Journal of AgriSearch, 10 (1): 41-45
An Open Access International Peer Reviewed Quarterly

ISSN : 2348-8808 (Print), 2348-8867 (Online)
https://doi.org/10.21921/jas.v10i01.12255

Proximate Composition of some Indigenous Plant Species having Ethno-medicinal Importance

SIMANTA DAS[1*], RANJAN KANDALI[1] AND SAMINDRA BAISHYA[2]

ABSTRACT

The present investigation was intended to study the phytochemical composition as well as juice characteristics of seven plant samples *viz. S. cumini* L., *S. fructicosum* Roxb. DC., *Basella alba* L., *Basella rubra* L., *R. indica* L., *R. damascena* Mill. and *R. bracteata* J.C. Wendl. collected from different places of Jorhat district, Assam, India. *R. indica* L., *R. damascena* Mill. and *R. bracteata* J.C. Wendl. of Rosaceae family was found with higher ascorbic acid content (139.84mg/100g, 142.72 mg/100g and 120.93 mg/100g) as well as total phenolic content (1516.52 mg GAE/100g, 1380.67 mg/100g and 1347.23 mg GAE/100g). Fruits of *Basella rubra* L. had higher total flavonoid content (292.52 mg QE/100g) followed by fruits of *Basella rubra* L. (262.88 mg QE/100g) and flowers of *Rosa bracteata* J.C. Wendl. (196.12 mg QE/100g). Fruits of *S. cumini* L. are found to be rich in anthocyanin content (124.87 mg/100g) as well as total ash (1.84%) and minerals like phosphorus (32.53 mg/100g), sodium (96.24 mg/100g), calcium (142.36 mg/100g) and potassium (252.44 mg/100g). Higher iron content (4.37 mg/100g) was quantified in fruits of *Basella rubra* L.

Keywords: North-Eastern India, Indigenous plants, Phytochemical analysis, Nutritive value

ARTICLE INFO

Received on	:	02.02.2023
Accepted	:	15.03.2023
Published online	:	30.03.2023

INTRODUCTION

The North-Eastern region of India contributes to a large extent to the total biodiversity of India. Plants have been used by numerous ethnic groups of this region for healthcare and they are still used by the majority of the population due to their non-toxic nature and economic affordability. However, the scientific basis of use of these medicinal plants still needs to be validated. *Syzygium cumini* L., commonly known as Jamun, is rich in different phytochemicals like glycosides, gallic acid, tannin, terpenoids and minerals etc. This plant fruit contains single long seed, dark purple in color and its shape is oval. Fruiting takes place once in a year. It is generally fleshy and having a hard seed inside. Not only antioxidant but jamun fruits contain different vitamins, tannins and other phytochemicals and its other plant parts also have some medicinal value (Ghosh *et al*. 2017). *Basella alba* L. (white) and *Basella rubra* L. (reddish violet) commonly known as Indian spinach, malabar spinach and ceylon spinach are fast growing and heat tolerant, perennial vines. Matured fruits are fleshy, stalk less, ovoid or spherical, 5- 6 mm long, white (*Basella alba* L.) and reddish violet or purple (*Basella rubra* L.). Rose flowers are grown worldwide as cut flowers, potted plants and in home gardens varying in size, shape and color. The flowers are used as an antidote to poisons and also as diuretic and febrifuge (Deka *et al*. 2017). They are generally woody plants, mostly shrubs or small to medium-size trees, some of which are armed with thorns, spines, or prickles to discourage herbivores. There are more than 20,000 commercial cultivars of rose based on petal color and texture. They are regarded as the most important commercial flower crop and there are 200 wild species in Rosa (Ghosh *et al*. 2017). Information regarding selected plants has been presented in table 1.

Table 1: Information regarding selected plant samples

Plant species	Family	Plant parts used	Properties
S. cumini L. (Malabar plum, jamun) and *S. fruticosum* Roxb. DC. (Bon-jamun, Kak jamun)	Myrtaceae	Matured fruit	Antimicrobial, antioxidant, antidiabetic and Hypolipidemic. (Ghosh *et al*.,2017)
B. alba L. and *B. rubra* L. (Malabar spinach)	Basellaceae	Matured fruit	Anticancer, antioxidant, anti-inflammatory and free radical scavenging (Kumar *et al*.,2016)
R. indica L. (Cyme rose), *R. damascena* Mill.(Taif rose) and *R. bracteata* J.C. Wendl. (Macartney rose)	Rosaceae	Full grown flower	Antioxidant, antidiabetic, anti-inflammatory, antimicrobial and anti-depressant qualities. (Ghosh *et al*., 2017)

MATERIALS AND METHODS

Matured fruits of jamun (*Syzygium cumini* L.), wild jamun (*S. fructicosum* Roxb. DC.), white puroi (*Basella alba* L.), dark violet puroi (*Basella rubra* L.), flowers of red rose (*Rosa indica* L.), pink rose (*Rosa damascene* Mill.) and white rose (*Rosa bracteata* J.C. Wendl.) were procured from Sensoa gaon (26°42 N and 94°10 E), Upper deuri gaon (26°47 N and 94°07 E) and Assam

[1,2] Deptt. of Biochemistry and Agricultural Chemistry, Assam Agricultural University, Jorhat, Assam, India
*Corresponding Author E-mail: simanta.das.adj21@aau.ac.in

Agricultural University area (26°44 N and 94°10 E) of Jorhat district, Assam, India (Table 1). Samples were subjected to morphological characters records *viz.* weight, length and breadth. Juice extraction from fruit and flower different plant samples was done as per method given by Naresh (2016). Collected plant samples (50g) were washed with distilled water, homogenized, mixed with extraction solvent (4% ethanol + 0.5 % citric acid) and kept for 72 hours in dark condition. By using Whatman filter paper no. 42, filtration was done and filtrates were stored in glass bottle in refrigerated condition for further analysis. The visual color (British Color Council color chart) and titratable acidity along with other juice characteristics like TSS content, pH, Vitamin C (ascorbic acid) were determined was observed and recorded. The fruits and flower samples of plant species selected for color extraction were oven dried (52ºC) for 3 days and grinded into fine powder. The powdered material was stored in a desiccator until used for further analysis. Biochemical analysis like moisture content, total soluble protein (Chitnis *et al.* 2019), total Alkaloid content, total terpenoids (Indumathi *et al.* 2014), total phenolics, total flavonoids (Deka *et al.*, 2017; Ghosh *et al.* 2017 and Jebitta *et al.* 2016). The total ash content was done by standard procedures with slight modifications. Minerals like phosphorus, calcium, sodium, potassium were determined by flame photometric method and iron content using UV-VIS spectrophotometer (Junsomboon *et al.* 2011). The experiment was laid out in Complete Randomized Design (CRD). All analysis was performed in triplicate and the average has been reported. The data were analyzed by one-way analysis of variance (ANOVA). The treatment means were compared among themselves by calculating critical difference (CD at P<0.05).

RESULTS AND DISCUSSION

Fully grown matured fruits of jamun, Malabar spinach and flowers of roses are varying in their shape and size depending on growing condition, soil and climate as well as varietal influence (Ghosh *et al.* 2017). Morphological characters of samples are represented in table 2. Visual color of juice extracts of *S. cumini* L. (45A), *S. fructicosum* Roxb. DC. (45A), *Basella alba* L. (45A), *Basella rubra* L. (46B), *Rosa indica* L. (46B), *Rosa damascene* Mill. (11A) and *Rosa bracteata* J.C. Wendl. (11A) was observed by Royal Horticultural Society Color chart (Vol. 5). The highest color hue was found in the juice extracts of *Rosa damascena* Mill. (3.31), whereas the lowest color hue was observed in juice extracts of *S. fructicosum* Roxb. DC. (0.46) (Table 3). In the case of color intensity, the juice extracts of *S. cumini* L. had higher color intensity value (2.75). The pH of extracted juice of *S.cumini* L. (3.85) was found to be slightly higher than that of *S. fructicosum* Roxb. DC. (3.12). Yogendrasinh (2017) reported the average juice pH of *S. cumini* L. fruit as 3.74±0.02. pH of extracted juice of *Basella alba* L., *Basella rubra* L., *Rosa indica* L., *Rosa damascena* Mill. and *Rosa bracteata* J.C. Wendl. were found in near-neutral range which can be correlated with Singh *et al.* 2017.

The highest per cent juice content was found in the juice extracted from the fruit of *S.cumini* L. (51.2%). Per cent juice content of *Basella alba* L. was found as 48.4 % while in *Basella rubra* L. it was recorded to be 47.5%. Islam *et al.* (2018), reported the per cent juice content of *Basella* spp. as 57.62±0.06 %. In the present investigation the flowers of *Rosa indica* L., *Rosa damascena* Mill. and *Rosa bracteata* J.C. Wendl. had lower per cent juice content (7.2%, 7.6% and 6.8%). Singh *et al.* (2017) reported the average per cent juice content of rose flower nearly ten (9.71±0.182%). The total soluble solid content of *S.cumini* L and *S. fructicosum* Roxb. DC. was found to be 12.96 and 13.41°B. Akhila *et al.* (2018), studied about TSS content of Jamun fruit juice (15±0.03°B). The report was in accordance with our present findings. In this present investigation TSS content of fruits of *Basella alba* L. and *Basella rubra* L. was estimated. The juice extracts of fruits of *Basella alba* L. were found as 0.52°B, whereas fruit juice extract of *Basella rubra* L. had 0.58 °B. The results could be comparable with Kumar *et al.* (2016). The TSS content of *Rosa indica* L., *Rosa damascena* Mill., and *Rosa bracteata* J.C. Wendl. were found as 8.12, 7.62 and 7.18°B, respectively. Butcaru *et al.* (2018), studied about nutritional properties of rose flower which ranged from 7.6°B to 10.35°B. In present investigation, flowers of *Rosa indica* L.(139.84mg/100g), *Rosa damascena* Mill. (142.72mg/100g) and *Rosa bracteata* J.C. Wendl. (120.93mg/100g) contained a higher amount of ascorbic acid content than that of the fruits of *S.cumini* L.(38.62 mg/100g), *S. fructicosum* Roxb. DC. (36.19 mg/100g), *Basella alba* L. (78.53 mg/100g) and *Basella rubra* L. (81.31 mg/100g). Similar reports of ascorbic acid content were recorded by Ghosh *et al.* (2017). The titrable acidity in juices measures the concentration of titratable hydrogen ions contained in the fruit juice neutralized with strong base solution to a fixed pH. The titrable acidity of the seven sample

Table 2: Juice characteristics of seven selected plant samples

Sample	Color hue	Color intensity	Juice pH	% Juice content (v/w)	Ascorbic acid (mg/100g)	Titrable acidity (%)
S. cumini L.	0.83	2.75	3.85	51.2	38.62	1.02
S. fruticosum Roxb. DC.	0.46	0.24	3.12	48.5	36.19	0.92
Basella alba L.	0.70	6.14	6.73	48.4	78.53	0.27
Basella rubra L.	1.19	0.93	6.47	47.5	81.31	0.22
Rosa indica L.	2.04	0.93	6.45	7.2	139.84	0.21
Rosa damascene Mill.	3.31	0.26	6.35	6.8	142.72	0.23
Rosa bracteata J.C. Wendl.	2.71	1.30	7.03	7.6	120.93	0.22
CD(0.05)	0.320	0.233	0.210	1.25	NS	NS
SE(d)	0.149	0.108	0.098	0.582	0.008	0.006
SE(m)	0.106	0.077	0.069	0.412	0.005	0.004

extracts were found with 1.02 (*S.cumini* L.), 0.92 (*S. fructicosum* Roxb. DC.), 0.27 (*Basella alba* L.), 0.22 (*Basella rubra* L.), 0.21 (*Rosa indica* L.), 0.23 (*Rosa damascena* Mill.) and 0.22 (*Rosa bracteata* J.C. Wendl) expressed in percentage.

Table 3: Morphological characteristics of seven selected plant samples (Data presented as mean of five replications ± standard deviation)

Sl. No.	Species	Part used	Weight (g)	Length (cm)	Breadth (cm)
1	*S. cumini* L.	Fruit	6.31±0.02	2.21±0.09	2.04±0.08
2.	*S. fruticosum* Roxb. DC.	Fruit	2.56±0.06	0.64±0.03	0.69±0.06
3.	*Basella alba* L.	Fruit	0.79±0.03	0.52±0.03	0.78±0.02
4	*Basella rubra* L.	Fruit	0.76±0.04	0.54±0.05	0.77±0.03
5.	*R. indica* L.	Flower	4.03±0.04	3.83±0.09	3.30±0.06
6	*R. damascena* Mill.	Flower	4.73±0.02	4.07±0.08	3.47±0.02
7	*R. bracteata* J.C. Wendl.	Flower	3.20±0.01	3.87±0.03	3.17±0.07

Phytochemical analysis of selected plant samples

The highest moisture content was found in fruits of *Basella alba* L. (84.12%) and the lowest was found in flowers of *Rosa damascena* Mill. (76.65%). The fruits of *S.cumini* L. (81.92%), *S. fructicosum* Roxb. DC. (78.48%), *Basella rubra* L. (83.88%), flowers of *Rosa indica* (81.37 %) and *Rosa bracteata* J.C. Wendl. (78.78%) were evaluated for total moisture content (Fig. 1). Findings of different researcher (Akhila *et al.* 2018 and Kumar *et al.* 2016) referred the total soluble protein content of fruits of jamun, malabar spinach and flowers of rose as 0.70±0.13 %, 2±0.05% and 1.7%, respectively. Our findings resulted in 0.78% (*S.cumini* L.), 0.44% (*S. fructicosum* Roxb. DC.), 1.02% (*Basella alba* L.), 0.95% (*Basella rubra* L.), 1.7% (*Rosa indica* L.), 1.2% (*Rosa damascena* Mill.) and 1.3% (*Rosa bracteata* J.C. Wendl.) of total soluble protein when determined by Lowry method (Table 4). Among seven selected plant samples the highest total alkaloid content was found in *S.cumini* L. (2.31%) followed by *S. fructicosum* Roxb. DC. (1.81%), *Basella alba* L. (0.04%), *Basella rubra* L. (0.05%), *Rosa indica* L. (0.05%), *Rosa damascena* Mill. (0.04%) and *Rosa bracteata* J.C. Wendl. (0.04%). Flowers of rose and fruits of Malabar spinach are usually found with lower alkaloid content when compared with fruits of jamun. Terpenoids are classified based on five-carbon (isoprene) units as their building blocks which can be used as natural flavor additives for food or fragrances in perfumery and traditional and alternate medicines as aromatherapy and antioxidant properties. The total terpenoid content of *S.cumini* L. was found as 7.62%. On the other hand, fruits of *Basella alba* L. (0.06 %) and *Basella rubra* L. (0.05%) were found with lowest terpenoid content. In contrary to that, Flowers of *Rosa indica* L. (63.82%), *Rosa damascena* Mill. (58.31%) and *Rosa bracteata* J.C. Wendl. (60.32%) had higher terpenoid percentage. Malik *et al.* (2017), reported the total terpenoid content in flowers of *Rosa* spp. ranged from 30 to 60 %.

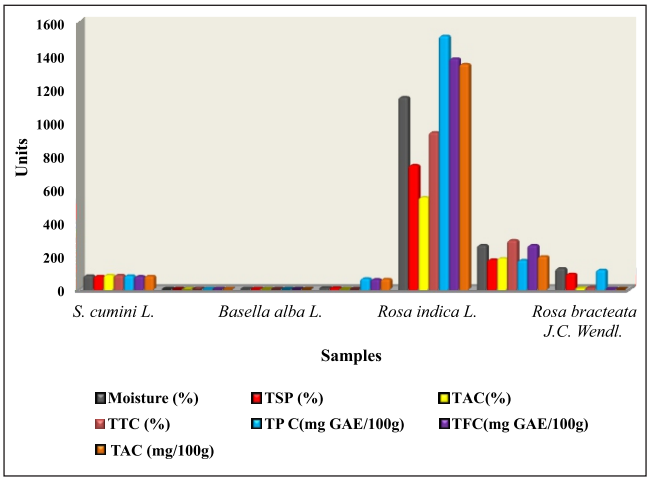

Fig. 1: Phytochemical analysis of selected plant samples

Table 4: Biochemical parameters of selected plant samples (Values are mean of three replications)

Sample	Moisture (%)	TSP (%)	TAC* (%)	TTC (%)	TPC (mg GAE/100g)	TFC (mg QE/100g)	TAC (mg/100g)
S. cumini L.	81.92	0.78	2.31	7.62	1149.28	262.87	124.87
S. fruticosum Roxb. DC.	78.48	0.44	1.81	5.57	741.25	176.23	91.41
Basella alba L.	84.12	1.02	0.04	0.06	548.98	184.16	5.96
Basella rubra L.	83.88	0.95	0.05	0.05	938.47	292.52	8.95
Rosa indica L.	81.37	1.7	0.05	63.82	1516.52	172.91	115.26
Rosa damascene Mill.	76.65	1.2	0.04	58.31	1380.67	262.88	2.36
Rosa bracteata J.C. Wendl.	78.78	1.3	0.04	60.32	1347.23	196.12	0.66
CD(0.05)	0.262	0.103	0.365	0.048	0.076	0.021	0.073
SE(d)	0.122	0.048	0.170	0.199	0.035	0.010	0.034
SE(m)	0.086	0.034	0.120	0.141	0.025	0.007	0.024

(NB: TSP: Total Soluble Protein, TAC*: Total Alkaloid Content, TTC: Total Terpenoid Content, TPC: Total Phenolic Content, TFC: Total Flavonoid Content, TAC: Total Anthocyanin Content, GAE: Gallic Acid Equivalent, QE: Quecertin Equivalent)

Plant phenolic compounds can act as antioxidants, structural polymers (lignin), attractants (flavonoids and carotenoids), UV screens (flavonoids), signal compounds (salicylic acid and flavonoids) and defense response chemicals (tannins and phytoalexins). Anthocyanins are flavonoids that exist in various fruits and vegetables. Anthocyanins are widely known as nutraceuticals and are a group of soluble vacuolar pigments, which are red, purple, or blue based on the pH of the microenvironment. Present investigation deals with total phenolic content along with total flavonoid and total anthocyanin content. Total phenolic, total flavonoid and total anthocyanin content of *S.cumini* L. and *S. fructicosum* Roxb. DC. was found to be 1149.28 mg GAE /100 g, 262.87 mg QE/100g, 124.87 mg/100g and 741.25 mg GAE/100g, 176.23 mg QE/100g and 91.41 mg/100g, respectively. Both the selected fruits of *Basella* spp. were evaluated for total phenolic content and it was found that *Basella rubra* L. had a high amount of total phenolic content (938.47mg GAE/100g) than that of *Basella alba* L. (548.98mg GAE/100g). Total flavonoid and total anthocyanin were found to be 292.52 mg QE/100g and 5.96 mg/100g in fruits of *Basella alba* L. On the other hand, fruits of *Basella rubra* L. had total flavonoid and anthocyanin content as 184.16 mg QE/100g and 8.95 mg/100g. Flowers of *Rosa indica* L. (1516.52 mg GAE/100g, 172.91 mg QE/100g and 115.26 mg/100g), *Rosa damascena* Mill. (1347.23 mg GAE/100g, 262.88 mg QE/100g and 2.36 mg/100g) and *Rosa bracteata* J.C. Wendl. (1380.67 mg/100g GAE/100g, 196.12 mg QE/100g and 0.66 mg/100g) had higher total phenol, flavonoids and anthocyanin content.

Ash provides a measure of the total amount of minerals within a food. Minerals like phosphorus, sodium, calcium and iron is a part of every cell of the body and is vitally concerned with many metabolic processes. Proximate analysis shows the presence of different minerals in selected plant samples (Table 5). Although three selected rose flower samples were found to be very less in minerals content, fruits of *S. cumini* L. and *S. fruticosum* Roxb. DC. were found with higher amount of sodium, calcium and potassium. On the other hand, fruits of *Basella alba* L. had higher phosphorus content (38.48 mg/100g). Iron content in all seven plant samples were found to be very less which can be found relatable with different researchers (Menaka *et al.* 2017).

CONCLUSION

Our findings are confined in three plant families concerning the diversity of plant species in North-Eastern part of India. Out of seven plant samples there are very few works regarding fruits of wild jamun (*S. fruticosum* Roxb. DC.). Selected samples contain higher amount of phenol, flavonoids and anthocyanin which could be incorporated in further research regarding antioxidant or antimicrobial effect. Extraction and purification of anthocyanin and betacyanin from natural sources along with other coloring component can be utilized in coloring industry without causing health hazard. For increasing chief components, biochemical as well as molecular characterization of this locally available food is necessary.

ACKNOWLEDGMENTS

This study is in part of Mr. Simanta Das's M.Sc. thesis and was funded by "Assam Agricultural University, Jorhat, Assam". Mr. Simanta Das would like to thank Department of Biochemistry and Agricultural Chemistry along with Department of Agricultural Biotechnology, Assam Agricultural University, Assam, India for their support during his M.Sc. studies.

Table 5: Total ash and mineral content (P, Na, Ca, K and Fe) of selected plant samples (Values are mean of three replications)

Plant Samples	Ash content (%)	Phosphorus (mg/100g)	Sodium (mg/100g)	Calcium (mg/100g)	Potassium (mg/100g)	Iron (mg/100g)
S. cumini L.	1.84	32.53	96.24	142.36	252.44	3.53
S. fruticosum Roxb. DC.	1.72	26.19	72.69	173.63	192.64	2.96
Basella alba L.	1.52	38.48	3.71	27.05	18.07	4.10
Basella rubra L.	1.44	33.23	2.63	23.14	16.21	4.37
Rosa indica L.	0.84	29.37	0.42	6.43	14.77	2.66
Rosa damascene Mill.	0.72	31.46	0.31	6.97	11.21	2.15
Rosa bracteata J.C. Wendl.	0.64	27.89	0.52	5.97	9.73	1.95
CD(0.05)	NS	0.079	0.087	NS	0.194	0.081
SE(d)	0.011	0.037	0.041	0.011	0.091	0.036
SE(m)	0.007	0.026	0.028	0.008	0.063	0.025

REFERENCES

Akhila H and Umadevi S H. 2018. Physico-chemical properties of jamun (*Syzygium cumini* L.) fruits and its processed products. *Int. J. Pure App. Biosci.* **6** (6): 1317-1325.

Butcaru AS. 2018. Cultivation technology of organic roses for petal production. Scientific papers, Series B, *Horticulture* L12:203-210.

Chitnis N, Pemberton P, Yukich J. 2019. Theory of reactive interventions in the elimination and control of malaria. *Malaria Journal* **18**:266-269.

Deka J, Borah U, Dash B, Dash S and Kalita L. 2017. Preliminary phytochemical screening and in vitro antimicrobial activity of ethanolic extract of stem of the herb *Basella alba* L. var. *rubra* (L.) stewart (family-Basellaceae). *Int. J. of Current Pharmaceutical Research* **9**(3):91-94.

Ghosh P, Pradhan RC, Mishra S, Patel AS and Kar A.2017. Physicochemical and nutritional characterization of Jamun (*Syzygium Cuminii*). *Current Research in Nutrition and Food research* **5**(1):25-35.

Indumathi C, Durgadevi G, Nithyavani S and Gayathri PK. 2014. Estimation of terpenoid content and its antimicrobial property in Enicostemma litorrale. *Int. J. of ChemTech Research* **6**(9): 4264-4267.

Islam MK, Khan MZ, Sarkar MA, Absar N and Sarkar SK. 2013. Changes in acidity, TSS, and sugar content at different storage periods of the postharvest mango (*Mangifera indica* L.) influenced by bavistin df. *International Journal of Food Science* **13**:1-8.

Jebitta SR and Allwin S. 2016. Antioxidant activity, total phenol, flavonoid, and anthocyanin contents of jamun (*Syzygium cumini*) pulp powder. *Asian Journal of Pharmaceutical and Clinical Research* **9**(2):361-367.

Junsomboon J, Jakmunee J. 2011. Determination of potassium, sodium, and total alkalies in portland cement, fly ash, admixtures, and water of concrete by a simple flow injection flame photometric system. *Journal of Automated Methods and Management in Chemistry* **1–9**.

Kumar SS, Manoj P, Nimisha G and Giridhar P. 2016. Phytoconstituents and stability of betalains in fruit extracts of Malabar spinach (*Basella rubra* L.). *Journal of Food Science and Technology* **53**(11):4014–4022.

Malik SK, Ahmad M and Khan F. 2017. Qualtitative and quantitative estimation of terpenoid contents in some important plants of punjab, Pakistan. *Pakistan Journal of Science* **69**(2): 150-154.

Menaka M and Chandra V. 2017. Nutrient content and antioxidant profile of raw and lyophilized jamun (*Syzygium Cumini)* Fruit Pulp. *Int. J. of ChemTech Research* **10**(2): 968-974.

Naresh N. 2016. Extraction and utilization of anthocyanin pigments from jamun (*Syzygium cumini* L.) M.Sc. (Hort.) thesis, Kerala Agricultural University, Thrissur. Retrieved from http://krishikosh.egranth.ac.in/handle/1/5810032105.

Citation:

Das S, Kandali R and Baishya S.2023. Proximate composition of some indigenous plant species having ethno-medicinal importance. *Journal of AgriSearch* **10**(1): 41-45