



Juice Extraction of *Amla*

Amla (*Emblica officinalis*) fruit being highly astringent in taste is not popular as a desert fruit. However, its high vitamin C, tannin and mineral contents and medicinal properties offer tremendous scope for processing into various juice based beverages such as syrups, squashes, nectar and ready-to-serve (RTS) drinks. The currently used method comprising of cold or hot extraction of the juice is not satisfactory as the juice recovery and vitamin C retention in the resultant juice are poor. Therefore, the present investigation was undertaken to study the effect of different juice extraction techniques on the quality of resultant juice.



Fully ripe and freshly harvested *amla* fruits were procured from the market and washed thoroughly with tap water. In all, 12 sets of juice extraction techniques were compared which include following treatments in combinations:

- (A) (i) Without blanching, (ii) With blanching (at 100°C for 7 min)
- (B) (i) Without water, (ii) With water : fruit (1:1) ratio
- (C) (i) Crushing whole fruits in apple grater and pressing in rack and cloth hydraulic press, (ii) Crushing fruit segments after seed removal in apple grater and pressing in rack and cloth hydraulic press, (iii) Seed removal and juice extraction through centrifugal extractor.

Chemical Constituents

11 compounds were isolated in *amla* and identified as gallic acid (I), ellagic acid (II), 1-O-galloyl-beta-D-glucose (III), 3,6-di-O-galloyl-D-glucose (IV), chebulinic acid (V), quercetin (VI), chebulagic acid (VII), corilagin (VIII), 3-ethylgallic acid (3-ethoxy-4,5-dihydroxybenzoic acid, IX), isostrictiniin (X) ascorbic acid

Aonlala Juice: Health Benefits

- *Amla* juice strengthens the body, expels toxins from the body and improves defense mechanism of the body.
- It is an essential vitamin to improve eye sight
- Weakness of body, heart and mind is dispelled by taking fresh *amla* juice in between meals.
- Massaging the head with *amla* oil induces sound sleep and is good for hair. prevents premature graying of hair.
- Wash eyes daily, in the morning with *anole* water (soaked in water beforehand) and drink the water to improve eyesight and remove constipation.
- Insert 2-4 *anole* juice drops into each nostril to cure bleeding of nose.
- Regulates blood sugar
- Very powerful anti-inflammatory herb.
- A wonderful antioxidant and a natural source of Vitamin C.
- *Amla* juice is a powerful food for the brain.
- Studies show that *amla* juice helps lower cholesterol
- *It* also helps maintain the functioning of the liver
- Increases hemoglobin, red blood cell count
- Useful for cough, bronchitis, asthma
- It is used in hyperacidity and with honey as an anthelmintic. The presence of *amla* juice resulted in an enhanced cell survival, decreased free radical production and higher antioxidant levels similar to that of control cells.

Analysis

After weighing, the resultant juice was pasteurized at 90⁰ C for 3 minutes before filling and sealing in sterilized glass bottles of 200 ml capacity. For determination of juice recovery the juice weight was divided by fruit weight and multiplied by 100. Density of the juice was determined by taking 'ratio of mass/volume of the juice. Total soluble solids (TSS) of the juice were determined by hand refractometer and expressed in percentage at 20⁰C. The pH of the juice was determined by using pH meter. The acidity and ascorbic acid contents were estimated by titrimetric methods. The tannin content of the juice was determined by colorimetric method by using a standard curve of tannic acid. For organoleptic evaluation, RTS beverage was prepared (10% juice, 10⁰ Brix and 0.22% acidity) from the juice extracted by different techniques and judged by a panel of 5 members using a 9 point Hedonic scale.

Physicochemical Characteristics

The data (Table-1) reveal that blanching of fruits at 100⁰C for 7 min prior to juice extraction distinctly improved the juice recovery but reduced the vitamin C content by 12 percent as compared to juice extracted from unblanched fruits. The density and tannin content of the juice were also more in case of juice extracted from blanched fruits. This may be due to slight concentration and better extraction of soluble constituents in the juice upon heating. TSS, acidity and pH of the juice did not differ significantly due to blanching of fruits.

Mixing water with fruits in 1:1 ratio during juice extraction had more than 100 % juice recovery but it diluted the juice which is evident by significantly lower values of TSS, density, acidity, ascorbic acid and tannin (Table-1).

Among the methods of juice extraction, centrifugal juice extraction recorded higher density, soluble constituents and higher vitamin C and tannin contents as compared to crushing and pressing whole of fruits. Higher soluble constituents, best vitamin C content and a juice recovery of 48.50% was obtained by centrifugal method from blanched fruits without addition of water.

Organoleptic Evaluation

The RTS beverages prepared from the juice extracted by all the techniques were acceptable and did not differ due to blanching of fruits or method of juice extraction. But the addition of water for juice extraction reduced the colour and overall sensory quality of the RTS beverages (Table 2) which may be due to dilution of the juice.

It is apparent that yield and quality of the juice varies with the method of extraction. This standardize method gives satisfactory juice yield with minimum loss of vitamin C and organoleptic quality.

Table-1**Effect of different techniques of extraction on the juice yield and quality**

S. No.	Process	Juice %	Density recovery %	TSS %	Acidity Brix	pH	Ascorbic mg/100 ml	Tannins %
1	Crushing and pressing whole fruits	66.0	1.10	6.0	0.78	2.90	375.0	2.43
2	Crushing and pressing whole fruits with water (1:1) ratio	168.0	1.00	3.0	0.47	2.87	203.6	1.63
3	Blanching, Crushing and pressing whole fruits	70.0	1.14	6.0	0.78	2.96	321.4	3.56
4	Blanching, crushing and pressing whole fruits with water (1:1 ratio)	172.0	1.01	3.5	0.47	2.86	135.7	2.26
5	Crushing and pressing fruit segments	61.0	1.04	6.0	0.78	2.89	335.7	2.73
6	Crushing and Pressing fruit segments with water (1:1 ratio)	157.8	1.00	4.0	0.47	2.88	221.4	1.23
7	Blanching, Crushing and Pressing fruit segments	64.4	1.08	7.0	0.78	2.90	321.4	2.03
8	Blanching, Crushing and Pressing Fruit segment with water (1:1 ratio)	167.6	1.00	4.0	0.55	2.86	207.1	1.57
9	Centrifugal extraction juice from fruit segments	45.8	1.12	7.0	0.94	2.90	478.6	3.03
10	Centrifugal extraction juice from fruit segments with water(1:1 ratio)	140.0	1.01	4.0	0.43	2.84	185.7	2.10
11	Centrifugal extraction blanched segments juice from fruit	47.8	1.20	7.5	0.94	2.90	417.8	3.26
12	Centrifugal extraction juice from blanched fruit segments with water (1:1)	150.0	1.01	3.5	0.39	2.82	178.6	1.93

TSS: Total Soluble Solids

Table 2

Sensory Quality of the RTS Beverage Prepared from the *amla* juice extracted by different methods

Technique No	Colour (units of Lovibond Tintometer)	Flavour- units of sensory testing method (Scores out of 9)	Overall average of colour and flavour
1	7.50	6.83	7.16
2	6.66	6.83	6.74
3	7.50	6.66	7.08
4	6.66	6.66	6.66
5	7.33	6.33	6.83
6	6.66	6.16	6.41
7	7.16	7.00	7.08
8	6.66	6.50	6.58
9	7.33	6.66	6.99
10	5.66	6.83	6.24
11	7.16	7.16	7.16
12	6.33	6.33	6.33

Machineries required

***Amla* Fruit Washer**

This machine is useful for washing the Fruits. Technical Specifications:

- Capacity - 15 to 20 kg per batch
- Cycle Time - 5 to 10 minutes depending on condition of vegetable.



- Electrical Power: 3 HP, 3 ph
- Appx. Overall Size: 1.0 x 0.7 x 0.5 M
- Construction - SS Tank with wire mesh basket, water circulation pump and agitation equipment.



***Amla* Shredding/ Deseeding**

Stainless steel body machine, *amla* shredding is done, seeds are separated only without cracking. Both small and big size *amla* can be processed. It requires an extra dyeset. Capacity – 250 Kgs *amla* /Hr., Motor-1.0HP single phase

Boiled *Amla* Breaking Machine

Capacity : 200 kg/hr., Motor : 1.0 hp. All contact parts & cover will be in s.s.304, stand will be in m.s.



Amla Prickling Machine

Capacity- 200 Kg/Hr., Motor- 1.0 HP, All contact & cover in SS 304 Mounting Frame in MS



Amla Hydraulic Press Juice

Capacity- 10 Kgs / lot/ 2 minutes, Motor: 1 Hp Single Phase, Hydraulic Power Pack 200 mm stroke, 2 Nos of S.S. Baskets of 10 Kg for pulp crushing, All contact parts are in S.S.304 & frame in M.S.



Extraction of *Amla* Juice

Fresh *amla* is procured from the market and kept in a water tank overnight. Then seed is separated from the thalamus. Thalamus is taken in a juice extractor in which required quantity of preservatives and antioxidants are added. The extractor starts and juice comes out, which was drained and kept for two hours in a settling tank. Fibers and unreacted materials settle at the bottom, if any. Then the juice is passed through the ultra filter. Fresh juice is packed immediately.

Amla Processing Machine

Machineries required

1	Juice extractor	Rs 25,000.00
2	Settling Tank	Rs 5,000.00
3	Ultra filter	Rs 5,000.00
4	Bottling Unit	Rs 10,000.00
5	Raw Materials	Rs 1,00,000.00
Total		Rs 1,45,000.00

Costing

Raw <i>amla</i> thalamus (4.5 kg)	Rs 120.00
Antioxidants	Rs. 10.00
Preservatives	Rs. 10.00
(4.00 kg)	Rs. 140.00
Depreciation Value	Rs. 10.00
Salary	Rs. 15.00
Packing	Rs. 5.00
Total	Rs. 170.00

Cost per Litre	Rs. 42.50
Profit - 10 %	Rs. 4.25
Cost /Litre	Rs. 46.75 (Sav Rs 47.00)
Market price per Litre	Rs. 75.00

Addresses of the supplier of Machineries

- Sanjivani Phytopharma (P)Ltd, 307,Third Floor,Prabhat Centre (Annex), Sector 1 A, C.B.D. Belapur,Navi Mumbai -400614, E.Mail- info@sanjivanitech.com
- Best Engineering Technologies, H.No. 5-9-285/13 , Plot No- 69/A, Rajiv Gandhi Nagar, Near Andhra Jyothi Press, Katpally,Hyderabad-500037 (A.P.)



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Note: Various references have been used in the preparation of this profile. For further details please contact the Institute.

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