0.49	0.27	0.31	0.48	0.12	1.12
CD at 5%		NS	0.03	1.6	0.9	1.0	1.6	0.4	3.7

Table 3: Organoleptic score of different cultivars of mango candy

S.No.	Cultivar	Organoleptic Score	Quality Rating
1.	Amrapali	7.76	Like moderately
2.	Mallika	9.00	Like extremely
3.	Dashehari	6.94	Like slightly
4.	Chausa	7.40	Like moderately

Table 4: Chemical properties of mango candy (Cv. Mallika)

S. No.	Characters	Value
1.	Total Soluble Solid (%)	70.00
2.	Acidity (%)	00.26
3.	Ascorbic acid (mg/100g)	10.25
4.	Reducing sugars (%)	27.50
5.	Non reducing sugar (%)	39.00
6.	Total sugars (%)	66.50
7.	Browning (O D)	00.26
8.	β-Carotene (mg/100g)	03.35
9.	Total Phenols (mg/100g)	18.00

were significantly higher in Mallika than other cultivars. The β-carotene substance was observed maximum in Amrapali (5.4 mg/100g) followed by Mallika (5.3 mg/100g) and minimum in Chausa (3.2mg/100g). The highest amount of total phenol contents were found in cultivar Mallika to the tune of 41.8 mg/ 100g and lowest in Chausa (27.9 mg/ 100g).Mallika has highest acidity and lowest TSS whereas reverse in case of Chausa may be due to genetic constitution of the cultivars. The differences between chemical characters in present findings and also in reported literature may be due to differences in location, orchard management, climatic conditions, fruit maturity, age of tree and growing season. These quality attributes ultimately influence the acceptability of processed products. Similar findings were also reported by Gowda and Huddar, 2004; Shivanandam *et al.*, 2008; Bhowmick *et al.*, 2012 and Sogi *et al.*, 2012.

Organoleptic score

The variability among the mango cultivars were indicated that the possibility of selecting a cultivar for candy making.

Osmo-dehydrated product (candy) of four mango cultivars

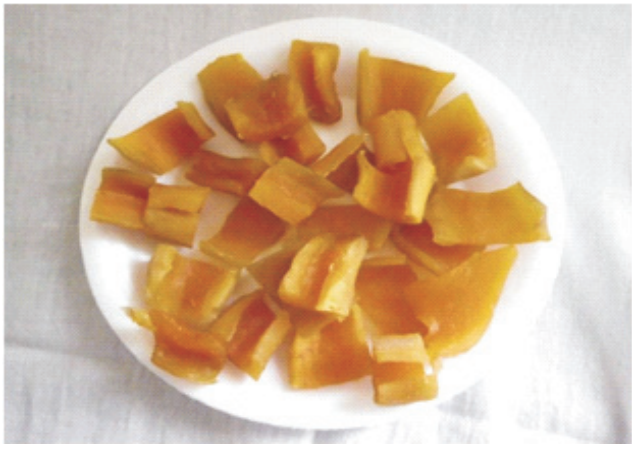

Plate1: Amrapali candy

Plate 2: Mallika candy

Plate3: Dashehari candy

Plate4: Chausa candy

Mallika (20 mg/100g) and significantly minimum in Chausa (16 mg/100g) than Amrapali and Mallika. The reducing sugars (6.2%), non-reducing sugars (12.3%) and total sugars (18.5%)

Organoleptic rating is the easiest method of judging the acceptability of any new processed product by the panel of experts. The data given in Table 3 indicate that the candy

prepared by the Mallika was judged as best by the scoring 9 value on 9 point hedonic scale followed by Amrapali (7.76). The prepared candies of all the cultivars were also shown in Plate1, 2, 3 and 4. Mallika having good physico-chemical attributes for candy making such as large oblong size, high fruit weight and pulp: stone ratio, good texture and better ratio of TSS and acidity as well as carotene and phenol content. This could also be influence due the pulp appearance, flavour, and taste. The chemical analysis is done after organoleptic scoring to obtain the nutrition statues in osmo-dehydrated product of cultivar Mallika (Table 4). Several scientists (Singh, 2012 on ber cultivars for candy; Pathak, 2011 on bael cultivars for candy; Singh *et al.*, 2014 in bael preserve and Sharma, 2014 on jamun mango blended jam) were also evaluated various fruit cultivars for candy making as well as several beverages on the basis of organoleptic test.

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