Title: METHOD OF PRESERVING COCONUT WATER AND FRUIT EXTRACTS

Abstract: The present invention provides a method for the preparation, extraction, preservation and utilization of tender coconut water and the often-discarded matured coconut water. The present invention aims to provide a method for the preservation of coconut water while retaining its nutrients. This, however, may not be construed as to limit the use of the same disclosed method for application on known fruit extracts.
Method of Preserving Coconut Water and Fruit Extracts

Field of Invention

The present invention relates to the processing of cocos nucifera liquid or commonly known as coconut water and also various fruit extracts.

Background Art

Coconut palm, botanically known as Cocos nucifera L, belongs to the natural order of Arecaceae (Palmoe), which is an important member of monocotyledons. A common practice in the coconut processing industry, especially those that require only the kernel of the coconut, is to discard the coconut water. Copra production is an example of coconut industry wherein the coconut water is just considered waste.

The coconut water, though in small amounts, contain various minerals, vitamins and proteins. Since these nutrients are of small quantities, there is a need to extract its nutrients in concentrated quantity. Also, coconut water quickly ferments therefore there is a need to find a way to prolong its shelf life.

The main objective of the present invention is to utilize the often-discarded coconut water. Another objective of the present invention is to provide a method to extract the nutrients of the coconut water. Further objective of the present invention is to provide a method for the preservation of coconut water while retaining its nutrients. This, however, may not be construed as to limit the use of the same disclosed method for application on known fruit extracts.

Embodiments of the Invention

The present invention provides a method for the preparation, extraction, preservation and utilization of tender coconut water and the often-discarded matured coconut water.

A sufficient amount of coconut water should be available for processing. After the collection and preparation of the coconut water, a filtering process is needed in order to remove the foreign materials in the liquid. A food grade hydrogen peroxide is then added as a disinfectant. This will eliminate the harmful bacteria present in the liquid. At room temperature, freshly collected coconut water has an average shelf life of 2 hours. By adding
the said food grade hydrogen peroxide, the shelf life is significantly increased to about 24 hours. Preferably, 50% vol food grade hydrogen peroxide must be added in an amount of 1 mL per liter of filtered coconut water. The solution is preferably chilled in order to further improve its shelf life. The chilling temperature is preferably at most 16°C. The shelf life of the solution may further be improved by adding a preservative. This would significantly extend the shelf life of the solution to about 6 months to 2 years. In one embodiment of the invention, the preservative is potassium sorbate, preferably in the range of 1.5-2 grams per liter of the solution. In another embodiment of the invention, the preservative is any preservative selected from the group comprising nissin, natamycin and sodium benzoate. In various existing coconut industries, coconut water are often collected in plastic and/or metal containers so there may be some unwanted metals mixed in the liquid. As a precautionary measure, a chelating agent may also be added to remove hard metals that may be present in the solution. In an embodiment of the present invention, the chelating compound is ethylenediaminetetraacetic acid, or EDTA, in the range of 25-30 milligram per liter of the solution. A pH control agent may also be added to bring the pH level of the solution close to the acidity level requirement acceptable to most food authorities for beverages. Preferably, the pH control agent concentration is in the range of 1-2 grams per liter of the solution. In one embodiment of the invention, the pH control agent is an organic acid selected from the group comprising: citric acid, ascorbic acid, lactic acid and tartaric acid. To further slowdown the spoilage of the solution, the said solution must then be pasteurized, preferably for 3-7 minutes. The processed coconut water can be made into a beverage but its shelf life may ultimately depend on what additional methods discussed above were implemented.

The nutrients found in the coconut water are of relatively small amounts. In order to have a concentrated solution of the coconut water, a precipitation process is necessary. To do this, table salt must first be added in the solution. The salt will help capture the essential nutrients in the form of precipitates. The salt will also act as a preservative further improving the solution's shelf life. In an embodiment of the invention, the salt is selected from the group comprising: sodium chloride, potassium chloride, and magnesium chloride. The salt is preferably added in the range of 4-4.5 grams per liter of the solution. However, precipitates will only form when the pH level of the solution is in the range of 9 - 9.5. Hence, an alkaline compound must be added to achieve the said desired pH range. In one embodiment of the present invention, the alkaline compound is selected from the group comprising: sodium hydroxide, potassium hydroxide and magnesium hydroxide. The said
precipitation process preferably has a sorption time of at least 4 hours. However, for the embodiment of the present invention wherein the salt is sodium chloride and/or the alkaline compound is sodium hydroxide, the precipitates will have excess sodium content, which is undesirable. After removing the supernatant liquid in the solution, a washing step using water, preferably warm distilled water, is therefore necessary to remove the excess sodium. The resultant product is a nutritional composition with shelf life ultimately dependent on what additional methods of preservation discussed above were implemented. The said nutritional composition may be used as an essential component for a fertilizer, energy drink, or a medicinal supplement composition.

Though the disclosure describes the methods in preserving coconut water, this may not be construed as to limit the use of the same method using other known fruit extracts. The methods described herein may therefore be applicable to known fruit extracts, preferably coming from those selected from the group comprising: guyabano, mango, melon, grapefruit, papaya, guava, apple, orange, calamansi, chico, watermelon, and the like.

EXAMPLE 1
Twelve Liter of coconut water was collected and was then filtered. Twelve milliliter of 50% vol food grade hydrogen peroxide was then added to remove harmful bacteria. Precipitation was done by adding 50 grams of table salt and 36 grams of sodium hydroxide. The precipitates were allowed to settle down for 4 hours, after which the supernatant liquid was removed. The precipitates were then washed for several times with warm distilled water to remove the excess sodium. Twelve grams of citric acid was then added to lower the pH level down to 6. Thirty milligrams of ethylenediaminetertraacetic acid (EDTA) was then added to remove hard metals which may be present in the solution. To further preserve the solution, 18 grams of potassium sorbate was then added. The solution is then filled into 500mL glass bottles with a headspace of about 10mL. The glass bottles were then sealed by crowning. A pasteurization process at 90°C for 7 minutes was then performed. The bottles were finally cooled down to 16°C and are now ready to be served.
Claims:

1. A method of preserving coconut water comprising the steps:
   a. preparing the coconut water,
   b. filtering the prepared coconut water, and
   c. adding a food grade hydrogen peroxide.

2. A method according to claim 1 characterized in that the concentration of the food grade hydrogen peroxide is 50%vol and is added in a ratio of mL per Liter of filtered coconut water.

3. A method according to any of claims 1 and 2 characterized in that it further comprises the step of chilling the solution.

4. A method according to claim 3 characterized in that the temperature of the solution is at most 16°C.

5. A method according to any of claims 1-4 characterized in that it further comprises the step of adding a preservative.

6. A method according to claim 5 characterized in that the preservative is potassium sorbate.

7. A method according to claim 5 characterized in that the preservative is selected from the group comprising:
   a. nissin,
   b. natamycin, and
   c. sodium benzoate.

8. A method according to any of claims 5-7 characterized in that the preservative is in the range of 1.5-2.0 grams per Liter of the solution.

9. A method according to any of claims 1-8 characterized in that it further comprises the step of adding a chelating agent.

10. A method according to claim 9 characterized in that the chelating agent is ethylenediaminetetraacetic acid (EDTA).

11. A method according to any of claims 9 and 10 characterized in that the chelating agent is in the range of 25-30 milligrams per Liter of the solution.

12. A method according to any of claims 1-11 characterized in that it further comprises the step of adding a pH control agent.

13. A method according to claim 12 characterized in that the pH control agent is an organic acid selected from the group comprising:
14. A method according to any of claims 12 and 13 characterized in that the pH control agent is in the range of 1-2 grams per Liter of the solution.

15. A method according to any of claims 1-14 characterized in that it further comprises the step of pasteurization.

16. A method according to claim 15 characterized in that the pasteurization process is done for 3-7 minutes.

17. A method of extracting and preserving the nutrients of coconut water comprising the steps:
   a. preparing the coconut water,
   b. filtering the prepared coconut water,
   c. adding a food grade hydrogen peroxide, and
   d. precipitation.

18. A method according to claim 17 characterized in that the concentration of the food grade hydrogen peroxide is 50%vol and is added in a ratio of 1mL per Liter of filtered coconut water.

19. A method according to any of claims 17 and 18 characterized in that it further comprises the step of chilling the solution.

20. A method according to claim 19 characterized in that the temperature of the solution is at most 16°C.

21. A method according to any of claims 17-20 characterized in that the precipitation process comprises the steps:
   a. adding salt,
   b. adding an alkaline compound, and
   c. removing the supernatant liquid.

22. A method according to claim 21 characterized in that the salt is selected from the group comprising:
   a. sodium chloride,
   b. potassium chloride, and
   c. magnesium chloride.
23. A method according to any of claims 21 and 22 characterized in that the salt is in the range of 4.0-4.5 grams per Liter of the solution.

24. A method according to any of claims 21-23 characterized in that the alkaline compound is selected from the group comprising:
   a. sodium hydroxide,
   b. potassium hydroxide, and
   c. magnesium hydroxide.

25. A method according to any of claims 21-24 characterized in that the alkaline compound is added such that the resulting pH level of the solution is in the range of 9.0-9.5.

26. A method according to any of claims 21-25 characterized in that the sorption time is at least 4 hours.

27. A method according to any of claims 21-26 characterized in that it further comprises a washing step.

28. A method according to claim 27 characterized in that the washing step is done using warm water.

29. A method according to claim 28 characterized in that the water is distilled.

30. A method according to any of claims 17-29 characterized in that it further comprises the step of adding a preservative.

31. A method according to claim 30 characterized in that the preservative is potassium sorbate.

32. A method according to claim 30 characterized in that the preservative is selected from the group comprising:
   a. nissin,
   b. natamycin, and
   c. sodium benzoate.

33. A method according to any of claims 30-32 characterized in that the preservative is in the range of 1.5-2.0 grams per Liter of the solution.

34. A method according to any of claims 17-33 characterized in that it further comprises the step of adding a chelating agent.

35. A method according to claim 34 characterized in that the chelating agent is ethylenediaminetetraacetic acid (EDTA).

36. A method according to any of claims 34 and 35 characterized in that the chelating agent is in the range of 25-30 milligrams per Liter of the solution.
37. A method according to any of claims 17-36 characterized in that it further comprises the step of adding a pH control agent.

38. A method according to claim 37 characterized in that the pH control agent is an organic acid selected from the group comprising:
   a. citric acid,
   b. ascorbic acid,
   c. lactic acid, and
   d. tartaric acid.

39. A method according to any of claims 37 and 38 characterized in that the pH control agent is in the range of 1-2 grams per Liter of the solution.

40. A method according to any of claims 17-39 characterized in that it further comprises the step of pasteurization.

41. A method according to claim 40 characterized in that the pasteurization process is done for 3-7 minutes.

42. A method according to any of claims 1-41 characterized in that the coconut water is substituted with a fruit extract.

43. A method according to any of claims 42 characterized in that the fruit extract is coming from those selected from the group comprising: guyabano, mango, melon, grapefruit, papaya, guava, apple, orange, calamansi, chico, and watermelon.

44. A beverage obtainable from the method according to any of claims 1-43.

45. A nutritional composition obtainable from the method according to any of claims 17-43.

46. A fertilizer composition comprising a nutritional composition according to claim 45.

47. An energy drink comprising a nutritional composition according to claim 45.

48. A medicinal supplement comprising a nutritional composition according to claim 45.
### INTERNATIONAL SEARCH REPORT

**PCT/PH2013/000014**

#### A. CLASSIFICATION OF SUBJECT MATTER

- A23B7/005
- A23B7/10
- A23B7/157
- A23B7/154
- A23L2/02
- A23L2/68
- A23L2/44
- A23L2/46
- A23L2/72
- A23L2/70

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

#### B. FIELDS SEARCHED

- Minimum documentation searched (classification system followed by classification symbols)
  - A23B
  - 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 practicable, search terms used)
  - EPO-Internal
  - BIOSIS
  - FSTA
  - WPI Data

#### C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<td>Y</td>
<td>DATABASE EPODOC&lt;br&gt;EUROPEAN PATENT OFFICE, THE HAGUE, NL; XP002714169, abstract&lt;br&gt;&amp; MX JL05 000 055 A (BENJAMIN SANCHEZ Y SANCHEZ [MX]) 18 June 2007 (2007-06-18) abstract</td>
<td>1-16,44</td>
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[X] Further documents are listed in the continuation of Box C.  
[X] See patent family 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 application or patent but published on or after the international filing date
  - "L" document which may throw doubts on priority claim(s) on 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

*"A" document member of the same patent family

Date of the actual completion of the international search: 26 September 2013

Date of mailing of the international search report: 05/12/2013

Name and mailing address of the ISA:
- European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk
- Tel. (+31-70) 340-2040
- Fax: (+31-70) 340-3016

Authorized officer: Munteanu, Ioana S.

Form PCT/ISA/210 (second sheet) (April 2005)
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<td>Y</td>
<td>WO 99/44444 A1 (UNIV GEORGIA RES FOUND [US]) 10 September 1999 (1999-09-10) abstract; claims 1-3</td>
<td>1-16,44</td>
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Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. □ Claims Nos.: because they relate to subject matter not required to be searched by this Authority, namely:

2. □ Claims Nos.: because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. □ Claims Nos.: because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. □ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. □ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. □ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. □ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

   l-16(completely) ; 44(partially)

Remark on Protest

□ The additional search fees were accompanied by the applicant’s protest and, where applicable, the payment of a protest fee.

□ The additional search fees were accompanied by the applicant’s protest but the applicable protest fee was not paid within the time limit specified in the invitation.

□ No protest accompanied the payment of additional search fees.
This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-16 (completely); 44 (partly)
   Method for preserving coconut water

2. claims: 17-43, 45-48 (completely); 44 (partly)
   Method for extracting and preserving nutrients from coconut water
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