



(86) Date de dépôt PCT/PCT Filing Date: 1995/08/23	(51) Cl.Int. ⁶ /Int.Cl. ⁶ A23L 1/221, A23L 1/223, A23L 1/222, A23B 7/14, A23B 7/157, A23B 7/154
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(86) N° demande PCT/PCT Application No.: AU 1995/000522	
(87) N° publication PCT/PCT Publication No.: 1996/007334	
(30) Priorité/Priority: 1994/09/02 (PM 7927) AU	

(54) Titre : PRODUIT AROMATIQUE FRAIS CONTENANT UN ANTIOXYDANT ET/OU UN SEL
(54) Title: FRESH HERB PRODUCT CONTAINING ANTIOXIDANT AND/OR SALT

(57) **Abrégé/Abstract:**

The invention relates to a fresh product which retains the bright and fresh colour of fresh herbs which can be used for culinary purposes and which can be stored for protracted periods. According to the invention the leaves, flowers, barks, fruits or other aromatic parts of plants normally used for culinary purposes which have been intimately mixed: (a) in the absence of oxygen with either a salt or mixture of salts or an oxygen scavenging agent or a mixture thereof together with such concentrations or water activity controlling solutes that the water activity of the mix is 0.90 or lower, or (b) in the presence of oxygen with an oxygen scavenging agent with or without a salt or mixture of salts together with such concentrations or water activity controlling solutes that the water activity of the mix is 0.90 or lower in each case the resultant product being stored in an oxygen free or substantially oxygen free atmosphere.

**PCT**WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : A23L 1/221, 1/222, 1/223, A23B 7/14, 7/154, 7/157	A1	(11) International Publication Number: WO 96/07334 (43) International Publication Date: 14 March 1996 (14.03.96)
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(54) Title: FRESH HERB PRODUCT CONTAINING ANTIOXIDANT AND/OR SALT (57) Abstract <p>The invention relates to a fresh product which retains the bright and fresh colour of fresh herbs which can be used for culinary purposes and which can be stored for protracted periods. According to the invention the leaves, flowers, barks, fruits or other aromatic parts of plants normally used for culinary purposes which have been intimately mixed: (a) in the absence of oxygen with either a salt or mixture of salts or an oxygen scavenging agent or a mixture thereof together with such concentrations or water activity controlling solutes that the water activity of the mix is 0.90 or lower, or (b) in the presence of oxygen with an oxygen scavenging agent with or without a salt or mixture of salts together with such concentrations or water activity controlling solutes that the water activity of the mix is 0.90 or lower in each case the resultant product being stored in an oxygen free or substantially oxygen free atmosphere.</p>		

Fresh herb product containing antioxidant and/or salt.

BACKGROUND OF THE INVENTION

Culinary herbs together with aromatic plants such as ginger, garlic, peppers and chillies are much prized ingredients in cooking. Fresh herbs are cultivated in home and commercial gardens and today are available fresh in many varieties. Herbs are used in the preparation of numerous traditional dishes and the aroma and colour of various specific herbs are of great importance in these.

In most parts of the world, fresh herbs are seasonal. Herbs may be obtained year round in dried form. Most herbs when dried, however, lose their green colour, aroma and flavour and are irreversibly altered so that they do not represent a satisfactory alternative to freshly picked herbs.

Many of the popularly used herbs contain enzymes which act very rapidly when the cell structure of the herb is disturbed resulting in loss of green colour, production of dark pigments and both loss of fresh flavour and the development of off-flavours. These changes occur more rapidly at elevated temperatures such as occur in many food processing operations and in cooking. Amongst these herbs are basil, coriander (cilantro), oregano, tarragon and mint. Many studies have been made on the enzymic degradation of herbs including those by Baritoux et al, 1991 (*Sciences-des-aliments* 11, (1) 49-62), Gerherdt. V et al (*Fleischerei* 34 (5) 508-208). Studies have also been made on the drying and storage stability of dried herbs, including those by Mastrocola, D et al 1988 (*Industrie-Alimentari* 27 (259) 341), Paeaekkoenen, K et al 1990 (*J Food Science* 55 (5) 1373-1377).

Many herbs can be obtained nowadays in frozen and freeze-dried form. Frozen herbs have good flavour and colour, but must be kept frozen and when thawed or used in cooking and in processed products are subject to the same enzymic action and colour and flavour changes as fresh herbs. Freeze-dried herbs, which are expensive to produce when wetted, suffer from the same enzyme action as frozen herbs.

The enzyme action in herbs can be prevented by blanching of the herbs in steam or hot water. In this way, the green colour can be largely preserved but the flavour is often almost completely destroyed. Ricci in British Patent No. 1 348 266 (1974) describes production of a green food flavouring by heating basil leaves in hot water, quenching in cold water, cutting into pieces and refrigerating.

Herbs, along with other vegetables, for many ages have been traditionally preserved by pickling with salt or salt brine with or without vinegar. This method is used extensively in the pickle industry. Herbs treated in this way lose their attractive bright green colour and much of the flavour is lost into the brine. Unless pasteurised these products are subject to surface molds and to salt and sugar tolerant yeasts. Coste (British patent 2,014,429, 1979) claims to have preserved chopped herbs by mixing with water activity controlling substances such as salt, glycerol and propylene glycol in such concentration that the water activity is less than 0.90. Oil up to 20% may be added to give a pasty consistency. We have observed that in following the procedures described by Coste, the resultant herb mixes quickly developed a dark olive green colour. In all case of the herbs with high levels of polyphenol oxidase enzymes such as basil mint and oregano the colour that developed on storage was a dark greenish black. In the cases, the colour changes were accompanied by off-flavours. Moreover, it was observed that even at water activities of 0.80, yeast and mold growth could occur on the surface of the mixes.

15 OBJECTS OF THE PRESENT INVENTION

Throughout this specification, the term "herb product" refers to the leaves, flowers, barks, fruits, roots or other aromatic parts of plants normally used for culinary purposes.

An object of the present invention is to produce a herb product with a natural bright fresh colour and a fresh flavour that is convenient to use for culinary purposes and which can be stored and distributed on a year round basis.

A further object of the present invention is to produce food products containing fresh herbs which are stored at refrigeration or freezer temperatures in a form suitable for convenient use that retain to a large extent both the colour and the flavour of the fresh herbs and can be used by the consumer to impart to culinary products such as sauces, dressings, casseroles, soups and other dishes the fresh flavour and colour of those herbs.

A further object of the invention is to produce food products containing fresh herbs which may be suitably stored and distributed so that the aforementioned products and qualities can be available on a year-round basis.

A still further object of the invention is to produce herb products which are adaptable to packaging in a range of quantities which vary from bulk industrial, smaller food service and retail unit size packs without any variation in quality in relation to the material used for such packaging.

A still further object of the invention is to produce herb products which when held at freezer temperature are sufficiently soft and fluid that they can be used directly from the freezer without thawing.

A still further object is to produce a herb product that may be pasteurised and suitably
5 packaged to produce a product for use where pasteurised herbs are needed.

SUMMARY OF THE INVENTION

The invention relates to a process of producing a non-acid fluid or semifluid colour and flavour stable herb product as herein defined comprising the steps of intimately mixing said herb product in the absence of heat with

- 10 (a) either a mixture of salts or an oxygen scavenging agent together with such concentrations of water activity controlling solutes that the water activity of the mix is 0.90 or lower in the absence of oxygen or;
- (b) an oxygen scavenging agent with or without a salt or mixtures of salts together with such concentrations of water activity controlling solutes that the water
15 activity of the mix is 0.90 or lower in the presence of oxygen

the resultant product being stored in an oxygen free or substantially oxygen free atmosphere and remaining fluid at temperatures within the range of +8°C to -20°C.

The invention also relates to a fluid or semi-fluid, colour and flavour stable herb product whenever produced by the said process.

20 The mixing may be performed in the presence of air in an open mixer provided an oxygen scavenger is included in the mix.

The salt is preferably sodium chloride, but other salts such as potassium chloride, calcium chloride, sodium citrate, sodium lactate and other edible salts can be used. The oxygen scavenger or antioxidant preferably comprises ascorbic acid or its salts, erythorbic
25 acid or its salts or related compounds. Water activity controlling substances may be salts such as sodium chloride, sugars, polyhydric alcohols, protein hydrolysates, hydrolysed starches. Also present may be pH controlling substances such as sodium citrate and citric acid, emulsifiers, vegetable oils, flavourings, essential oils and oleoresins, stabilisers such as gums and other food ingredients such as cheese, meats, preservatives, flavour potentiators and the
30 like.

The invention also consists of food products containing said herb product.

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PREFERRED EMBODIMENT

In preparing these stable herb products, the herbs should be freshly picked, well washed and kept cool. Succulent stems may be included with the leaves. Prepared

quick-frozen herbs may also be used. With fresh herbs, after washing, excess water is removed, for example by blowing with an air stream or by centrifuging. The herbs may then be reduced to particles of predetermined size for example by pulverising or chopping in a cutter, slicer or dicer such as is common in the food industry. Some small leafed herbs for instance thyme leaves, may be used in unchopped form. Throughout the process the herbs are preferably to be kept as cool as possible. The chopped or otherwise prepared herbs are then mixed with as little delay as possible with the salt or salts, the oxygen scavenger and the water activity controlling solutes. If a high enough concentration of salt is used, this may be sufficient to control the water activity to 0.90 or below, without the use of additional water activity controlling substances. Other food ingredients such as vegetable oil may also be added at this stage. Alternately, the mixture of whole or coarsely cut herbs and other ingredients may be chopped together in a single operation to any degree of comminution using suitable equipment such as a food processor with rotating sharpened blades equipped for operation under vacuum or inert gas. One typical piece of industrial equipment of this type is manufactured by the Stephan Co., Hameln, Germany.

The mixing or combined mixing and chopping operation are preferably performed under conditions which subject the ingredients to as little oxygen as possible. This is best achieved either in an inert gas such as nitrogen or under vacuum. It can, however be performed in an open mixer provided the oxygen scavenger is added. In this case the mixture should preferably be vacuum de-aerated after mixing

During mixing, the solutes dissolve in water extracted from the herbs and form a flowable liquid mix. It is therefore usually unnecessary to add any water.

After mixing, the herb mix is packaged in sealed glass jars or other low oxygen transmission packages such as flexible laminates, metal or plastic tubes, etc. In smaller containers for consumer use it is preferred that the type of package be such that the contents can be squeezed out and re-sealed (eg a metal tube) so that air is kept to a minimum within the package. The packaged product is held at low temperature, preferably between 8°C and -20°C and more preferably at -20°C.

The herb products prepared as outlined above may be pasteurised in a heat exchanger in the absence of oxygen and either cooled and aseptically packaged or packed hot into low oxygen transmission containers and rapidly cooled after the package is sealed. Such pasteurised packs have good colour retention and flavour though not as

good as the unheated products. They may be used where a pasteurised product is need, for example for addition to dairy products.

The herbs may be selected from any of those customarily used for human consumption. Included amongst the herbs used in accordance with the present invention are basil, coriander (cilantro), oregano, tarragon, mint, parsley, chives and chervil and other aromatic plants such as red peppers, chillies, garlic and ginger (collectively herein referred to as herbs). The present invention relates to products in which the colour of culinary herbs together with their fresh flavour can be retained for an extended period of time. While all herbs will benefit from this invention, those herbs which contain particularly active enzyme systems which lead to rapid colour deterioration and associated flavour changes benefit to an even greater degree.

The present invention relates not only to herbs such as basil, oregano, coriander, tarragon and mint which oxidise very quickly but is also equally beneficial for other herbs such as parsley, chives, garlic and ginger.

It has been found that by processing of these herbs as described herein, a very superior product can be prepared:

1. Incorporating edible salts such as sodium chloride or potassium chloride assist in preventing the rapid discolouration and flavour change of the herbs. While a salt concentration as low as 3% retards discolouration a salt level as high as 20% has a more pronounced and lasting effect on maintaining colour and flavour. Since these herb preparations are used at a low level in the recipe as consumed, for instance about 2 to 5%, the salt carry-over into the dish is low, usually not more than one half of one percent.
2. When the mixing procedure is not performed under inert gas or vacuum or when a salt is not added, the addition of ascorbic acid, sodium ascorbate, erythorbic acid or other similar antioxidants with the herbs achieves colour and flavour retention. The level of the antioxidant used would normally be below 2%, most usually between 0.2 and 1.0%. Even when mixing is performed in the substantial absence of oxygen, the use of the oxygen scavenger is often advantageous.
3. To achieve prolonged maintenance of colour and flavour, the mixture of herbs, salt and the antioxidant must be protected from oxidation by

packaging so that minimal exposure to oxygen can occur. This may be achieved by packaging in sealed containers of glass or metal, or in flexible packages with low oxygen permeability.

Since the herb mix is packaged under anaerobic conditions, to avoid spoilage it must be maintained at a water activity below 0.90, preferably below 0.85. This may be achieved by maintaining a sufficiently high level of sodium chloride (10-20%) or by adding to the mixture other water activity controlling solutes such as sugars, polyhydric alcohols or other salts. Where sugar additions are used to control the water activity, those sugars with a low sweetness level such as lactose, dextrose and maltose are preferred.

The mixture, to ensure good shelf-life should be kept cool below 8°C and preferably under freezer conditions (about -20°C). The choice of salt concentration and that of other water activity controlling solutes can be made so that even at -20°C, the mixture will maintain its fluidity, will not freeze, and can be used directly out of the freezer without thawing. It has been found that if the herb mix has a water activity of about 0.90 or less, ice crystals will not usually develop in the product and fluidity will be maintained. Herb mixes prepared as outlined above will maintain their fresh colour and flavour for in excess of twelve months.

The herb preparations prepared as described above may be used in the preparation of a range of herb-based sauces which are preferably prepared without heating at water activities about 0.85. These sauces are packed in packages with minimal exposure to oxygen and are preferably stored at freezer temperature for long shelf-life. If a combination of salt and/or other water activity controlling solutes are used to arrive at a water activity about 0.85, the products remain fluid or spoonable at freezer temperatures. In the preparation of these sauces, it is often desirable to add a proportion of up to about 50% of an edible oil. The oil generally improves the flow characteristics of the product, partially dissolves and assists in stabilizing the essential herb oils and assists in the blending of these flavours in culinary preparations. It is preferred to use an oil which does not solidify at freezer temperatures. One such oil is sunflower seed oil, but other oils such as safflower and corn oil have also been found suitable. In preparing sauces with edible oils, the use of emulsifying agents such as polyoxyethylene sorbitan esters of fatty acids, monoglycerides, lecithin and sugar esters may be found necessary.

These herb preparations and herb based sauces may be used on cooked pasta, rice or vegetables, in salad dressings, in other recipes where a fresh herb flavour or colour is

desired, in cottage cheese mixes and many other prepared foods.

The invention will now be described with reference to the following non-limiting examples.

1. BASIL

Fresh basil leaves were washed and chopped in a kitchen type food processor with the ingredients listed below for about 60 seconds or until the size of the leaf particles was about 1.5 x 1.5mm.

	% by weight
Basil leaves	70.7
Salt	14.0
Dextrose	14.0
Citric Acid	0.3
Guar gum	0.3
Sodium erythorbate	0.7

The resultant paste was transferred to a container and placed in a vacuum chamber which was evacuated several times to remove entrapped air. The basil paste had a water activity of 0.80. It was packed into low-oxygen-transmission clear laminated pouches holding about 150g each.

These were sealed to eliminate as much air as possible. Some of the packs were stored at -20°C, others at 6°C. After 4 weeks the basil stored at 6°C was just a shade darker than that stored at -20°C. After 4 months it was noticeably darker but still a bright green. The product at -20°C was equally as bright as when first made and had a typical fresh basil flavour.

2. TARRAGON

Fresh washed tarragon leaves were chopped in a kitchen food processor which had been fitted with a plastic sleeve on the top opening so that nitrogen gas could be flowed through the processor during chopping. The leaves were chopped for about 60 seconds with the following ingredients:

	% by weight
Tarragon leaves	50.7
Emulsifier (sugar ester)	0.3
Salt	10.0
Lactose	11
Dextrose	11
Safflower oil	16.7
Guar gum	0.3

The product had a water activity of 0.86. The viscous emulsion was packed into aluminium tubes and the ends sealed. The tubes were stored at -20°C. For use, the screw cap was removed from the tube and a quantity of the emulsion squeezed out. Even though stored at -20°C, the product was still fluid. After use, the tube was resealed with the cap so that a negligible quantity of air was entrapped. After twelve months, the colour and flavour of the tarragon had not changed.

3. GARLIC

Garlic cloves were peeled of their outer membranes and chopped in a kitchen food processor for 2 minutes with the following ingredients:

	% by weight
Garlic	70.5
Salt	9.5
Whey powder	9.5
Ascorbic acid	0.2
Citric acid	0.3
Sunflower oil	10.0

The resultant paste had a water activity of 0.84. It was packed into plastic tubes which had been made from an opaque laminate containing aluminium foil as an oxygen barrier. These were stored under refrigeration at 6°C. After 12 months the creamy white colour of the paste had not deteriorated and the flavour was typical of fresh garlic.

4. PESTO with BASIL

A pesto sauce was prepared from fresh basil leaves by chopping all of the following ingredients together in a Stephan UMC Cutter (A Stephan U Sohne, Hameln, Germany) equipped for vacuum cutting and mixing.

	% by weight
Basil leaves	29.1
Citric acid	0.2
Salt	6.0
Whey powder	8.1
Guar gum	0.3
Black pepper	0.3
Pine nuts	11.0
Fresh garlic	8.5
Parmesan cheese	8.5
Sunflower seed oil	<u>28.0</u>
	<u>100.0</u>

The mix was cut under vacuum until a fine emulsion was obtained. The water activity of the mix was 0.85. The product was packed into 100g pouches made from low oxygen transmission material and sealed to avoid air. The pouches were stored at -20°C. For use, the entire content of the pouch which was still fluid at -20°C, was mixed with 250 gram of dry pasta which had been cooked in unsalted water.

5. MINT

Freshly picked mint leaves were washed, spin-dried and mixed with the following ingredients:

	% by weight
Mint leaves	50
Dextrose	11
Whey powder	15
Glycerol	10

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Guar gum	0.2
Sodium erythorbate	0.8
Sunflower seed oil	13

The mixture was chopped under a nitrogen stream as in example 2 for 60 seconds. The product has a water activity of 0.84. It was packed into low oxygen transmission plastic bags which were sealed so as to minimise any headspace air and stored at -20°C. After 12 months storage, there was no appreciable deterioration in colour or flavour.

WE CLAIM

1. A process of producing a non-acid fluid or semifluid colour and flavour stable herb product as herein defined comprising the steps of intimately mixing said herb
5 product in the absence of heat with a salt and/or oxygen scavenging agent together with such concentrations of water activity controlling solutes that the water activity of the mix is 0.90 or lower in the absence of oxygen, the resultant product being stored in an oxygen free or substantially oxygen free atmosphere and remaining fluid at a temperature within the range of +8 to -20 °C.
- 10 2. A process as claimed in claim 1 wherein the salt comprises a mixture of at least two salts.
3. A process of producing a fluid or semifluid, colour and flavour stable herb product as claimed in claims 1 or 2 wherein the product is reduced to particles prior to mixing.
- 15 4. A process as claimed in claims 1 or 2 wherein said salt is selected from the group consisting of sodium chloride, potassium chloride, calcium chloride, sodium citrate or sodium lactate.
5. A process as claimed in claims 1 or 2 wherein the oxygen scavenging agent is selected from the group consisting of ascorbic acid or its salts, erythorbic acid or its
20 salts.
6. A process as claimed in claims 1 or 2 wherein the water activity controlling solutes are from the group consisting of sodium chloride, sugars, polyhydric alcohols, protein hydrolysates and hydrolysed starches.
7. A process as claimed in claim 6 wherein said sugars comprise lactose,
25 dextrose and maltose.
8. A process as claimed in claims 1 or 2 wherein a pH controlling substance is added in said intimate mixing.

9. A process as claimed in claim 8 wherein the pH controlling substance comprises sodium citrate, sodium lactate or citric acid emulsifiers.
10. A process as claimed in claims 1 or 2 wherein the product also contains vegetable oils, flavourings, essential oils and oleoresins, stabilisers, emulsifiers and
5 other food components.
11. A process as claimed in claims 1 or 2 wherein the water activity of the mix is below 0.85.
12. A process of producing a herb product as claimed in claims 1 or 2 wherein the mixing is carried out in an inert gas or under vacuum.
- 10 13. A process of producing a herb product as claimed in claims 1 or 2 wherein said product is pasteurised in the absence of oxygen.
14. A process as claimed in claims 1 or 2 wherein the herb product is selected from the group comprising basis, coriander (cilantro), oregano, tarragon, mint, parsley, chives, chervil and other aromatic plants.
- 15 15. A non-acid fluid or semi-fluid colour and flavour stable herb product whenever produced by the process claimed in any one of claims 1 to 14.
16. A food product containing a herb product whenever produced by the process as claimed in any one of claims 1 to 14.