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Physical and biochemical content of indigenous underutilized *Sohiong* (*Prunus nepaulensis* Ser.) fruit in Meghalaya, India

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ABSTRACT

Prunus nepalensis **belongs to the family Rosaceae, is an important underutilized fruit of the tribal population in Meghalaya. The study was conducted to investigate the physical and biochemical contents of two different genotypes of *Sohiong* fruits. Result indicated that the big fruit size type had higher values for various physic-chemical characters except for pulp recovery (74.71 %), pulp to stone ratio (2.95) and dry recovery (34.72 %), TSS (20.15%), β-carotene (2.76 mg/100g), anthocyanin (358.86 mg/100g) and fibre (2.5%). Similarly, the mineral contents of big - sized fruits were comparatively higher than the small fruit type except for potassium and ash content (1.51%). The study indicated that the availability of *sohiong* fruit ranging from August to November. In addition, fruits are rich in vitamin, minerals and bio-chemical properties. Therefore, this crop has potential to meet the nutritional needs among the tribal population of Khasi and Jaintia Hills.**

Keywords: *Prunus nepaulensis*, variability, physical, biochemical

INTRODUCTION

Prunus nepaulensis (Ser. ex DC.) Steud {syn. *Prunus nepalensis* Hook., *Padus napaulensis* (Ser. ex DC.) Schneider} is locally known as *Sohiong* and it belongs to family Rosaceae (Rymbai *et al*., 2015). This crop is an important indigenous underutilized fruit of Khasi and Jaintia Hills in Meghalaya. It is widely distributed in different parts of Khasi and Jaintia Hills. The fruit trees grow wildly in the forest areas and home backyards, and there is no established orchard of this crop in the region. *Sohiong* has an immense potential for commercial cultivation in the state as well in other parts of the world where relative cool climate is exit.

Since time immemorial, *sohiong* fruits are being utilized by the tribal population of Khasi and Jaintia Hills in various forms. The fruits are eaten fresh when ripened. The *sohiong* fruit quality possesses excellence and unique colour, taste and flavor (Patel *et al*., 2008). It is also rich in essential nutrients. It has a good potential for extraction of natural edible colour required in food industry. Authors have also been observed that its colour, when added to squash and jam, remains stable for one year. Ready to serve (RTS) product and cherry wine are also being prepared from pulp and juice of the fruit due to the fact that it imparts desirable purple colour to the wine. The expansion of area for commercial cultivation of this crop in the state may offer income and employment generation for the tribal peoples.

The plant is of low chilling types resembling very much to the common cherry (Singh *et al*., 1976). Trees are evergreen, medium to large size 15-20 m height with grey bark, open, upright branches. Leaves are oblong, lanceolate, caudate, acuminate, and glabrous with average length of 11.2 cm and breadth of 4.7 cm. Fruit-bearing starts after 7–8 years of planting the seedling. Flowering occurs between October and March. Flowers are white in colour arranged in terminal recemes or auxillary. Fruits mature between August and November, depending on the altitude. Fruit is drupe, fleshy green to pinkish in colour at early stage and later on becomes dark purple at ripening with smooth surface (Rai *et al*., 2005). The stone is hard, round in shape with smooth surface but rough in few genotypes. At present, there are no distinct varieties of *sohiong* identified in the region. However, based on variability existing in fruit size, two types of *sohiong* fruits are recognized; 1) Big fruit size and 2) Small fruit size. Although, the fruit has been consumed over centuries, however, no information exists on the nutritional values of the two types of fruit.

MATERIALS AND METHODS

The fruits of the two types (big and small fruits) of different genotypes of *sohiong* were collected from different parts of Khasi and Jaintia Hills distributed between $25^0$1' and $26^0$5' North latitudes and $85^0$49' and $92^0$52' East Longitudes with altitude ranging from 600 to 2000 m and temperature 2-28^{0}C. The fruits were analyzed for the variability existing in physical characteristics, bio-chemicals and mineral contents. Twenty fruit samples for each genotype and ten genotypes for each fruit type were analyzed at ICAR Research Complex for NEH Region, Umiam, Meghalaya. Fruits samples were washed and kept at room temperature for 10 minutes to remove the adhering water before analysis. The fruit and stone weights were determined using electronic balance (Adiar Dutt-1620C). Fruit length

and diameter, stone length and diameter were measured using digital vernier calliper (callipers (Mitutoya Digimatic Caalliper, Code No. 500-147). Pulp recovery percentage was taken as pulp weight divided by total fruit weight and multiplied by 100. Pulp: stone ratio was calculated by dividing pulp weight by stone weight. The specific gravity was determined by water displacement method. The dry matter percentage was obtained by (C-A)/(B-A) X 100, where, A, weight of Petri dish; B, total weight of fresh sample + Petri dish; C, total weight of dry sample + Petri dish. The dry weight of a sample was obtained after drying at 120 °C in an oven, until constant weight was reached. Bio-chemical analysis was determined for TSS using hand refractometer (HI 96801); acidity, ascorbic acid, reducing sugar, total sugar, β-carotene, anthocyanin and pectin were analyzed according to Rangana (1997). Moisture percentage for fruit and seeds was estimated according to Akther *et al*. (2012) and fibre content by Anon. (1990). Mineral contents for both fruit types of *sohiong* was analyzed after sample digestion with 24 cm^3 mixture of the conc. HNO_3, Conc. H_2SO_4 and 60% $HClO_3$ (9:2:1 v/v). Elemental analysis was carried out as per the standard methods of Anon. (1990). Nitrogen was analyzed using Kjeldahl method. Potassium was analyzed using flame photometer. Copper, Zinc, iron, magnesium, sulphur and manganese were analyzed using atomic absorption spectrophotometer, while phosphorus content was determined colorimetrically with spectrophotometer (Umar *et al*., 2007). Ash content was estimated according to Akther *et al*. (2012).

Table 1. Physical characteristics of two types of *Sohiong* fruits.

Parameters	Fruit size	
	Bigger	**Smaller**
Fruit weight (g)	7.91	3.98
Specific gravity	0.95	0.94
Fruit length (mm)	21.76	18.16
Fruit diameter (mm)	21.80	17.12
Stone weight (g)	2.44	1.00
Stone length (mm)	15.94	13.48
Stone diameter (mm)	15.08	11.48
Pulp recovery (%)	69.11	74.71
Pulp: stone ratio	2.24	2.95

Bio-chemical characteristics

The two types of *sohiong* genotypes showed a wide variation for biochemical characteristics (Table 2). Comparatively, higher content of acidity (3.32%), ascorbic acid (58.38 mg/100g), reducing sugar (4.44%), total sugar (8.75%), pectin (2.00%), moisture (fruit, 61.84% and seed, 33.33%) was observed in bigger fruit *sohiong* genotypes. However, smaller fruit *sohiong* genotypes recorded higher content for TSS (20.15%), β-carotene (2.76 mg/100g), anthocyanin (358.86 mg/100g) and fibre (2.5%) over bigger fruit *sohiong* genotypes. The present finding has also been observed by Rymbai *et al*. (2014) in two eco-types of *sohiong*.

RESULT AND DISCUSSION

Physical characteristics

A great variability between the two types of *sohiong* fruits was observed (Table 1). Bigger fruit size recorded higher value over smaller fruit type for fruit weight (7.91 g), fruit length (21.76 mm), fruit diameter (21.80 mm), stone weight (2.44 g) and stone length (15.94 mm). While smaller fruit size recorded higher value for pulp recovery percentage (74.71) and pulp to stone ratio (2.95). However, specific gravity (0.94 – 0.95) recorded was almost the same for the two types. The dry recovery was higher in smaller fruit types (34.72%) than in bigger fruit types (32.64%) as depicted (Fig. 1b). The variability in fruits physical characteristics within the species has also been reported by Rymbai *et al*. (2015).

Mineral contents

The two fruit types of *sohiong* genotypes were also analyzed for their minerals content which showed great variability between the two (Table 2). The bigger size fruit recorded comparatively higher amount of phosphorus (115 mg/100g), sulphur (1362.5 mg/100g), iron (9.6 mg/100 g), copper (1.56 mg/100 g), zinc (2.42 mg/100 g) and manganese (7.70 mg/100 g). Whereas, higher amount of minerals in smaller size fruit over bigger fruit types was recorded for potassium (530 mg/100 g). It was interesting to note that nitrogen content (bigger fruit, 69.95 mg/100 g; smaller fruit, 70.01 mg/100 g) of both the genotypes is the same. The ash content of smaller fruit types (1.51%) was comparatively more than that of bigger fruit size (1.03%) genotypes (Fig. 1a). Rymbai *et al*. (2014, 2015) also reported a great variation in mineral contents among different types of *sohiong*, which might be due to genetic variability.

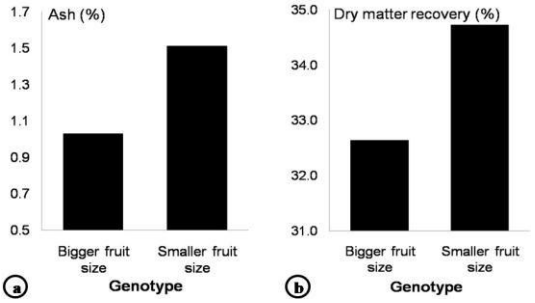

Fig 1. a) ash content (%) and b) dry recovery (%) of two types of *Sohiong* fruits.

Table 2. **Bio-chemical and mineral contents of two types of *Sohiong* fruits**

Parameter	Fruit types	
	Bigger	**Smaller**
TSS (%)	19.60	20.15
Acidity (%)	3.32	2.56
Ascorbic acid (mg/100 g)	58.38	50.04
Reducing sugar (%)	4.44	4.26
Total sugar (%)	8.75	7.50
'β' Carotene (mg/100 g)	2.16	2.76
Anthocyanin (mg/100 g)	313.34	358.86
Pectin (%)	2.00	1.80
Moisture in fruit (%)	61.84	59.71
Moisture in seed (%)	33.33	25.22
Fibre (%)	1.71	2.50
Nitrogen (mg/100g)	69.95	70.01
Phosphorus (mg/100g)	115.00	87.53
Potassium (mg/100g)	485.01	530.00
Sulphur (mg/100g)	1362.52	787.50
Iron (mg/100g)	9.60	2.32
Copper (mg/100g)	1.56	1.00
Zinc (mg/100g)	2.42	2.10
Manganese (mg/100g)	7.70	5.62

CONCLUSION

Based on the above facts, it can be concluded that the two types of *sohiong* fruits showed wide variability for physical characteristics and nutritional contents of the fruit. Bigger fruit size types recorded maximum value for most of the physical parameters, except pulp recovery, pulp: ratio and dry matter recovery. Similarly, maximum value for bio-chemical characters was noted in bigger fruit size, except for TSS, β-carotene, anthocyanin and fibre. Smaller fruit size types showed higher value for potassium content, while the other mineral contents was recorded higher in bigger fruit. But it was interesting to note that both the fruit types had the same content of nitrogen. These genotypes can also be studied in depth for further evaluation and utilization in improvement programme, with regard to wide duration availability of fruits, long post-harvest life, consumer preferences and emerging market expectations. Therefore, in view of the high nutrient contents and scope of improvement in *sohiong*, there is a need for commercial cultivation of this potential crop in order to achieve nutritional security.

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