

Nutritional Quality Assessment and value addition of *Muntingia calabura* L. (Singapore Cherry) fruits

E.Tamilselvi

Department of Textile Science and Design Community Science College and Research Institute, Tamil Nadu Agricultural University, Madurai – 625 104, Tamilnadu, India

ABSTRACT

Muntingia calabura is also referred as Singapore cherry the sole species in the genus *Muntingia*, is a flowering plant belonging to the family *Elaeocarpaceae*. The fruits are abundant, red in color, round in shape, smooth, tender skin, juicy pulp with very sweet, musky, fig-like flavor, and filled with exceedingly tiny, yellowish seeds. Various parts of the tree have several documented medicinal uses i.e. it possess antiproliferative, antioxidant, antinociceptive, cardioprotective and antipyretic effects. The fruits has lot of health benefits and widely eaten by children. Keeping the above aspects in view, an experiment was conducted to assess the physicochemical, nutritional qualities and value addition of *Muntingia calabura* L. fruits at Community Science College and Research Institute, Tamil Nadu Agricultural University, Madurai, India. The results indicated that one hundred grams of fruits contains 77.83 % of moisture, 0.24 g of fat, 3.35g of crude fibre, 1.80 g of ash, 171.36 mg of vitamin C, and 1576.97 µg of carotene. Also the fruits possess pH 5.8, acidity 0.241% and TSS 15.20%. Further, value added products such as fruit candy and jam were developed from the *Muntingiacalabura* fruits and evaluated for the acceptability using nine point hedonic scale score card. The organoleptic characteristics such as color and appearance, flavor, texture/consistency and taste of the products were moderately acceptable and the overall acceptability scores of fruit candy and jam were 7.4 and 7.8 respectively. Since, the tree is very common in nursery, streets, residencies etc., and the fruits possess nutritionally good, there is a scope for preparation of these kinds of fruit based value added products and can minimize the fruits wasted unknowingly throughout the year. The fruits can be said as poor man's source of the vital nutrients since it is a good source of vitamin C and Carotene besides other nutrients. If processing and value addition is possible and may help to improve the nutritional and economic status of weaker section.

Keywords: *Muntingia calabura*, Singapore cherry, physicochemical and nutritional qualities and value addition

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INTRODUCTION

Fruits place an important place in human nutrition as a source of micronutrients such as vitamins and minerals besides providing energy. They are the major source of antioxidants and other phytochemicals and capable of preventing or healing degenerative diseases. But the consumption of fruits among a section of people is very low because of high cost. Also the availability of fruits depends the season, climatic other conditions.

Muntingia calabura L., (Family: *Elaeocarpaceae*) the sole species in the genus *Muntingia* also referred as Singapore cherry is a fast-growing tree of slender proportions, native to the American continent and is widely grown in warm areas of Asian region, including Malaysia. This plant has several vernacular names like straw berry tree, American cherry (English), Chinese cherry (or) Japanese cherry (India) and cherry chettu (Telugu) [2].

This tree reaches 25 to 40 ft in height, with spreading, nearly horizontal branches. It is a pioneer species, evergreen, thrives best in open country, acclimatized to poor soil, able to tolerate acidic, alkaline and drought conditions. It is said to grow better than any other tree in the polluted air of Metropolitan Manila. It is flowering and fruiting throughout the year. The tree was brought to this part of the world from tropical America in the 19th century and since then it has become naturalized throughout Southeast Asia.[4].The tree is being evaluated for reforestation in the Philippines where other trees have failed to grow and also for wildlife sanctuaries since birds and bats are partial to the fruits. In India, the trees are usually found in streets, road sides and commercially grown in nursery for cultivation purpose.

The plant has been reported to possess antiproliferative, antioxidant, antinociceptive, cardioprotective and antipyretic effects [8].Flowers of *Muntingiacalabura* are said to possess antiseptic properties. The flowers are used as antimicrobial agent and treated to relieve headaches, abdominal cramps, and spasms [5].

The fruits are found to have phytochemical compounds including anthocyanins, phenolic acids, and flavonoids which showed the antioxidant activity [3] and anti- inflammation activity [5]. Einbond *et al.* [1] investigated the anti-oxidant activity in twelve edible fruits which includes *Muntingia calabura* and reported that these fruits possess strong anti-oxidant activity. He also indicated the presence of anthocyanins in *Muntingiacalabura*. A total of 42 volatile compounds have been identified in the vacuum distillation extract of ripe fruits [7].In Mexico, the fruits are sold in the markets. In India especially in Tamil Nadu still the people are unaware of the value of fruits, leaves and other parts of the tree. This tree can be said as poor man's fruit source and a habitat for sparrows, parrot, bats and other birds. Hence an attempt was made to study about the Singapore cherry (*Muntingia calabura*) fruits with the following objectives

- To study the physico-chemical and nutritional qualities of Singapore cherry (*Muntingiacalabura*) fruits and
- To develop value added products from Singapore cherry

MATERIAL AND METHODS

The study was conducted at Department of Food Science and Nutrition, Community Science College and Research Institute, Tamil Nadu Agricultural University, Madurai during the year 2018-19.

Collection of *Muntingia calabura* fruits

The Singapore cherry (*Muntingiacalabura*) fruits (Fig.1.) were collected from trees found in nursery nearby the institution. The facilities available in the department were used for analysis and value addition of fruits.

Physicochemical and nutritional qualities of *Muntingia calabura* fruits

The physicochemical and nutritional quality parameters like moisture, pH, acidity, TSS, fat, crude fibre, ash, vitamin C and total carotenoids were estimated for Singapore cherry (*M.calabura*) fruits as per the methods given by Ranganna [6]. The duplicate fruits samples were used to analyse each quality parameter.

Value addition of fruits

The value added products such as fruit candy and jam (Fig.2) were prepared from Singapore cherry (*M.calabura*) fruits as per the methods given by Srivastava and Kumar, [9]. The candy was prepared by slow processing method. The fruits were steam blanched for a minute and then used for actual processing for preparation of candy. The products were prepared and evaluated for their acceptability using nine point hedonic scale score card with semi trained consumer panel.

RESULTS AND DISCUSSION

Physicochemical and nutritional profile of Singapore cherry (*Muntingia calabura*) fruits

The physicochemical and nutritional qualities such as moisture, pH, acidity, TSS, fat, crude fibre, ash, vitamin C and Total carotenoids were analysed and the values per 100g are given in table 1.

Table 1 Physicochemical/nutritional quality of *Muntingia calabura* fruits

Physicochemical/nutritional characteristics	Value/100g
Moisture (%)	77.83
pH	5.80
Acidity (%)	0.241
TSS (%)	15.20
Fat (g)	0.24
Crude fibre (g)	3.35
Ash (g)	1.80
Vitamin C (mg)	171.36
Total Carotenoids (μ g)	1576.97

From the study it was found that 100 g of Singapore cherry (*Muntingia calabura*) fruits contains 77.83 % of moisture, 15.20% of TSS, 3.35g of crude fibre 1.8g of ash and negligible quantity of fat. The result shows that the fruits are good source of vitamin C and total carotenoids. Generally the fruits are very sweet and much liked by children and the intensity of sweetness may be due to the presence of more TSS. The presence of high amount of vitamin C and total carotenoids may help boost the health benefits to the consumers.

Value addition of Singapore cherry (*Muntingia calabura*) fruits

The mean organoleptic/sensory scores of value added products such as candy and jam are given in and fig.2.

Candy

The colour and appearance of the Singapore cherry fruit candy resembles dried grapes or raisins on outside and like dried fig inside the candy. The texture of candy was like chewable. The candy had the blend of fruit and sweet flavour. Also the flavour of candy was liked very much by the people who know the fresh fruit flavour. The candy was sweet in taste and highly acceptable. The mean overall sensory acceptability of fruit candy was 7.4/9.0.

Jam

Jam is a good accompaniment for any kind of bread which can be taken regularly either in the breakfast, dinner or can be used as snack and it is a favourite food for children and people of all age groups. The jam prepared out of Singapore cherry fruits was brown in colour, good flavor and taste. The tiny seeds of the cherry were spread overall in the jam which looks a different kind than the normal jam. The consistency of jam was spreadable but a little elastic in nature and acceptable. The overall acceptability scores of jam was 7.8/9.0 i.e. highly acceptable. Like candy jam was also liked very much by the people who know the taste and flavour of fresh fruit.

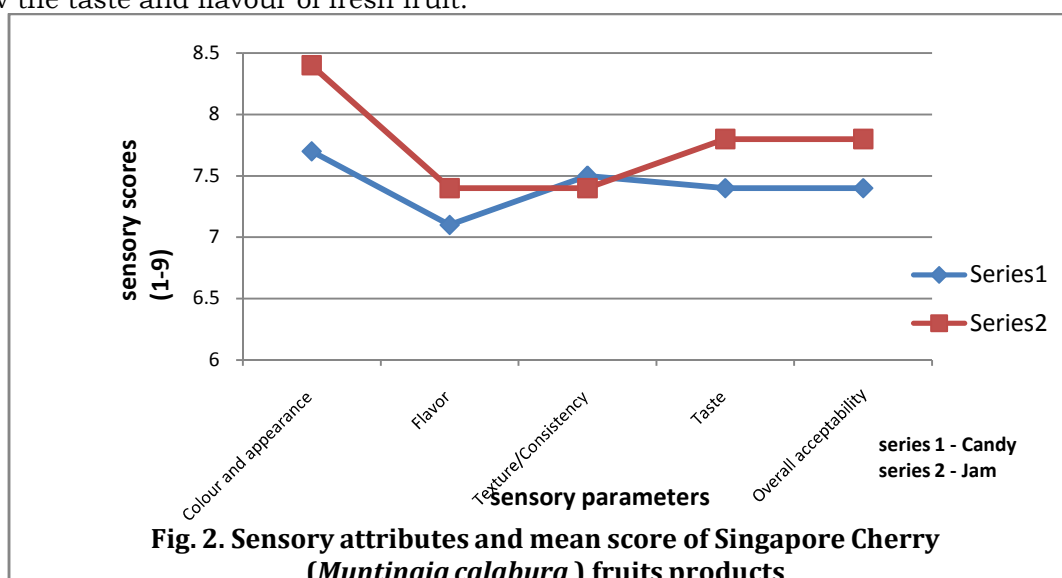


Fig. 2. Sensory attributes and mean score of Singapore Cherry (*Muntingia calabura*) fruits products

CONCLUSION

Singapore cherry (*Muntingia calabura*) fruits are good source of vitamin C (171.36 mg %) and total carotenoids (1576.97 μ g) and the nutritional profile are comparable with commonly consumed fruits like amla, dates, etc. The value added products prepared from fruits such as candy (7.4) and jam (7.8) were moderate to highly acceptable.

Since, the tree is very common in nursery, streets, residencies etc., and the fruits possess nutritionally good, there is a scope for preparation of these kinds of fruit based value added products and can minimize the fruits wasted unknowingly throughout the year. The fruits can be said as poor man's source of the vital nutrients since it is a good source of vitamin C and total carotenoids besides other nutrients. Processing and value addition of this highly nutritious, underutilized or unpopular and unwittingly wasted fruits may help to improve the nutritional and economic status of the population of weaker section.



Fig.1. Photographs of Singapore cherry (*Muntingiacalabura*) fruits and its value added products

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