

Beverage Industry in India & Scope for Medium Scale Juice Extraction Units in Goa

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Abstract: Sticky weather is common in all coastal states of India and it is necessary to keep oneself hydrated. The warm and humid weather persists for larger duration of the year. Such weather conditions offer wide scope for beverage business in the country. Beverages in India are segmented into three major categories, viz.: Alcoholic, Carbonated sugary drinks and Juices and its blends. Recent research suggests that regular consumption of alcoholic and carbonated beverages develops diseases like type 2 diabetes, obesity, cardiac related disorders, malnutrition, chronic pancreatitis, alcoholic liver disease, periodontal diseases and cancer. However due to mass media like internet and television, people have become more aware about ill-effects of consuming alcoholic or carbonated soft drinks, as a result, there is major shift seen towards consumption of fresh extracted juice from fruits and vegetables as healthy alternative. In this paper, recent trends of juicing industry in India is discussed and concept model of medium scale juice extractor is proposed. Starting a medium scale juice extractor unit will not only boost agricultural sector of state but also create employment opportunities for local people.

Keywords: Juice Extraction, Cashew Juice, Masticating Juicer, Goan Juices, Medium Scale Juice Extractor

I. Introduction

India is 7th largest country on the globe [1] and the fact that majority of its portion lies between tropic of cancer and Equator, gives it diverse climatic conditions in every region of the country. The diversity in climatic conditions along with long coastal line of Indian peninsular makes India a natural producer variety of fruits and vegetables. In spite these advantages fruits and vegetables of India occupy only 1 % of global market [2]. Poor logistics infrastructure, unskilled manpower and improper utilization of modern technology has caused post-harvest losses. Delicate soft fruits have small shelf life and hence tend to deteriorate after harvesting. Heaps of fruits and vegetables are wasted in markets or processing outlets. The wastage can be reduced by manufacturing fresh fruit or vegetable juices [3]. Juicing is one of the alternating to avoid wastages of fruits and vegetables but has not reached to its full potential in India [4].

Juices not only carry vital vitamins but also offer health benefits from phytochemicals. Juices can be consumed conveniently compared to whole fruit by small kids and elderly people. Ease of processing and transportation of juices compared to whole fruits and vegetables is added advantage. In this paper, changing lifestyle of people towards hygienic and healthy diet is recognized and a step towards setting up medium scale juice extractor to meet demand of fresh juice of single fruit or mixed fruit is discussed [5]. All unique fruits of tropical regions are identified and their seasonal availability in Northern hemisphere is tabulated. Traditionally prepared juices in Goa are summarized and juice extraction procedure for fibrous fruits or vegetables is defined. Inputs were taken from suppliers of kitchen juicers to decide on basic working mechanism for juice extractor which will produce batch wise large quantity of juice and a concept model was proposed after brainstorming session.

A medium scale juice extractor is designed to attract customers from untapped Goan and national markets. Agricultural sector of Goa will be most benefited as it will boost demand for fresh fruits and vegetables. Also, this initiative will be a positive step in generating employment for the young people of India.

II. Literature Review

During Top 10 packaged fruit Juice Making Companies Indiare Safal, 24 Mantra, Del Monte, Minute Maid, Capri Sun, B Natural, Ceres, Paper Boat, Real, TROPICANA. There are variety of juices manufactured by these branded companies like Apple, Orange, Pomegranate, Pineapple, Grapes, Cranberry, Peach, Apricot, Tomato, Mosambi, Litchi, Gauva, Plum, Jamun and Amal on very large scale [6]. The current Prime Minister of India Mr. Narendra Modi suggested major carbonated drink production firms to add 2% of fruit content in their products, which will thereby help the farmers to cultivate more in fruits and can generate profit [7]. Apart from these big giants there are large number of local companies which supply fruit flavoured beverages (Carbonated or Noncarbonated) containing less than 1% fruit pulp. There are many fruits like Cashew, raw mango, kokum, Jamun, Desi Amla, Carabmbola (Star Fruit), Bimli and Pink Sweet lime which have not received enough attention in juicing. Juice of these fruits have not been explored in juice production and hence has potential market in Goa as well as all over India [8].

2.1 Seasonal availability of fruits

Seasonal fruits have high nutritional value and are best to taste when consumed during season. Freshly collected fruits during respective season are normally found at the best rate as well. Although modern farming techniques allows all fruits to be available throughout the year. But consumption of fruit or fruit juice according to season is best for health. The Table 1 below shows the seasonal availability unique juiceable from grown in India [9].

Table 1. Seasonal availability of Various fruits of India.

Fruit	Yearly Harvesting Trend											
	1	2	3	4	5	6	7	8	9	10	11	12
APPLES												
Pears												
Raw mango												
Cactus Pear												
Sweet Lime												
Kokum												
Kiwifruit												
Pineapple												
Bimli												
Tangerines												
Cashew												
Oranges												
Limes												
Watermelon												
Beetroot												
Gooseberries												
Jamun												
Desi Amla												
Carambola												

2.2 Traditionally prepared Juices in Goa

The location for medium scale juice extractor is chosen as Goa, India hence, it is very important to understand the trends of juicing in the local places.

2.2.1 Cashew Juice Production

Goa is known for production of best quality cashew juice which is extracted by manual squashing the cashew fruit. Evergreen tropical cashew tree occupies the largest area among horticultural crops and covers about 55,302 ha area with an annual production estimated at 27,070 tonnes. The cashew juice is known as 'Niro' in Goa and is well known for its delicious taste and refreshing nutrients. However, sale of cashew juice is very rare and most of it is used for making 'Feni' using natural fermentation technique [10].

2.2.2 Raw Mango Juice Production

The land of Goa also produces various varieties of mangoes. Traditionally mango is used to prepare pickle, juice, jam or shrikhand and other sweetmeats once the fruit is ripe. But the fruit in raw form in goa is used to make refreshing drink known locally as panh or pamak. This drink is believed to give relief from other heat related issues.

2.2.3 Other fruit Juice Production

Apart from Cashew juice and Raw Mango juice production, juices of Apple, Lemon, Mosambi and Pineapple are also produced and served as fresh fruit juice. Alternatively, some of juice can be concentrated and later reconstituted with water without sacrificing the quality factors of the juice.

III. Extraction of Juices

Understanding some technical terminologies is very essential before studying the extraction of fresh fruit juice. Juice is defined as unfermented but fermentable, turbid or clear, intended for direct consumption, obtained by the mechanical process from sound, ripe fruits, preserved exclusively by physical means. The juice may be. The juice may have been concentrated and later reconstituted with water without sacrificing the quality factors of the juice [4].

Our aim is to develop a small to medium scale fresh juice extraction unit. Pure 100% produced will be directly sold to the customers on day to day basis as per the requirement. This is another step towards eliminating unlabeled dilution and adulteration and other, unethical trade practices from juicing industry. There are many unit operations involved in converting whole fruit to the juice. General procedure of juice extraction is modified to suit for extraction of juice from fresh fruit is shown in Fig.1.

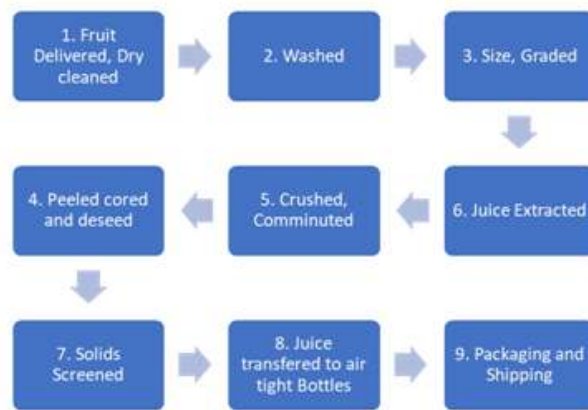


Fig. 1. Flow diagram: Medium scale fresh juice Extraction [11]

IV. Methods of Juice Extraction & Customer feedback

Juicing is trending in India and drinking fresh-pressed juices helps to lose weight, boost immunity, prevent cancer and cleanse your system. The consumers of juice can buy packaged juice directly from the general stores or they can make juice on their own by using small juicer available in market. Centrifugal juice extractors and cold press juicers (also known as Masticating Juicers) are two types of juicer available in market for family scale juice production. Centrifugal juice extractors, utilizes a fast-spinning metal blade that spins against a mesh filter, separating juice from flesh. This mechanism works on centrifugal force which pushes the lighter juice droplets out through the filter mesh. Thus, separating juice and pulp, which are collected in different containers. The major disadvantage is that its fast-spinning metal blade generates heat, which destroys some of the enzymes in the fruits and vegetables. The agitation caused due to high speed spinning blade creating lot of agitation. This mixes air with fresh juice and leads to oxidation of nutrients, decreasing the quality of juice. Cold press juicers (Masticating juicers) are new in market and give better yield of juice with better quality. Vertical axis Masticator and Horizontal masticator are two variants of cold press juicers. The mechanism in such juicers is designed first to crush and then press against the filter screen. The juice is separated from the fiber of fruit due to the compression of fruit between augur of juicer and filter screen. The juice extraction involves minimum heat and agitation, thus maintaining the ingredients and nutrients in the juice intact [12].

A survey was held to find out the which type of juicer is preferred by customers. It is found the people buy centrifugal juicer if the application of the juice is in cooking, baking or any other process where heat will be eventually applied. Other reason for opting for centrifugal juicers is low cost compared to cold press juicers. Slow press juicer is seen to attract customers who are keener to drink fresh juice. The cold press juice is costlier than centrifugal type, but it keeps nutrients in the juice intact which makes it more demanding in market.

On the other hand, Market of industrial scale juice production is occupied big multinational companies which have huge juice processing chain installed to produce large yield of juice. The output of such industry is packaged juices and not the fresh juice.

V. Concept Design

The goal in fresh juice manufacture is to collect as much of the desirable components from the fruit as possible without also extracting the undesirables. A concept of a novel fresh juice extractor is developed which will be used for medium scale fresh juice production. The Juice extractor unit is conceptualized to have five sections. The five sections are Hopper, Shredder, crusher, intermediate storage and masticator. Fruit cutting, crushing and masticating operations are combined in one machine, powered by a high torque motor. The masticating action is carried out along the vertical axis and the masticator is gravity fed with fresh fruit after it is cut and crushed. The vertical feeding of fresh fruit under gravity eliminates the need of separate arrangement for fruit feed and cutting and crushing prior to mastication yields more juice than otherwise. The schematic of the Extractor unit is shown in fig. 2. Separate outlets is provided for fresh fruit juice and another outlet is provided for collecting the dry fiber.

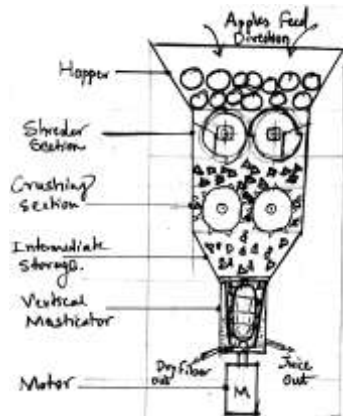


Fig. 2. Concept Sketch of Medium scale juice extractor

VI. Conclusion

A concept model for medium scale fresh fruit juice extractor was proposed after studying the basic existing concepts of juice extraction. The proposed machine concept utilizes cutting, crushing and vertical axis mastication and is expected to give more yield of fresh fruit juice than the existing concepts. Machine is expected to transform local fruits as well as the fruit found in other parts in India into fresh fruit juice as the shelf life whole fruit is less.

VII. Future Scope

In the research carried out so far, a concept model for medium scale juice extraction is proposed. In future, the concept model can be converted into a CAD model and FEA of various components of machine can be performed. Once the dimensions of the CAD model are finalized the functionality test of its prototype can be performed by manufacturing its parts using 3D printing technology. If the prototype functions successfully then pilot production can be attempted with financial assistance from reputed engineering firms in Goa.

Acknowledgment

We would like to thank Department of Mechanical Engineering, Fr. Agnel Institute of Technology & Design, Assagao, Bardez, Goa, India for their constant support in my research work.

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