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NUTRITIONAL AND LIPID COMPOSITION OF AEGLE MARMELOS AND SYZYGIUM CUMINI PULP POWDER

Saumya Singh*[1] and Gita Bisla[2]

[1,2]Faculty of Home Science, Banasthali University, Banasthali (Rajasthan)-304022, India.

***Corresponding Author: Saumya Singh**
Faculty of Home Science, Banasthali University, Banasthali (Rajasthan)-304022, India.

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ABSTRACT
Aegle marmelos and *Syzygium cumini* used in traditional medicine as it contain different bio active compounds. Antidiabetic and hypoglycaemic effect of *Aegle marmelos* and *Syzygium cumini* has been explored and proved. This study aimed to access the proximate composition, essential fatty acids and quantitative analysis of phytochemicals in both fruit powders *Aegle marmelos* and *Syzygium cumini.* These fruit powders not only help to prevent many diseases but also used as functional ingredient. This study includes the estimation of moisture, ash, fat, fiber, CHO, protein. Mineral content vit C, calcium of *Aegle marmelos* and *Syzygium cumini* were determined by titerametric method and zinc, phosphorous, iron were determined by Atomic absorption spectrophotometric method (AAS). Quantitative analysis of differential nutrient components were performed by standard methods and estimation of lipid profile were also done. Results indicate that calcium, phosphorous of *Aegle marmelos* and *Syzygium cumini* was higher (230.1±0.08mg/100g and 160.03±0.04mg/100g). Thus, the study concluded that both fruit powders contain many differential nutrient components and minerals which help to maintain nutritional status as well as prevent various diseases.

KEYWORDS: *Aegle marmelos, Syzygium cumini,* proximate analysis, differential nutrient components.

INTRODUCTION
Bael (*Aegle marmelos)* family Rutacae, is called bael fruit. This is generally considered as sacred tree by the hindus. Bael tree is found growing wild in India.[1] Bael is a medicinal plant which has various medicinal values against the diseases. Bioactive compounds have been deprived from this plant.[2] This part of plant contain sufficient amount of coumarins, alkaloids, sterols and essential oil, not only fruit but other parts of this plant also have medicinal properties.[3] Bael have a lipid lowering property and used in therapy and management of hyperlipidemia by reducing lipid levels.[4,5] Bael is suggested a system of traditional medicine, it possess various medicinal properties. Hypoglycaemic and antioxidant properties are useful in long term management of diabetes.[6] Bael extract reduces the blood glucose level and cholesterol in diabetic animals, it also reduce the oxidative stress.[7]

Jamun *(Syzygium cumini)* known as black plum is a significant medicinal plant in traditional medicinal system. It has been used in the treatment of diabetes since the traditional Smedicinal system.[8] It is also helpful in the treatment of inflammation, ulcer and diarrhoea.[9] The beautiful colour of jamun is attributed to the presence of a phyto chemical in it called anthocynins where as, its astringent taste is due to the high content of tannins.[10] Other phytochemicals are present in jamun pulp- terpenes, flavonols, flavanonol, these phytochemicals provide various therapeutic benefits.[11] Jamun pulp has been reported very effective to lower blood glucose levels in diabetes.[12] Jamun fruit has potential against the hyperglycemia. Jamun fruit holds many nutraceutical potential and regulates the insulin parameters and blood glucose level.[13] It is used in the treatment of diabetes to control blood sugar and cholesterol. Aqueous extract of jamun has been reported to inhibit plasma, oxidative stress and elevate antioxidant status by increasing expressions of endogenous antioxidant enzymes.[14] Antioxidant properties of jamun has been shown to protect pancreatic β cells from alloxan induced oxidative stress and reversed hyperglycemia by regenerating β cells and enhanced other endogenous antioxidant levels in plasma.[15] Jamun plant extract also reported to have hypotensive and diuretic effect.[16]

MATERIAL AND METHODS
Collection of sample
Certified variety of bael fruit and jamun fruit were purchased from the authorized dealer**.** Fruit pulp was dried in oven at 100℃ and fine powder was prepared in

blender, stored in auto seal pouches at room temperature until the time of assaying.

Nutritional analysis

Moisture content was determined by using hot air oven until the weight of sample decreased and become constant, Ash content was determined by ashing the sample in muffle furnace at 600℃. Crude fat was estimated by Soxhlet method using petroleum ether as a solvent. Crude fiber determined by Acid Alkali digestion method.[17] Total carbohydrate was determined by subtracting the sum of moisture, ash, protein, fat, fiber content from 100. Protein content was determined by Microkjeldhal method.[18]

Mineral analysis, aliquots were prepared from the bael and jamun fruit powder. Vitamin C and calcium were determined by Titerametric method,[17,18] zinc[19], phosphorous and iron was determined by atomic absorption spectrophotometric method.[20]

Lipid profile

Among fatty acids, amount of omega-6, omega-3 and conjugated linoleic acid in bael and jamun fruit powders were estimated by GCMS method as described by Alonso et al.[21]

Soluble carbohydrate was analyzed by Periodate Oxidation method modified by Flood and Priestley.[22] Amylose and Amylopectin was determined by the method developed by Mohana et al.[23] and Shanita et al.[24] Resistant starch was determined by AOAC method as described by Sambucetti and Zuleta.[25]

Differential nutrient components

Preparation of water extract

10g of both fruit powders were successively dissolved in 200ml water in a beaker. The extract was evaporated to dryness in a rotary evaporator or water bath for 72 hours. The obtained extract was stored in a refrigerator at 4℃ until used. Oxalic acid as described by Yadav and Agrawal.[26] Phytic acid was described by the method developed by Sadasivam and Manickam.[27] Tannin, saponin as described by Wadood et al.[28]

RESULTS AND DISCUSSION

Nutritional analysis of *Aegle marmelos* fruit powder and *Syzygium cumini* fruit powder were indicated in table 1. Moisture content was 5.20±0.00 and 3.14±0.004 (g/100g). The ash content of both fruit powders ranged from 5.85±0.00 and 0.27±0.004 (g/100g). Fat content reveled that both fruit powders were showed the negligible amount of fat content that were 0.60±0.00 and 0.3±0.00 (g/100g). Fiber content was low in *Aegle marmelos* fruit powder 5.31±0.00 (g/100g) and negligible in *Syzygium cumini* fruit powder 0.19±0.004 (g/100g). The protein content of both fruit powders ranged from 5.06±0.04 (g/100g) and 0.38±0.004 (g/100g). In the body CHO provide energy, store energy, build macromolecules, and spare protein and fat for other uses. CHO content was high in both fruit powders *Aegle marmelos* and *Syzygium cumini* 79.1±0.14 and 95.72±0.004 (g/100g). As per the results of mineral analysis, appreciable amount of vitamin C present in both fruit powders 40.03±0.04 (g/100g) and 25.36±0.004 (g/100g). Calcium content in both fruit powders was high (230.1±0.08 and 160.03±0.04 (mg/100g). About 99% of the body's calcium is stored in the bones which are very essential for formation of bone and teeth, muscle contraction, functioning of many enzymes and many more. No zinc content was found in *Aegle marmelos* fruit powder and the content of zinc in *Syzygium cumini* fruit powder was 10.13±0.09 (mg/100g). Phosphorous content was high in both *Aegle marmelos* fruit powder 150.03±0.04 (mg/100g) as well as in *Syzygium cumini* fruit powder 96.03±0.04 (mg/100g). Iron was remarkably reported high amount in *Aegle marmelos* fruit powder 105.23±0.09 (mg/100g) and low in *Syzygium cumini* fruit powder 14.26±0.04 (mg/100g). Thus, the use of fruits in our diet keeping every person fit and healthy with healthy nutrients needed to help the body function through the day.

Table 1: Results of proximate composition of *Aegle marmelos* and *Syzygium cumini* pulp powder.

Nutrients	*Aegle marmelos* pulp powder	*Syzygium cumini* pulp powder
Moisture (g/100g)	5.20±0.00	3.14±0.004
Ash (g/100g)	5.85±0.00	0.27±0.004
Fat (g/100)	0.60±0.00	0.3±0.00
Fiber (g/100g)	5.31±0.00	0.19±0.004
CHO (g/100g)	79.1±0.14	95.72±0.004
Protein (g/100g)	5.06±0.04	0.38±0.004
Vitamin C (mg/100g)	40.03±0.04	25.36±0.04
Calcium (mg/100g)	230.1±0.08	160.03±0.04
Zinc (mg/100g)	-	10.13±0.09
Phosphorous (mg/100g)	150.03±0.04	96.03±0.04
Iron (mg/100g)	105.23±0.09	14.26±0.04

Legends- Each value represent the mean ± SD deviation of three determinants (n=3) on dried weight of fruit powders. DW: Dry weight.

Essential fatty acids

The results of lipid profile are shown in (Table 2) the amount of omega 6, omega 3 were abscent in *Aegle marmelos* and *Syzygium cumini* pulp powder. Conjugated linoleic acid content of *Aegle marmelos* pulp powder was observed to be highest 10.55±0.004 (g/100g) as compare to *Syzygium cumini* pulp powder. Amount of soluble CHO were low in both pulp powder 1.92±0.004 (g/100g) and 0.90±0.004 (g/100g). Amylase content was low in *Aegle marmelos* pulp powder 1.16±0.004 (mg/100g) and moderate in *Syzygium cumini* pulp powder 4.84±0.004 (mg/100g). The Amylopectin content of both pulp powders were ranged from 3.26±0.004 and 4.65±0.004 (mg/100g).

Table 2: Results of essential fatty acid of *Aegle marmelos* and *Syzygium cumini* pulp powder.

Lipid profile	*Aegle marmelos* pulp powder	*Syzygium cumini* pulp powder
Omega 6 (g/100g)	-	-
Omega 3 (mg/100g)	-	-
Conjugated linoleic acid (g/100g)	10.55±0.004	3.25±0.004
Soluble CHO (g/100g)	1.92±0.004	0.90±0.004
Amylase (mg/100g)	1.16±0.004	4.84±0.004
Amylopectin (mg/100g)	3.26±0.004	4.65±0.004
Resistant starch (gm/100g)	-	-

Legends- Each value represent the mean ± SD deviation of three determinants (n=3) on dried weight of fruit powders.

Differential nutrient components

The results of phytochemicals shows the amount of oxalic acid, phytic acid, tannin and saponin in aqueous extract of *Aegle marmelos* and *Syzygium cumini* pulp powder in which oxalic acid was observed to be the highest (27.03±0.04mg/100g) in *Aegle marmelos* pulp powder as compared to *Syzygium cumini* pulp powder. Phytochemical rich foods directly reduce inflammation and improve insulin sensitivity and have a potential to moderate oxidative stress.

Table 3: Results of Differential nutrient components of *Aegle marmelos* and *Syzygium cumini* pulp powder.

Phytochemicals analysis	*Aegle marmelos* pulp powder (aqueous extract)	*Syzygium cumini* pulp powder (aqueous extract)
Oxalic acid (mg/100g)	27.03±0.04	2.06±0.04
Phytic acid (mg/100g)	6.11±0.004	5.11±0.004
Tannin (g/100g)	1.11±0.009	0.063±0.00
Saponin (g/100g)	0.05±0.00	0.0165±0,00

Legends- Each value represent the mean ± SD deviation of three determinants (n=3) on dried weight of fruit powders.

CONCLUSION

This study indicated that ***Aegle marmelos*** and ***Syzygium cumini*** pulp powder selected in the research depicts significant clinical and pharmacological activities. It provide many nutrients to the human body as it is rich in calcium, phosphorous and vitamin C. *Aegle marmelos* and *Syzygium cumini* pulp powder possess hypoglycaemic, hypolipidemic and blood pressure lowering property. These summer fruits are associated with many health and medicinal benefits as it convert starch into energy and keep your blood sugar levels in check. So these pulp powders are very helpful to maintaining good health and protect the body against many diseases, therefore it can be easily recommended for human consumption.

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