Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; 7(3): 1045-1047
Received: 10-03-2018
Accepted: 14-04-2018

Yamuna Pandey
Department of Horticulture, Sikkim University, P/O Samdur, Gangtok Sikkim, India

Sujata Upadhyay
Department of Horticulture, Sikkim University, P/O Samdur, Gangtok Sikkim, India

Siddharth S. Bhatt
Himalayan Institute of Pharmacy and Research, Dehradun, Uttarakhand, India

Correspondence
Yamuna Pandey
Department of Horticulture, Sikkim University, P/O Samdur, Gangtok Sikkim, India

Phyto-Chemical constituent of some wild edible fruits of Sikkim Himalaya

Yamuna Pandey, Sujata Upadhyay and Siddharth S Bhatt

Abstract
The present investigation entitled "Phyto-chemical constituent of some wild edible fruits of Sikkim Himalaya" was carried out at Deptt. Of Horticulture Sikkim University during the year 2014-2017. The 10 different wild fruits were collected from different regions of Sikkim Himalaya and phyto-chemical constituent viz., TSS, acidity, ascorbic acid, total sugar, reducing sugar and non reducing sugar were analyzed using standard method of analysis. On the basis of present finding the fruit of *Diploknema butyraceae* showed maximum TSS (17.46±0.45 ºBrix) while minimum in *Calamus erectus* (2.38±0.30 ºBrix), the fruit of *Elaeagnus latifolia* was found to be highly acidic having titrable acidity value of 3.88±0.17 % followed by *Spondiasaxillaris* (3.47±0.23 %) whereas, less acidic fruits observed were *Diploknema butyraceae* (0.007±0.06%) followed by *Ficus roxburghii* (0.024±0.01 %). Ascorbic acid was found maximum in *Baccaurea sapida* (51.10±1.40 mg/100 g) and minimm in *Calamus erectus* (2.20±0.11 mg/100 g). As far as sugar is concerned the fruit of *Diploknema butyraceae* was showing maximum total, reducing and non-reducing sugar and fruit of *Calamus erectus* showed less sugar per cent.

Keywords: phytochemicals, TSS, acidity, ascoric acid, sugar, underutilized fruits.

Introduction
A large number of plants species are being used to meet food, fuel, timber and other needs. Besides growing few crops, people frequently collect wild edible plants for food and other plants from natural habitats to meet their subsistence need (Sundriyal, 1999) [7] and (Sundriyal *et al.*, 1998) [8]. Sikkim is the tiny state North East India is blessed with abundant natural resources which have been used by people for many years in different ways. Underutilized fruits are vital source of an adequate diet and they serve as food supplements, appetizer and sometimes the nutritional values of underutilized fruits are found higher than several known cultivated food yielding species (Orech *et al.*, 2007) [4]. The world has witnessed growing scientific and commercial interest in underutilized plants and plant based products mainly due to their huge economic potential and widespread cultural acceptability, however less than 5 per cent species have been analysed (Shinwari *et al.*, 2009) [6]. Sometimes the nutritional value of traditional plants is higher than several known commercial fruits (Orech *et al.*, 2007) [4] but very few nutritional studies have emphasized over the significant health benefits of such fruits species. Keeping the above points in mind, the phytochemical potential of very popular indigenous fruits of Sikkim like *Eleagnus latifolia, Elaeocarpus sikkimensis, Eriolobus indica, Ficus roxburghii, Machilus edulis, Spondias axillaris, Rubus ellipticus, Diploknema butyracea, Baccaurea sapida* and *Calamus flagellum* which contribute immensely to the nutrition and food security needs of people living in Sikkim will be studied and discussed in the current proposed research.

Materials and methods
The present study entitled "Phyto-chemical constituent of some wild edible fruits of Sikkim Himalaya" was carried out at Laboratory of Department of Horticulture, Sikkim University during the year 2014-2017. The university is located at 6th mile, Samdur, Gangtok Sikkim. The details of materials used and procedures followed during the course of investigation are described in this chapter.

Total soluble solid (T.S.S.)
The total soluble solids of the fruits were determined with the help of hand refractometer and it was expressed in degree brix (°B).

Titrable acidity

The total titrable acidity was determined by titrating 10 ml aliquot against 0.1N sodium hydroxide using phenolphthalein as indicator by method as suggested by AOAC (1980) [1]. Generally citric acid is added in most fruit, Thus results were expressed as per cent of citric acid (Equivalent wt. 64.04). Weighed sample (10 g) of fresh fruit was crushed in pestle & mortar and mixed thoroughly to obtain pulp the by adding some water boiled for 1hr to replace the water lost in evaporation. Cooled and transferred to a volumetric flask, volume made up to 100 ml. Diluted an aliquot of sample to 10 ml and place in titration flask then few drops of 1% phenolphthalein as an indicator and titrated with N/10 NaOH to light pink colour using burette or pipette. Titre value was noted and per cent titrable acidity as citric acid was calculated using following formula:

$$\text{T. A (\%)} = \frac{\text{Titre x Normality of alkali x vol. made x equivalent wt. of acid}}{\text{Weight of sample x Vol. of aliquot x 100}} \text{x100}$$

Ascorbic acid

The ascorbic acid was determined by reduction of 2, 6-dichlorophenol indophenols dye by ascorbic acid as procedure given by AOAC (1980) [1]. Ten (10) ml of juice was taken and blended with 0.4% HPO_3 and finally volume was made up to 100 ml with 0.4% HPO_3 and then 10 ml aliquot was titrated against standardized dye to obtain a pink colour which persists at least for 15 seconds. Ascorbic acid was expressed in terms of mg per 100 gm pulp by using formula:

$$\text{Ascorbic acid (mg/100 g pulp)} = \frac{\text{Dye factor x titre reading x dilution}}{\text{Weight of sample}} \text{x100}$$

Sugar (Total, Reducing and Non- reducing)

Total sugars: Totalsugar was estimated by following the standard method of AOAC (1980) [1]. The sugar extract was hydrolyzed with concentrated hydrochloric acid and titrated against 10 ml of mixed Fehling solution (5 ml Fehling solution A + 5 ml Fehling solution B) using methylene blue as indicator. The percentage of total sugar was calculated using the formula given below and the results were expressed as per cent total sugar.

$$\text{Total sugar (\%)} \frac{\text{Factor x dilution}}{\text{Weight of sample x Titre reading}} \text{x100}$$

Reducing Sugar (RS): The reducing sugar was estimated by the method of AOAC (1980) [1]. The extract was taken and titrated against 10 ml of mixed Fehling solution A and B using methylene blue as indicator. The results were expressed as percentage of reducing sugar and calculated using following formula:

$$\text{Reducing sugar (\%)} \frac{\text{Factor x dilution}}{\text{Weight of sample x Titre reading}} \text{x100}$$

Non-Reducing Sugar (NRS): NRS was calculated bysubtracting the amount of reducing sugar from that of totalsugars followed by multiplication with 0.95.

Statistical analysis

All values were expressed as mean ± SD of three parallel determinations.

Results and Discussion

TSS (Total Soluble Solid)

Fruit of *Diploknema butyraceae* possessed the highest amount of TSS i.e. 17.46±0.45°Brix followed by *Rubus ellipticus* (16.11±0.08 °Brix) and *Eleaocarpus sikkimnesis* (14.03±0.15 °Brix) whereas, the lowest TSS was observed in the fruit of *Calamus erectus* (2.38±0.30 °Brix) and significant amount of TSS was also observed in *Elaeagnus latifolia* (13.2±0.2 °Brix), *Baccaurea sapida* (12.57±0.15 °Brix) and *Spondias axillaris* (12.17±0.15 °Brix). This variation in TSS is obvious as it is an inherent character of different species. The present findings partially agreed with the results of (Rymbai *et al.,* 2016) [5] as they found silimar value in the fruit of *E. latifolia* and B. sapida. (Kumar *et al.,* 2015) [3] recorded maximum TSS in fruit of *D. butyraceae* (18°Brix) which was similar to our finding.

Titrable Acidity

It is evident from the data presented in table 1. that all the fruits under study varied significantly with respect to titrable acidity. The maximum titrable acidity was observed in *Elaeagnus latifolia* (3.88±0.17 %) followed by *Spondias axillaris* (3.47±0.23 %) and *Eriolobus indica* (2.94±0.07 %) whereas, *Diploknema butyraceae* (0.007±0.06 %), *Ficus roxburghii* (0.024±0.01 %) and *Calamus erectus* (0.034±0.06 %) were found to contain less titrable acidity. These findings are in accordance with the results of (Rymbai *et al.,* 2016) [5] who reported the 1.93 % acidity in the fruit of *Baccaurea sapida* and 2.8 % in *E. latifolia.* Each fruits show variation according to their variable sensory traits.

Ascorbic acid

It is clear from the data presented in table 1. the higher amount of ascorbic acid was found in the fruit of *Baccaurea sapida* followed by *Spondias axillaris* and *Diploknema butyraceae* (51.10±1.40 mg/100g, 34.54±0.99 mg/100 g and 22.72±0.65 mg/100 g, respectively). While, ascorbic acid was observed minimum in *Calamus erectus* (2.20±0.11 mg/100 g) and *Ficus roxburghii* (3.36±0.27 mg/100 g). Ascorbic acid in the fruit of *Spondias axillaris* (32.0 mg/100g fresh weight) was also reported by (Kumar *et al.,* 2015) [3] which was similar to our finding. (Bhutia, 2013) [2] results revealed that the concentration of ascorbic acid varied in the range of 0.7 – 32.0 mg/100 g (FW) and it was noted maximum in the fruit of *Spondias axillaris.* Such variation in ascorbic acid could be attributed to the nature and extent of genetic variability present in the experimental material.

Table 1: Phytochemical constituent of wild edible fruits of Sikkim Himalayas

Sl. No.	Name of fruits	Parameters					
		TSS (ºBrix)	Acidity (%)	Ascorbic acid (mg/100g)	Total sugar (%)	Reducing sugar (%)	Non reducing sugar (%)
1	*Baccaurea sapida*	12.57±0.15	1.95±0.04	51.10±1.40	4.03±0.05	2.39±0.62	1.56±0.60
2	*Calamus erectus*	2.38±0.30	0.034±0.06	2.20±0.11	0.66±0.95	0.40±0.21	0.25±0.34
3	*Diploknema butyraceae*	17.46±0.45	0.007±0.06	22.72±0.65	12.25±0.04	5.22±1.35	6.68±1.26
4	*Elaeagnus latifolia*	13.2±0.2	3.88±0.17	14.13±1.50	3.54±0.64	2.08±0.57	1.22±0.54
5	*Eleaocarpus sikkimnesis*	14.03±0.15	2.03±0.05	11.43±1.12	6.61±1.15	5.04±0.44	1.36±0.70
6	*Eriolobus indica*	10.17±0.25	2.94±0.07	9.7±0.59	7.56±0.02	3.75±0.71	3.62±0.70
7	*Ficus roxburghii*	5.87±0.42	0.024±0.01	3.36±0.27	3.64±0.45	1.91±0.55	1.65±0.71
8	*Machillus edulis*	3.63±0.15	0.12±0.02	5.19±0.37	0.75±0.21	0.61±0.33	0.13±0.11
9	*Spondias axillaris*	12.17±0.15	3.47±0.23	34.54±0.99	3.15±0.03	2.22±0.69	0.91±0.67
10	*Rubus ellipticus*	16.11±0.08	1.97±0.03	5.67±0.06	7.86±0.16	5.57±1.20	2.18±1.24

*Values were expressed as mean ± SD of triplicate

Sugar (Total, reducing and non-reducing)

Data pertaining to sugar are presented in table 1. It was observed that the maximum total sugar was noted in the fruit of *Diploknema butyraceae* (12.25±0.04 %) followed by *Rubus ellipticus* (7.86±0.16 %) and *Eriolobus indica* (7.56±0.02 %) whereas; minimum total sugar was noted in *Calamus erectus* (0.66±0.95 %) and *Machillus edulis* (0.75±0.21 %). As far as reducing sugar iis concerned it was found to be highest in *Rubus ellipticus* (5.57±1.20 %) followed by *Diploknema butyraceae* (5.22±1.35 %) and *Eleaocarpus sikkimnesis* (5.04±0.44 %) and lowest reducing sugar was noted in *Calamus erectus* (0.40±0.21%) and *Machillus edulis* (0.61±0.33 %). Non–reducing sugar was maximum in *Diploknema butyraceae* (6.68±1.26 %) and minimum in *Machillus edulis* (0.13±0.11 %). The results are partially in agreement with the results of (Kumar *et al.*,2015) [3] as he observed highest total sugar in fruits of *Eriobolus indica* (13.04 %) while *Machilus edulis*, *Spondias axillaris*, *Terminalia chebula*, *Castanopsis hystrix* and *Elaegnus latifolia* had least total sugar (3%). Non-reducing sugar in fresh fruits of the species varied from 0.1 to 6.0 %. *Diploknema butyraceae* possessed maximum amount of non-reducing sugar while minimum in *Eriolobus indica.*

Conclusion

With the present research finding it is concluded that wild edible fruits of Sikkim Himalayas are most liked fruits by the local people and they are potential source of nutrition for the local tribes. These crops if exploited properly can keep people healthy and nutritionally secure than any other expensive fruits. These wild edibles also have potential to give economic security to local people by fetching good price by selling them. Therefore there is a urgent need of further research in these crops emphasizing over there nutritional and medicinal properties.

Acknowledgements

Authors are highly thankful to the facilities and funds provided by Sikkim University, Gangtok-737102, Sikkim, India.

References

1. AOAC. Official Method of Analysis. Association of Official Analytical Chemist, AOAC, Benjamin Franklin Station, Washington, DC. 1980.
2. Bhutia KD. Studies on the physicochemical characteristics and utilization aspects of some indigenous minor fruits of Sikkim. Ph.D thesis. Department of Pomology and Post Harvest Technology. Uttar Banga Krishi Vishwavidyalaya. 2013; pp.203.
3. Kumar S, Mahato, Chettri B. Important aspects of some underutilized fruit crops and their wild relatives for food and nutritional securityin Darjeeling Himalayas. International journal of Agricultural science and Research. 2015; 5(4):29-42.
4. Orech FO, Hansen JA, Friis H. Ethnoecology of traditional leafy vegetables of the Luo people of Bondo district, western Kenya. International Journal of Food Science and Nutrition. 2007; 58(7):522-530.
5. Rymbai H, Roy AR, Deshmukh NA, Jha AK, Shimray W, War GF, *et al*. Analysis study on potential underutilized edible fruit genetic resources of the foothills track of Eastern Himalayas, India. Genet Resour Crop Evol. 2016; 63:125-139.
6. Shinwari ZK, Khan J, Naz S, Hussain A. Screening of medicinal plants of Pakistan for their antibacterial activity. African Journal of Biotechnology. 2009; 8(24):7082-7086.
7. Sundriyal M. Distribution, propagation and nutritive value of some wild edible plants in the Sikkim Himalaya, Ph D thesis submitted to Garhwal University, Srinagar (Garhwal), 1999.
8. Sundriyal M, Sundriyal RC, Sharma E, Purohit AN. 'Wild edibles and other useful plants from the Sikkim Himalaya, India'. Oecologia Montana. 1998; 7:43-54.