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(54) Title: PROCESS FOR PREPARING CUSTARD APPLE JELLY

(57) Abstract: The present invention provides a process for preparing custard apple jelly without discoloration, bitterness and off-flavor, said process comprising the step of (a) obtaining custard pulp and diluting the same with water to obtain a mixture containing 60 to 80 % wt./wt by weight of custard apple pulp; (b) filtering the mixture of step (a) under an operating pressure of 1 to 3 bars to obtain a filtrate containing 45 to 60 % by wt of the custard apple pulp; (c) adding sweetening agent, preservatives, settling agent and other food additives, and (d) boiling the mixture of step (c) at a temperature in the range of 90oC to 100 oC and cooling the same to obtain the custard apple jelly.

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PROCESS FOR PREPARING CUSTARD APPLE JELLY

FIELD OF THE INVENTION:

The present invention relates to a process for preparing custard apple jelly. More particularly, the present invention deals with a process for preparing jelly from custard apple, which is free of bitterness, discoloration and off-flavor.

BACKGROUND OF THE INVENTION:

Custard apple (Seetaphal) is a tropical fruit grown mainly in the tropical climate. The fruit is heart shaped with light green skin and a soft creamy white flesh. The fruits are well known for their delicious taste. Nutritionally, the fruit is rich in carbohydrate, minerals and is an excellent source of vitamin C. Besides, high nutritive value, it is known for its excellent medicinal properties. It is said to contain the qualities of the rejuvenating drugs. It has been found to be very useful to the brain and the nervous system. It also enhances muscular strength and tones up the heart.

Processing of custard apple for custard apple jelly is rendered inaccessible due to its characteristic property of discoloration, development of bitterness and off-flavor. The fresh fruit pulp contains ~ 75% water along with TSS of ~ 25°B, enriched by reducing sugars. During the normal course of preparation of any fruit jelly, it is required to boil the fruit pulp along with the addition of sugar, acid, preservative(s) and solubilized pectin, to adjust the ultimum TSS to 68°B. By boiling the custard apple fruit pulp, the above mentioned 3 characteristic problems are imminent and unavoidable.

Custard apple fruit after ripening yields to a sweet and pleasant flavored pulp. The pulp develops characteristic problems of bitterness, off-flavor and discoloration, when heated above 55°C, during processing. Custard apple jelly is not available in the market nor any reference is covered in the scan of literature. No processed product as of custard apple jelly is available in the market. The present invention entails to depict a process to prepare jelly from custard apple fruits, free of bitterness, off-flavor and discoloration.

OBJECTS OF THE INVENTION:

The main object of the present invention is to provide a process for preparing jelly from custard apple fruits, free of problems of custard apple pulp turning pink and development of off-flavor and bitterness, while processing.

Another object is to extend the storage life of the custard apple fruit in the form of jelly, as value added product.

SUMMARY OF THE INVENTION:

Accordingly, the present invention provides a process for preparing custard apple jelly without discoloration, bitterness and off-flavor, said process comprising the step of (a) obtaining custard apple pulp and diluting the same with water to obtain a mixture containing 60 to 80 % wt./wt by weight of custard apple pulp; (b) filtering the mixture of step (a) under an operating pressure of 1 to 3 bars to obtain a filtrate containing 45 to 60 % by wt of the custard apple pulp; (c) adding sweetening agent, preservatives, settling agent and other food additives, and (d) boiling the mixture of step (c) at a temperature in the range of 90° C to 100° C and cooling the same to obtain the custard apple jelly.

DETAILED DESCRIPTION OF THE INVENTION:

Accordingly, the present invention provides a process for preparing custard apple jelly without discoloration, bitterness and off-flavor, said process comprising the step of (a) obtaining custard pulp and diluting the same with water to obtain a mixture containing 60 to 80 % wt./wt by weight of custard apple pulp; (b) filtering the mixture of step (a) under an operating pressure of 1 to 3 bars to obtain a filtrate containing 45 to 60 % by wt of the custard apple pulp; (c) adding sweetening agent, preservatives, settling agent and other food additives, and (d) boiling the mixture of step (c) at a temperature in the range of 90° C to 100° C and cooling the same to obtain the custard apple jelly.

More particularly, the present invention provides a process for preparing custard apple jelly comprising the steps of:

a) obtaining custard apple pulp;

b) diluting the pulp of step (a) with water to contain 60-80% w/w pulp, followed by micro-filtration using a ceramic membrane with a pore size of 0.1-0.2 μm with an operating pressure of 1-3 bar at 25-30°C to obtain a micro-filtrate containing 45 – 60% fruit;

c) dissolving the micro-filtrate obtained in step (b) with 40 to 50% by weight of a sweetening agent 40-55%, 0.7 to 1.0% by weight of a settling agent and 0.4 to 0.55% by weight of a flavoring agent;

d) boiling the mixture of step (c) till the total soluble solids reaches to 68°B to 70°B;

e) adding permitted preservatives to the boiled mixture of step (d), and

f) allowing the mixture of step (e) to set at room temperature to obtain the custard apple jelly.

In an embodiment of the present invention, the custard apple pulp is obtained from fresh ripe custard apple fruits.

In another embodiment of the present invention, wherein in step (a), the custard apple pulp is obtained by scooping the pulp from ripe fruits using a pulper followed by separating seeds from the same.

In a further embodiment of the present invention, wherein in step (c), the sweetening agent used is sugar.

In a still further embodiment of the present invention, wherein in step (c), the settling agent used is pectin.

In yet another embodiment of the present invention, wherein in step (c), the flavoring agent used is citric acid.

In a further embodiment of the present invention, wherein in step (d), the mixture is boiled at a temperature in the range of 95°C to 98° C.

In yet another embodiment of the present invention, wherein in step (e), the permitted food preservative used is sodium benzoate.

In still further embodiment of the present invention, wherein the mixture of step (e) is filled in sterilized containers and allowed to set at room temperature.

In another embodiment of the present invention, the custard apple jelly thus obtained has a shelf life greater than 6 months.

In an embodiment of the present invention, it was required to overcome the problems of discoloration, development of bitterness and off flavour while processing the pulp.

In another embodiment of the present invention, the pulp was diluted and subjected to micro-filtration using a ceramic membrane with a pore size of 0.1 – 0.2 μm with an operating pressure of 1 – 3 bar at 25 - 30°C .

In another embodiment using the micro-filtered juice, jelly is prepared, that is similar from any other fruit, however with characteristic pleasant flavor of custard apple.

The process of the present invention involves the following steps:

(a) separation of pulp from the fruit wall; (b) passing through a pulper to remove the seeds; (c) dilution with water to contain 60-80% (w/w) pulp, followed by microfiltration using a ceramic membrane with a pore size of 0.1-0.2 μm with an operating pressure of 1-3 bar at 25-30°C; (d) use of the microfiltrate containing 45 – 60% fruit ; (e) dissolving sugar (40-55%), pectin (0.7%-1.0%) and citric acid (0.4-0.55%); (f) followed by boiling the mixture till the total soluble solids reaches 65° brix ;(g) adding permitted preservative

namely sodium benzoate (236 ppm) (h) filling the above mixture into sterilized bottles and allowing to set at room temperature.

The following examples are given by way of illustration of the present invention and its use for preparation of jelly from custard apple, and therefore should not be construed to limit the scope of the present invention.

EXAMPLE – 1

The pulp is obtained from the mature ripe fruits procured from the tropical climate. The pulp after dilution with water was micro filtered as described above to obtain sparkling clear juice. The micro filtrate (5.5 kg) having a brix of 16°and an acidity of 0.12% is used to dissolve sugar 5.3 kg and the whole mixture is allowed to boil. To the boiling mixture, pectin 80 g (4% solution) dissolved in microfiltered juice (2kg) and citric acid (36g) was added and boiling continued till the mixture attained 65°brix. With the addition of sodium benzoate (2.36 g) dissolved in a little warm water, the product was filled hot into pre-sterilised glass bottles, lug capped and allowed to set at room temperature.

EXAMPLE - 2

Here the pulp is obtained from mature ripe fruits procured from sub-tropical climate. The procedure followed was similar to that in Example - 1, yields a pleasant flavored product.

THE NOVELTY OF THE INVENTION IS AS FOLLOWS:

The process described serves to yield jelly from the custard apple, free of characteristic problems *viz.*, bitterness, off-flavor and discoloration while processing above 55°C. Accordingly, no processed product of custard apple is available in the market. In the present invention, in the first phase, the custard apple after suitable dilution is subjected to micro filtration so that the clear filtrate, free of particles, renders it to be free from the above said problems (which are imminent and unavoidable, if the fruit pulp is used directly). The second phase involves addition of sugar, pectin and citric acid to the filtrate obtained by micro filtration, followed by heating to reach the desired 65°B. The sodium benzoate at 236 ppm was added as preservative. The jelly obtained resembles jelly of any other fruit and thus represents a value-added form of the custard apple fruit.

ADVANTAGES OF THE PRESENT INVENTION:

The main advantages of the present invention are:

1. The process offers to develop value-added product of custard apple, not available in the market.

2. The product though involves heating of the clarified juice, renders to overcome the problems characteristic of heating custard apple pulp.
3. The product developed is similar to other fruits, can be stored for more than 6 months.
4. The product can serve the needs in off-season and of populations in areas bereft of custard apple production.
5. The product affords for easy transportation and thus, can serve to boost the earnings in domestic or export markets.

We Claim:

1. A process for preparing custard apple jelly without discoloration, bitterness and off-flavor, said process comprising the step of (a) obtaining custard pulp and diluting the same with water to obtain a mixture containing 60 to 80 % wt./wt by weight of custard apple pulp; (b) filtering the mixture of step (a) under an operating pressure of 1 to 3 bars to obtain a filtrate containing 45 to 60 % by wt of the custard apple pulp; (c) adding sweetening agent, preservatives, settling agent and other food additives, and (d) boiling the mixture of step (c) at a temperature in the range of 90° C to 100° C and cooling the same to obtain the custard apple jelly.

2. A process as claimed in claim 1, wherein said process comprises the step of:
   a) obtaining custard apple pulp;
   b) diluting the pulp of step (a) with water to contain 60-80% w/w pulp, followed by micro-filtration using a ceramic membrane with a pore size of 0.1-0.2 μm with an operating pressure of 1-3 bar at 25-30°C to obtain a micro-filtrate containing 45 – 60% fruit;
   c) dissolving the micro-filtrate obtained in step (b) with 40 to 50% by weight of a sweetening agent 40-55%, 0.7 to 1.0% by weight of a settling agent and 0.4 to 0.55% by weight of a flavoring agent;
   d) boiling the mixture of step (c) till the total soluble solids reaches to 68°B to 70°B;
   e) adding permitted preservatives to the boiled mixture of step (d), and
   f) allowing the mixture of step (e) to set at room temperature to obtain the custard apple jelly.

3. A process as claimed in claim 1, wherein the custard apple pulp is obtained from fresh ripe custard apple fruits.

4. A process as claimed in claim 2 wherein in step (a), the custard apple pulp is obtained by scooping the pulp from ripe fruits using a pulper followed by separating seeds from the same.

5. A process as claimed in claim 2 wherein in step (c), the sweetening agent used is sugar.

6. A process as claimed in claim 2 wherein in step (c), the settling agent used is pectin.

7. A process as claimed in claim 2 wherein in step (c), the flavoring agent used is citric acid.

8. A process as claimed in claim 2 wherein in step (d), the mixture is boiled at a temperature in the range of 95°C to 98° C..

9. A process as claimed in claim 2 wherein in step (e), the permitted food preservative used is sodium benzoate.

10. A process as claimed in claim 2 wherein in step (f), the mixture of step (e) is filled in sterilized containers and allowed to set at room temperature.

11. A process as claimed in claims 1 or 2, wherein the custard apple jelly thus obtained has a shelf life greater than 6 months.

AMENDED CLAIMS

[received by the International Bureau on 09 August 2004 (09.08.04);
Original claim 1 amended; claims 2-11 unchanged; (2 pages).]

1. A process for preparing custard apple jelly without discoloration, bitterness and off-flavor, said process comprising the steps of (a) obtaining custard pulp and diluting the same with water to obtain a mixture containing 60 to 80 % wt./wt by weight of custard apple pulp; (b) micro-filtering the mixture of step (a) under an operating pressure of 1 to 3 bars to obtain a particulate free custard apple juice having a density of about 16° Be filtrate containing 45 to 60% by wt of the custard apple pulp; (c) adding sweetening agent, preservatives, settling agent and other food additives to the said particulate free custard apple juice, and (d) boiling the mixture of step (c) at a temperature in the range of 90° C to 100° C and cooling the same to obtain the custard apple jelly.
2. A process as claimed in claim 1, wherein said process comprises the step of:
   a) obtaining custard apple pulp;
   b) diluting the pulp of step (a) with water to contain 60-80% w/w pulp, followed by micro-filtration using a ceramic membrane with a pore size of 0.1-0.2 μm with an operating pressure of 1-3 bar at 25-30°C to obtain a micro-filtrate containing 45 – 60% fruit;
   c) dissolving the micro-filtrate obtained in step (b) with 40 to 50% by weight of a sweetening agent 40-55%, 0.7 to 1.0% by weight of a settling agent and 0.4 to 0.55% by weight of a flavoring agent;
   d) boiling the mixture of step (c) till the total soluble solids reaches to 68°B to 70°B;
   e) adding permitted preservatives to the boiled mixture of step (d), and
   f) allowing the mixture of step (e) to set at room temperature to obtain the custard apple jelly.
3. A process as claimed in claim 1, wherein the custard apple pulp is obtained from fresh ripe custard apple fruits.
4. A process as claimed in claim 2 wherein in step (a), the custard apple pulp is obtained by scooping the pulp from ripe fruits using a pulper followed by separating seeds from the same.
5. A process as claimed in claim 2 wherein in step (c), the sweetening agent used is sugar.

6. A process as claimed in claim 2 wherein in step (c), the settling agent used is pectin.
7. A process as claimed in claim 2 wherein in step (c), the flavoring agent used is citric acid.
8. A process as claimed in claim 2 wherein in step (d), the mixture is boiled at a temperature in the range of 95°C to 98° C..
9. A process as claimed in claim 2 wherein in step (e), the permitted food preservative used is sodium benzoate.
10. A process as claimed in claim 2 wherein in step (f), the mixture of step (e) is filled in sterilized containers and allowed to set at room temperature.
11. A process as claimed in claims 1 or 2, wherein the custard apple jelly thus obtained has a shelf life greater than 6 months.

STATEMENT UNDER ARTICLE 19(1)

The Applicant has amended claim 1 to reflect that the custard apple jelly prepared by the process of the present invention is free from bitterness, discoloration and off-flavor.

As regards Document DE 28 42 820 A, this cited document does not deal with any information exclusively on a sweet product like jelly which is exclusively and solely prepared from custard apple. This document has no information on the development of jelly prepared from custard apple juice, free of adverse qualities of bitterness, discoloration and off-flavor. The information quoted on marmalade includes custard apple along with passion flower and the specific taste of the product is not mentioned. Whereas the product prepared by the process of the present invention is totally different from the marmalade product quoted in the reference.

Regarding cited document XP008024809, the detailed steps involving the preparation of jelly from custard apple are not mentioned in this reference, nor it does have any cross reference cited except the one line on page 19 to 20, there is no mention about jelly in the reference cited. Whereas the process of the present invention entails a novel procedure of use of particulate free custard apple juice through micro-filtration with the use of sweetening, thickening and preservative agents for the production of jelly. The jelly thus prepared is free of bitterness, discoloration and off-flavor, despite heating the above mixture (prior to gel set) to boiling, which in a normal course when custard apple juice is used directly, the above three problems are very imminent and characteristic.

With regard to citation document XP-002276675, the cited document does not provide any information on any processed product including jelly, nor any product involving use of heat i.e. heating the mixture to boiling.

Therefore, Applicants respectfully submit that none of the cited documents give any mention or description (nor any cross reference is cited), on the steps involved in preparation of jelly from custard apple juice, more particularly and importantly, in the final product to be free from bitterness, off-flavor and discoloration. The steps detailed in the present process involve all the essential details to obtain a product free of the prior art problems, despite the use of heat, the final product has a pleasant aroma along with a storage life of minimum 6 months at room temperature.

Finally, the Applicants submit that the amendments made to the main claim is falling within the scope of the originally filed specification and no additional material or matter is added to the amended claim. In fact, the amendments carried to the claim is of restrictive in nature.

INTERNATIONAL SEARCH REPORT

PCT/IN 03/00410

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A23L1/064

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A23L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ, FSTA

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DE 28 42 820 A (HOYOS PEDRO) 10 April 1980 (1980-04-10) the whole document	1-11
Y	SAO S N: "ANONAS THE LEGENDARY FRUIT" INDIAN HORTICULTURE, XX, IN, vol. 19, no. 3, October 1974 (1974-10), pages 19-21, XP008024809 ISSN: 0019-4875 the whole document	1-11
L	MORTON, J.: "Custard Apple" INTERNET ARTICLE, 'Online! XP002276675 Retrieved from the Internet: URL:http://www.hort.purdue.edu/newcrop/morton/custard_apple.html> 'retrieved on 2004-04-08! the whole document	1-11

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
13 April 2004	29/04/2004

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European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Vernier, F

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INTERNATIONAL SEARCH REPORT

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 2842820 A	10-04-1980	DE 2842820 A1	10-04-1980