Sugarcane juice powder by spray drying technique

Natural, healthy, safe and nutritious product from sugarcane

A process has been developed for preparation of chemical free dried sugarcane juice powder/granules using a spray drying technique.

Scenario

- India is the second largest producer of sugarcane next to Brazil. Indian sugar cane finds its application in the following segment.

- Nearly about 50% quantity of cane produced will be utilized by the sugar factories for the production of white sugar and the rest goes for preparation of different forms of jaggery,

- Traditional Indian Medicine system recommends sugarcane juice to cure a wide range of ailments like fever, jaundice, urinary disorders and others to a small extent.

- Sugarcane juice is used as a refreshing natural energy drink, delicious drink in both urban and rural areas of many countries.

- Juice is a healthy alternative to refined sugar added drinks because it is a naturally flavored drink on its own.
Fresh juice cannot be stored normally for more than six hours due to the presence of simple sugars, which spoils the juice quickly.

If this spoilage is prevented, the juice can be preserved and used as a good beverage.

The sugarcane juice has medicinal values, besides it also provides energy, certain vitamins and minerals. The synthetic drinks available in the market have mainly sugar, citric acid and flavor.

Sugarcane varieties cultivated in our country normally contains around 20% of total soluble solids in the juice at the age of about 12 months, of which a major part of is sugar and the rest with minerals and health promoting constituents. The Juice extracted from cane is an opaque liquid covered and its color varies from light grey to dark green, depending on the rind color of the cane variety crushed.

Sugarcane juice contains sucrose, fine particles of bagasse, wax, coloring and minerals. The cane juice has an acidic pH ranging from 4.5 to 5.7. Another major component of the juice is the colloids. These colloids are particles existing in a permanent state of dispersion and they impart turbidity to the juice.

**Composition of juice**

The estimated composition of fresh sugarcane juice is given in Table 1.

<table>
<thead>
<tr>
<th>Constituents</th>
<th>Content, mg per 100 ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Sugar</td>
<td>11.5</td>
</tr>
<tr>
<td>Ascorbic Acid</td>
<td>1.5</td>
</tr>
<tr>
<td>Phosphorous</td>
<td>6.8</td>
</tr>
<tr>
<td>Iron</td>
<td>0.5</td>
</tr>
<tr>
<td>Calcium</td>
<td>2.1</td>
</tr>
</tbody>
</table>

The juice is viscous owing to the presence of colloidal substances such as waxes, proteins to pectin substances, natural gums, starch and silica.
Flavoured sugarcane juice added with natural flavoring substances like ginger, lemon, Mint, chills, Spices in combination of flavors at specified quantity makes the juice vendors to lead is profitable business model in metro cities. Including as common refreshing drink sold ubiquitously along the roads in Indian cities and towns.

To serve for this sugarcanes are crushed using manual or motorized crushers to extract sugarcane juice and consumed fresh. But it needs a hygienic handling which is not generally taken care of. Sugarcane juice as such is highly nutritious and prone for spoilage due to yeast and bacteria. Even within few hours of extraction of the juice, fermentation sets in and the juice loses its natural refreshing properties.

**Shelf life for cane juice**

It would be very difficult to maintain the sugarcane juice in the liquid state without adding a high amount of preservatives. Addition of preservatives will affect the natural flavour of sugarcane juice and its consumer acceptance. The only alternative to preserve fresh juice is to remove the water in the juice as quickly as possible.

**Sugar cane juice powder**

This is possible by the application of known techniques such as freeze drying, flash evaporation and vacuum drying. This dried juice will not support the growth of microorganisms and biochemical activity and thus improves the stability and storability of sugarcane juice. But these processes yield a solid dried sugarcane juice and from this, it is difficult to get desired commercial product.

Researchers have constantly worked on bringing new products form sugar cane juice to the market. They are successful up to ready-to-dilute sugarcane juice beverage powder, preserved juice in bottles and other packed containers.

A research team from Sugar cane breeding institute moved a step ahead to develop an efficient process for sugar cane juice powder using spray drying technique.
Process

Sugarcane harvested at 10 - 14 months after planting is suitable for preparation of commercially acceptable sugarcane juice powder/granules.

Physical treatment of the process wherein canes are harvested bulk in the conventional way contain dried leaves, green tops, insect infested and damaged, all these are removed with care.

Care is taken to use clean water and hygienic practices to avoid microbial contamination.

Juice collection and its conversion

From this processing stage onwards the remaining operations are carried out in a clean closed and sterile environment.

The extraction of juice with crushers fabricated from food grade material of construction is a mandate and preserving the extracted juice in it clean containers. Yield enhancement techniques in juice extraction and clarification will be an added advantage.

The colour and quantity of juice extracted from cane is an opaque liquid and its colour varies from light grey to dark green, depending on the colouring matter in the rind of the cane crushed. This is step is followed by filtration through fine stainless steel mesh to remove fibre particles.

Spray drying

The temperature and spray jet are adjusted to obtain fine to coarse particle size of dried sugarcane juice which is packed in moisture proof pouches.

An additional flavor of spray dried sugarcane juice for beverage application can also be taken up by use of the respective flavoring component such as lemon extract, ginger extract, coffee extract, tea extract and spices extract.
The above process described eliminated the addition of synthetic preservatives and colourants in the dried sugarcane juice. The resultant spray dried sugarcane juice possesses consumer acceptable qualities and can be of high commercial value.

A method of preparation of spray dried sugarcane juice powder and granules with devoid of preservatives, colorants, anti caking agents, stabilizers and other chemicals. The use of spray dried sugarcane juice finds its application as a sweetener and for preparation of natural health drinks and beverages.

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