

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO			
RAD: 14-98072- -4	FECHA: 2016-03-11 12:03:20		
DEP: 2020 DIRECCION DE NUEVAS CREACIONES	EVE: 1 REGISTRO/DEPOSITO/CONCESION/DEPOSITO		
TRA: 2 PATENTES DE INVENCION	FOLIOS: 8		
ACT: 519 TRASLADOINFORME			

DIRECCIÓN DE NUEVAS CREACIONES

2020
Bogotá, D.C.,

Abogado(a)/Señor(a)
JUAN GUILLERMO MOURE PEREZ

Asunto: Radicación: 14-98072- -4
Trámite: 2
Evento: 1
Actuación: 519
Oficio: 2478
Folios: 8

Patente de Invención	X			Patente de Modelo de Utilidad	
Vía Nacional	X				
Vía PCT (Fase Nacional)		Capítulo I		Capítulo II	
No. Solicitud Internacional					
Fecha de Presentación Internacional					

Como resultado del examen de fondo realizado, con fundamento en el Artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se comunica:

1. Documentos estudiados

Descripción:	Radicado N° 14-098072-00000-0000	07/Mayo/2014
Reivindicaciones:	Radicado N° 14-098072-00000-0000	07/Mayo/2014
Dibujos:	Radicado N° 14-098072-00000-0000	07/Mayo/2014

2. Objeto de la invención

De acuerdo con lo establecido en el numeral 1.2.2.2 del capítulo primero del Título X de la Circular Única para efectos del examen de patentabilidad, se tendrá en cuenta la tasa pagada por la solicitante al momento de comenzar el examen para las reivindicaciones adicionales; esto es que cuando la solicitud contenga más de diez (10) reivindicaciones y no se haya pagado la tasa complementaria, sólo se estudiarán las cubiertas por la tasa pagada. En el presente caso se estudiarán las reivindicaciones 1 a 21 del capítulo reivindicatorio (Pág. 23 a 25, Radicado N°. 14-098072-00000-0000).

Título de la solicitud: “Proceso para la producción de extracto de café verde con ácidos clorgénicos y/o enriquecido con otros extractos naturales” (Pág. 14, Radicado N°. 14-098072-00000-0000).

El problema planteado en esta solicitud consiste la necesidad de desarrollar un

procedimiento para el procesamiento de granos de café verde, pues cuando éstos se procesan a temperaturas elevadas y durante altos periodos de tiempo se afecta la concentración de ácidos clorogénicos en los extractos producidos.

Para resolver este problema técnico la solicitud en estudio proporciona un método optimizado para la obtención de extractos líquidos y sólidos a partir de café verde que presenten altos contenidos de ácidos clorogénicos, trabajando a bajas temperaturas de extracción buscando la conservación de dichos ácidos.

El objeto de la presente solicitud se relaciona con la Clasificación Internacional de Patentes (CIP): A23F 5/24.

3. De la solicitud de patente

Título

El título hace referencia a “(...) ácidos clorgénicos”, pero estos compuestos no son conocidos en el campo técnico, se considera que corresponde a un error ortográfico; se sugiere hacer la aclaración o corrección necesaria.

Reivindicaciones (Art 30 D 486, Art 22 PCT)

La evaluación de los criterios de claridad y concisión de las reivindicaciones presentadas permite encontrar que:

- La reivindicación 1, reclama dos posibilidades de tratamiento de los granos de café, mutuamente excluyentes, al señalar que “*se selecciona de a) deshidratación (...); o b) criocongelado*” (subrayado fuera de texto), dado que se emplea la conjunción disyuntiva “o” uniendo alternativas incompatibles, y la posibilidad a) se realiza a altas temperaturas (80 a 120 °C), y la posibilidad b) a temperaturas inferiores 0 °C, por lo tanto, las dos opciones se consideran como tratamientos independientes.
- La reivindicación 1 tiene por objeto un proceso, sin embargo, dicho proceso no es claro dado que reclama una sola etapa y, para una de las opciones, el criocongelado, no se define ninguna condición técnica que defina completamente la invención. Se sugiere realizar las aclaraciones respectivas o definir la invención por sus características esenciales, teniendo en cuenta no modificar o ampliar la material ya divulgada.
- Según la descripción, la invención está caracterizada por un proceso con etapas definidas, entre ellas las que se definen en la página 16, líneas 17 a 32, y página 17, líneas 1 a 3; sin embargo, estas etapas, con su secuencia, no están definidas en las reivindicaciones, así como tampoco se encuentran sus condiciones técnicas tales como: temperatura, tiempo, presión, flujos, entre otras, las cuales definen completamente la invención. Se sugiere corregir esta inconsistencia entre la descripción y las reivindicaciones modificando la descripción o las reivindicaciones para que concuerden. Se sugiere también realizar las aclaraciones respectivas o definir la invención por sus características esenciales, teniendo en cuenta no modificar o ampliar la material ya divulgada.
- Las reivindicaciones 4, 5 y 16 no se encuentran suficientemente soportadas en las reivindicaciones de las cuales dependen, puesto que reclaman una etapa adicional que no se ha divulgado en ninguna de las reivindicaciones a las cuales hace referencia.
- Las reivindicaciones 1 a 6, 9, 13, 15, 16, 18, 19 y 21 presentan como características técnicas esenciales términos generales, tales como: “*granos de café*”, “*aire caliente*”, “*gases inertes (...)*”, “*sustratos deshidratadores*”, “*deshidratadores solares o liofilización*”, “*operación de extracción*”, “*operación de molienda*”, “*proceso de recirculación con solventes*”, “*operación de concentración*”, “*operación de secado*”, “*extractos naturales de café, frutas o especias*”, “*operación de aglomeración*”, “*café verde finamente picado*”, “*sólidos solubles*” los cuales, aunque corresponden a términos ampliamente conocidos, abarcan una extensa gama de posibilidades. De

tal manera, sugieren de forma imprecisa que la protección se extiende a otras posibles variaciones, por lo cual se propone realizar las modificaciones respectivas utilizando términos que describan de forma menos general, definir claramente los rangos y/o restringir los componentes reclamados a aquellos que tienen un efecto técnico demostrado.

- En las reivindicaciones 18 y 19 las expresiones “hasta un 4 a 8%” y “hasta un 32 a 42%” no son claras, por lo cual no permiten distinguir la invención del estado de la técnica. Se sugiere hacer las correcciones pertinentes.
- Las reivindicaciones 8, 11 y 12 se refieren a “donde el extracto tiene una concentración de sólidos solubles entre el (...)”, “(...) aumenta los sólidos solubles hasta un 32 a 42%”, “donde el tamaño de partícula del molido está, entre 50 y 120 micras o entre 2500 y 5000 micras”, que corresponden a resultados a alcanzar y no definen el procedimiento, puesto que las reivindicaciones incluirían no sólo la solución propuesta por el solicitante, sino todas las alternativas presentes o futuras que lleguen a ese resultado. Se sugiere reemplazarlo por las características esenciales o estructurales, que contribuyen a la obtención de ese efecto.
- Las reivindicaciones 17, 18, 19 y 20 presentan falsa dependencia con las reivindicaciones 1 a 3, 12, 4 a 8, 9 a 11, 13 o 14, respectivamente. Se sugiere definir el producto por sus características técnicas.
- Las reivindicaciones 17 a 20 hacen referencia a “Un producto de café verde (...)”, pero se están caracterizando por el método para su obtención, de esta manera, no es claro el objeto de la invención. Al respecto, no debe olvidarse que las reivindicaciones de producto y de procedimiento/método son diferentes y, por ello, deben redactarse de manera independiente en el pliego reivindicatorio.
- La reivindicación 21 depende del producto de la reivindicación 20; sin embargo, al no estar éste definido por sus características técnicas, no es posible determinar tampoco las características técnicas del producto de la reivindicación 21. Se sugiere definir el producto por sus características técnicas.
- En la reivindicación 14, la operación “ultrapasteurizado” no está soportada en la descripción, dado que en la Descripción solo se hace referencia a que el extracto puede ser congelado o empacado, o secado por aspersión, por liofilización o por vacío (Pág. 16, líneas 32 a 33). Se sugiere hacer la corrección correspondiente.
- En la reivindicación 14 la expresión “opcionalmente” no es limitativa, porque no restringe el alcance de la reivindicación. Se sugiere incluir las características opcionales o preferentes en una reivindicación dependiente.
- En la reivindicación 15 el término “finamente” es impreciso y/o relativo, por lo cual no permite distinguir la invención del estado de la técnica. Se sugiere eliminarlo o sustituirlo por términos precisos o rangos concretos.

Descripción (Art 28 D 486)

A lo largo de la descripción se encuentran los términos “ácidos clorgénicos” (por Ej. Pág. 15, líneas 1 y 20) y “ácido clorogénico” (por ej. Pág. 15, línea 25 y 30), se solicita hacer la corrección pertinente.

4. Determinación del Estado de la Técnica

El estado de la técnica se determinó con base en la fecha de presentación de la solicitud de patente nacional: mayo 7 de 2014, y se encontraron los siguientes documentos que anticipan el objeto de esta solicitud:

Ítem	Documento	Título	Fecha de Publicación
D1	WO 2011 073052	“Method of producing an extract of Green coffee”	23/Junio/2011
D2	Art. 1*	“Influence of processing on the content of sugars in green Arabica coffee beans”	Junio 2006

El documento D1¹ divulga un método para producir un extracto de café verde, en el que los granos de café verde han sido objeto de tratamiento térmico y extracción (Pág. 1, líneas 5 y 6). Dicho método comprende a) tratamiento térmico de los granos de café verde a una temperatura entre 100°C y 180°C por al menos 5 minutos manteniendo el nivel de humedad entre 6% y 50% del peso total de los granos de café; y b) hacer la extracción de los granos de café tratados en el paso a) para producir un extracto de café líquido, donde los granos de café y/o el extracto de café no son tostados (Pág. 2, líneas 1 a 5).

El documento D2² se refiere a la influencia de la forma de procesamiento de granos de café verde de la variedad Arabica sobre el contenido de azúcar. El procesamiento se da en húmedo, despulpando y fermentando los granos, en seco, o semi-seco, despulpando los granos pero sin fermentarlos (Pág. 196, Materiales y Métodos). El proceso de extracción se realizó congelando los granos con nitrógeno líquido, y luego moliéndolos hasta polvo fino (Pág. 196, Col. 2, Párr. 6).

5. Examen de Patentabilidad (Art 14 D486)

Novedad (Art 16 D486)

La reivindicación 1 consiste en: *“Un proceso para producir un extracto de café verde, que comprende...”* (Pág. 23, Radicado N°. 14-098072-00000-0000).

Comparación de las características técnicas esenciales, con las del estado de la técnica:

Características esenciales	D1
Un proceso para producir un extracto de café verde, que comprende el tratamiento granos de café mediante una operación que se selecciona de:	Método para producir un extracto de café verde (Pág. 1, línea 5).
a) deshidratación de granos de café a una temperatura entre 80°C y 120°C, hasta que los granos alcancen una humedad del 5% al 10%; o	Tratamiento térmico de granos de café verde a una temperatura entre 100°C y 180°C por al menos 5 minutos, manteniendo el nivel de humedad entre 6% y 50% del peso total de los granos de café (Pág. 2, líneas 1 a 4).

De acuerdo con la tabla anterior, las características esenciales del producto de la reivindicación 1 habían sido divulgadas previamente en el documento D1, por lo tanto, la materia reivindicada no es nueva.

Comparación de las características técnicas esenciales, con las del estado de la técnica:

Características esenciales	D2
Un proceso para producir un extracto de café verde, que comprende el tratamiento granos de café mediante una operación que se selecciona de:	Influencia del procesamiento sobre el contenido de azúcares en granos de café verde Arabica (Título).
b) criocongelado de granos de café	Para excluir la variabilidad debido a variaciones individuales, 60 granos fueron pesados y puestos como una muestra, congelados con nitrógeno líquido y molidos hasta polvo fino (Pág. 196, Col. 2, Párr. 6).

De acuerdo con la tabla anterior, las características esenciales del producto de la reivindicación 1 habían sido divulgadas previamente en el documento D2, por lo tanto, la materia reivindicada no es nueva.

Asimismo, el documento D1 divulga las características de las reivindicaciones dependientes así:

1 http://worldwide.espacenet.com/publicationDetails/originalDocument?CC=WO&NR=2011073052A1&KC=A1&FT=D&ND=3&date=20110623&DB=EPODOC&locale=en_EP

2 *Influence of processing on the content of sugars in green Arabica coffee beans. Knopp et al. European Food Research and Technology, 2006, 223, 2, 195-201.

- Reivindicación 5: los granos de café verde tratados térmicamente, y que van a ser sometidos a extracción, pueden estar enteros o molidos. En el método de la invención, los granos de café verde pueden ser molidos antes o después del tratamiento térmico, o pueden permanecer enteros durante todo el proceso (Pág. 3, líneas 25 a 30).
- Reivindicaciones 4, 6 y 7: la extracción de los granos de café verde tratados puede ser realizada por cualquier método, por ejemplo usando agua, etanol o cualquier otro solvente (Pág. 3, líneas 50 a 22).
- Reivindicaciones 9 y 10: el extracto de café verde obtenido puede ser concentrado, por ejemplo, por filtración o evaporación (Pág. 3, líneas 32 a 33).
- Reivindicaciones 13 y 14: el extracto de café verde obtenido puede ser (...) secado hasta ser un polvo, por ejemplo mediante liofilización o aspersión (Pág. 3, línea 33).
- Reivindicación 15: el método de la invención comprende preparar una composición de comida o bebida a partir del extracto obtenido mediante el tratamiento térmico y la extracción de la invención. (...) por ejemplo una bebida de café, una bebida de café o chocolate, una bebida de malta, una bebida de frutas (Pág. 5, líneas 24 a 30). Una bebida de acuerdo a la invención puede estar en la forma de un polvo o concentrado líquido para ser mezclado con un líquido adecuado, o ser una bebida lista para el consumo. (...) Una bebida acorde a la invención puede comprender cualquier otro ingrediente adecuado conocido en el arte para producir una bebida, como endulzantes (...), aromas y saborizantes como frutas, cola, café, o aroma y/o sabor a té (Pág. 6, líneas 5 a 15).
- Reivindicación 16: el café verde que ha sido tratado térmicamente de acuerdo con la invención puede ser puesto en una cápsula adecuada para la extracción (Pág. 4, líneas 9 a 10, y Reivindicación 10).

De igual manera el documento D2 divulga las características de las reivindicaciones dependientes así:

- Reivindicación 3: Para excluir la variabilidad debido a variaciones individuales, 60 granos fueron pesados y puestos como una muestra, congelados con nitrógeno líquido y molidos hasta polvo fino (Pág. 196, Col. 2, párr. 6).

Las reivindicaciones dependientes 3 a 7, 9, 10, 13, 14 y 16 no mencionan alguna característica que haga nuevo el proceso de la reivindicación 1, por lo cual se considera que no son nuevas.

La reivindicación 17 consiste en: *“un producto de café verde deshidratado que comprende...”* (Pág. 24, Radicado N°. 14-098072-00000-0000).

Comparación de las características técnicas esenciales, con las del estado de la técnica:

Características esenciales	D1
Un producto de café verde deshidratado que comprende un nivel de humedad de 5% a 10% o criocongelado, y un tamaño de partícula entre 50 y 120 micras o entre 2500 y 5000 micras.	Durante el tratamiento, el contenido de humedad de los granos de café es mantenido entre 6% a 50% en peso (Pág. 3, líneas 1 y 2). Los granos de café tratados térmicamente fueron molidos en un Molino Freezer 6800 hasta un tamaño de partícula por debajo de 100 micrómetros (Pág. 7, líneas 14 y 15, Ejemplo 2).

De acuerdo con la tabla anterior, las características esenciales del producto de la reivindicación 17 habían sido divulgadas previamente en el documento D1, por lo tanto, la materia reivindicada no es nueva.

Nivel inventivo (Art 18 D486)

La reivindicación 2 consiste en: “El proceso según la Reivindicación 1...” (Pág. 23, Radicado N°. 14-098072-00000-0000):

Comparación de las características técnicas esenciales, con las del estado de la técnica:

R*	Características esenciales	D1
1	Un proceso para producir un extracto de café verde, que comprende el tratamiento granos de café mediante una operación que se selecciona de: a) deshidratación de granos de café a una temperatura entre 80°C y 120°C, hasta que los granos alcancen una humedad del 5% al 10%; o	Método para producir un extracto de café verde (Pág. 1, línea 5). Tratamiento térmico de granos de café verde a una temperatura entre 100°C y 180°C por al menos 5 minutos, manteniendo el nivel de humedad entre 6% y 50% del peso total de los granos de café (Pág. 2, líneas 1 a 4).
2	El proceso según la reivindicación 1 donde la deshidratación se realiza mediante aire caliente, gases inertes o mezclas de los mismos, sustratos deshidratadores, deshidratadores solares o liofilización.	No lo menciona.

El documento D1 se considera el estado de la técnica más cercano a la invención definida en la reivindicación 2 porque divulga un método para producir un extracto de café verde, en el que los granos de café verde han sido objeto de tratamiento térmico y extracción (Pág. 1, líneas 5 y 6).

La diferencia entre la invención, definida en la reivindicación 2 y el procedimiento divulgado en D1 consiste en que este último no menciona la forma de realización del tratamiento térmico.

No se evidencia un efecto técnico inesperado entre el método de la presente solicitud que incluye seleccionar que la deshidratación de los granos de café se realice mediante aire caliente, gases inertes o mezclas de los mismos, sustratos deshidratadores, deshidratadores solares o liofilización y el método divulgado en el documento D1 que menciona la realización de un tratamiento térmico a los granos de café sin indicar el tipo de operación realizada, dado que ambas invenciones solucionan el mismo problema técnico, que consiste en proporcionar un proceso para producir un extracto de café verde trabajando a bajas temperaturas.

Por lo tanto, el problema técnico objetivo que pretende resolver esta invención se puede formular así: “¿Cómo obtener un método para la obtención de un extracto de café verde, alternativo al revelado en el documento D1?

Sin embargo, la persona normalmente versada en la materia reconoce que las operaciones mencionadas corresponden a operaciones de secado de sólidos (Operaciones Unitarias en Ingeniería Química, McCabe, W.L. et al, 1991, McGraw Hill, Pág. 847 a 858), por lo que la selección de una de ellas carece de nivel inventivo. Cabe decir, que la solución al anterior problema técnico objetivo se encuentra dentro de un proceso de optimización, lo cual hace parte de la práctica habitual de la persona versada en la materia que trabaje en el campo de producción de extractos de café verde.

En consecuencia, la persona normalmente versada estaría en capacidad de realizar la deshidratación de los granos de café mediante aire caliente, gases inertes o mezclas de los mismos, sustratos deshidratadores, deshidratadores solares o liofilización como una alternativa a las reveladas en el documento D1 para llegar así al objeto de la

reivindicación 2 de la solicitud. Por lo cual se considera obvia.

De igual manera, las reivindicaciones dependientes 8, 11 y 12 no mencionan características técnicas tangibles adicionales que puedan brindarle nivel inventivo al objeto de la reivindicación 1, puesto que se encuentran redactadas en términos de resultados a alcanzar, efectos o ventajas.

6. Conclusión

Los requisitos de Patentabilidad de la presente solicitud están afectados así:

Ítem	Documento	Reivindicaciones afectadas	Requisito que afecta
D1	WO 2011 073052	1, 4 a 7, 9, 10, 13, 14 a 16	Novedad/Nivel Inventivo
		2	Nivel Inventivo
D2	Art. 1*	1 a 3	Nivel inventivo

En cumplimiento del artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le indica que debe dar respuesta dentro del término de sesenta (60) días contados a partir del día siguiente de la fecha de notificación de la presente comunicación. En caso de no dar respuesta al presente requerimiento, o si a pesar de la respuesta subsistieran los impedimentos para la concesión, se denegará la patente.

Si como respuesta a este requerimiento el solicitante llegara a modificar: i) el capítulo reivindicatorio, ii) la descripción de la invención a proteger, iii) o presente un nuevo capítulo reivindicatorio, no deberá pagar la tasa de modificación voluntaria pero sí la correspondiente a la tasa de examen de patentabilidad para que se estudie la materia modificada. En todo caso, el número de requerimientos por no patentabilidad estará supeditado a que el término del estudio de patentabilidad no sea superior a 18 meses, contados desde la publicación de la solicitud de patente de invención. Adicionalmente, se le recuerda al solicitante que si como respuesta a este requerimiento llegara a modificar el capítulo reivindicatorio y éste contenga más de diez (10) reivindicaciones deberá pagar la tasa por reivindicación adicional.

Se invita al solicitante se sirva indicar, si así lo considera, su renuncia al término faltante de sesenta (60) días para dar respuesta a este requerimiento y presentarla por escrito.

Notifíquese el presente oficio conforme a lo dispuesto en el numeral 5.2, literal e), del capítulo quinto del título primero de la Circular Única No. 10 de 2001.



JOSÉ LUIS SALAZAR LÓPEZ
Director de Nuevas Creaciones (c)

El anterior requerimiento fue notificado por fijación en lista, de fecha 2016-03-15

Elaboró: Monica Liliana Sarmiento Romero
Revisó: Alba Rocio Lemus Quiroga

Monica Sarmiento

Search history

Search 1: TAC=(extract green coffee) (Results 27)
Search 2: TAC=(green coffee) (Results 678)
Search 3: TAC=(chlorogenic acid) (Results 1699)
Search 4: TAC=(2 and 3) (Results 80)
Search 5: TAC=(coffee extract) (Results 1725)
Search 6: TAC=(2 and 3 and 5) (Results 24)
Search 7: TAC=(2 and 3 and 5) and CPC=(a23f) (Results 15)

Title: ENHANCED EXTRACTS OF FOOD AND BEVERAGE COMPONENTS

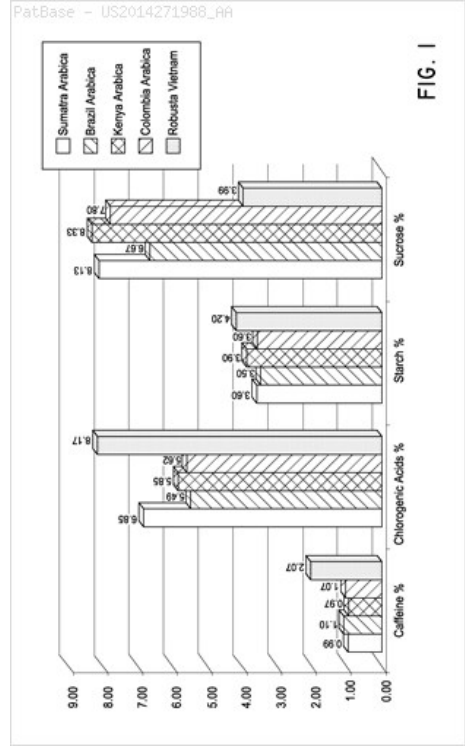
Abstract: Source: US2014271988A Generally described are extracts and beverages with enhanced nutrients, flavors and textures and methods of making the same. Some embodiments relate to extracts and beverages produced through filtration techniques.

Classifications:

International (IPC 8-9): A23F5/00 A23F5/02 A23F5/16 A23F5/18 A23F5/24 A23F5/26 A23F5/36 A23L1/015 A23L1/221 A23L1/28 A23L2/56 A23L2/710 (Advanced/Invention)

CPC: A23F5/24 A23F5/18 A23L1/015

US: 426/392 426/431 426/432 426/45 426/594



Family:

Publication number	Publication date	Application number	Application date
AU2014238140 AA	20140925	AU20140238140	20140227
CA2905329 AA	20150910	CA20142905329	20140227
CN105050415 A	20151111	CN201480014628	20140227
EP2986133 A1	20160224	EP20140767735	20140227
KR20150131078 A	20151124	KR20157026944	20140227
TW201442638 A	20141116	TW20140108950	20140313
US2014271988 AA	20140918	US20140213982	20140314
US2014272077 AA	20140918	US20140214122	20140314
WO14149512 A1	20140925	WO2014US19145	20140227

Priority:

US20130799208P 20130315 WO2014US19145 20140227 US20140214122 20140314
US20140213982 20140314

Probable Assignee: STARBUCKS CORP DBA STARBUCKS COFFEE CO

Assignee(s): (std): STARBUCKS CORP D B A STARBUCKS COFFEE CO ; STARBUCKS CORP DBA STARBUCKS COFFEE CO

Assignee(s): ROBINSON URANO A ; VU DIEN WAN ; DA CRUZ J MARCIO ; KUO JOSEPH ; STARBUCKS D B A STARBUCKS COFFEE CO CORP

Inventor(s): (std): DA CRUZ J MARCIO ; VU DIEN VAN ; ROBINSON URANO A ; KUO JOSEPH ; VU DIEN WAN

Inventor(s): DA CRUZ J

Agent(s): MINTER ELLISON; GOUDREAU GAGE DUBUC; GRUENECKER PATENT U RECHTSANWAELTE PARTG MBB; SWEENEY CHRISTOPHER T

Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BN BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IR IS IT JP KE KG KM KN KP KR KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PA PE PG PH PL PT QA RO RS RU RW SA SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

Title: PRODUCTS COMPRISING, AND USES OF, DECARBOXYLATED PHENOLIC ACIDS DERIVED FROM **CHLOROGENIC ACIDS** OF COFFEE

Abstract: Source: US2011046235A The present invention relates to uses of decarboxylated phenolic acid derived from **chlorogenic acid** of coffee as well as products comprising decarboxylated phenolic acid derived from **chlorogenic acid** of coffee, especially a **coffee extract**, and methods of producing such products. Coffee comprises **chlorogenic acids**, according to the invention these **chlorogenic acids** can be transformed into decarboxylated phenolic acids. The resulting decarboxylated phenolic acids have antioxidant and/or anti-inflammatory properties and can be used as ingredients in food and beverage products and to treat certain health conditions.

Classifications:

International (IPC 8-9): A23F5/00 A23F5/02 A23F5/24 A23L1/29 A23L1/30 A23L2/02 A23L2/38 A23L2/52 A61K31/05 A61K31/085 A61K31/09 A61K31/343 A61K36/00 A61K36/74 A61P17/00 A61P19/00 A61P19/08 A61P25/00 A61P25/20 A61P25/24 A61P25/28 A61P27/02 A61P29/00 A61P3/04 A61P3/10 A61P35/00 A61P39/06 A61P43/00 C07C39/19 C07C43/215 C07C43/23 C12P7/22 (Advanced/Invention); A23F5/00 A23F5/02 A61K36/185 A61K36/74 A61P17/00 A61P19/00 A61P25/00 (Core/Invention); A23F5/02 A23F5/24 A61K36/74 (Core/Non-invention)

International (IPC 1-7): A23F5/02

CPC: A23F5/02 A61K36/74 A23L1/29 A23L2/38

European: A23F5/02 A61K36/74

US: 426/2 426/2S 426/433 426/433S 426/442 426/442S 426/45 426/45S 426/594 426/594S 426/655 426/655S 514/720 514/733 514/733S 568/653 568/653S 568/654 568/654S 568/763 568/763S

PatBase - US2011046235_AA

Patent Application Publication Feb. 24, 2011 US 2011/0046235 A1

Figure 1

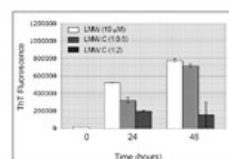
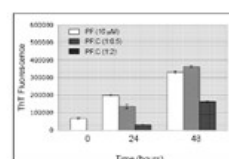


Figure 2



Family:

Publication number	Publication date	Application number	Application date
AR071425 AA	20100616	AR2009P101574	20090430
AU2009242334 AA	20091105	AU20090242334	20090312
AU2009242334 BB	20140501	AU20090242334	20090312
BRPI0910839 A2	20150728	BR2009PI10839	20090312
CA2723054 AA	20091105	CA20092723054	20090312
CN102014648 A	20110413	CN200980115501	20090312
CO6280591 A2	20110520	CO20100104197	20100824
EP2282642 A1	20110216	EP20090737933	20090312
EP2282642 B1	20130724	EP20090737933	20090312
ES2425691 T3	20131016	ES20090737933T	20090312
HR20130882 T1	20131025	HR20130000882	20130918
IN07605DN2010 A	20110909	IN2010DN07605	20101028
JP2011518570 T2	20110630	JP20110506627T	20090312
JP5504254 B2	20140528	JP20110506627T	20090312
KR20110008200 A	20110126	KR20107024428	20090312
MX2010011060 A1	20101122	MX20100011060	20101007
MX2010011060 A1	20101122	MX20100011060	20090312
PE01292010 A1	20100302	PE20090000581	20090429
PT2282642 T	20130827	PT20090737933T	20090312
RU2010148751 A	20120610	RU20100148751	20090312
TH126325 A	20130819	TH20091001878	20090428
TW200944132 A	20091101	TW20090109987	20090326
UA103765 C2	20131125	UA20100102995	20090312
US2011046235 AA	20110224	US20090990587	20090312
UY31797 A1	20091110	UY20090031797	20090430
WO09132889 A1	20091105	WO2009EP52939	20090312

Priority:

EP20080155434 20080430 WO2009EP52939 20090312 EP20090737933 20090312

Probable Assignee: NESTEC SA

Assignee(s): (std): BEL RHLID RACHID ; CAVIN CHRISTOPHE ; KRAEHNBUHL KARIN ; NESTEC SA ; PAGE NICOLAS ; RAAB THOMAS WOLFGANG ; NESTEC SA

Assignee(s): NESTEC S A

Inventor(s): (std): BEL PHLID RACHID ; BEL RHLID RACHID ; CAVIN CHRISTOPHE ; KRAEHNBUHL KARIN ; PAGE NICOLAS ; RAAB THOMAS ; RACHID BEL RHLID ; WOLFGANG RAAB THOMAS ; RAAB THOMAS WOLFGANG ; NICOLAS PAGE ; KARIN KRAEHNBUHL ; CHRISTOPHE CAVIN

Inventor(s): THOMAS WOLFGANG RAAB ; BEL-RHLID, RACHID ; BELRHLID RACHID

Agent(s): SHELSTON IP; SHELSTON IP PTY LTD; LOMHOLT STIG BREDSTED; ISERN JORGE; K AND L GATES LLP

Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BR BW BY BZ CA CF CG CH CI CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IS IT JP KE KG KM KN KP KR KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PG PH PL PT RO RS RU SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

Title: COFFEE EXTRACT

Abstract: Source: US2011045106A The present invention relates to a method of producing a coffee extract with antioxidant and anti-inflammatory properties and uses of the extract of the invention. The coffee extract comprises caffeic acid and/or ferulic acid and can be produced by hydrolysing chlorogenic acids present in coffee extract, e.g. with a microorganism or an enzyme. The coffee extract of the invention may e.g. be used as an ingredient of a food or beverage product.

Classifications:

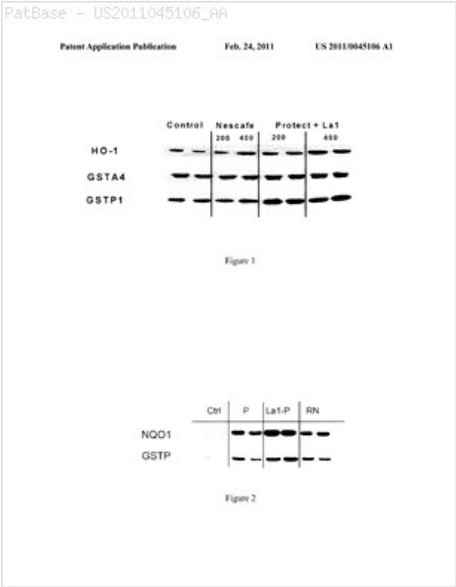
International (IPC 8-9): A23F5/00 A23F5/02 A23F5/24 A23F5/26 A61K31/192 A61K36/00 A61K36/18 A61K36/74 A61P17/00 A61P17/04 A61P19/08 A61P25/00 A61P29/00 A61P3/04 A61P3/10 A61P35/00 A61P37/08 A61P39/06 (Advanced/Invention); A23L1/30 (Advanced/Non-invention); A23F5/00 A23F5/24 A61K36/185 (Core/Invention); A23F5/02 A61K36/74 (Core/Non-invention)

International (IPC 1-7): A23F5/02 A23F5/24 A23F5/26

CPC: A23F5/02 A23F5/246 A23F5/26

European: A23F5/02 A23F5/24D A23F5/26

US: 424/725 424/725P 426/45 426/45S



Family:

Publication number	Publication date	Application number	Application date
AR071426 AA	20100616	AR2009P101575	20090430
AU2009242333 AA	20091105	AU20090242333	20090312
BRPI0911496 A2	20150728	BR2009PI11496	20090312
CA2723050 AA	20091105	CA20092723050	20090312
CN102014650 A	20110413	CN200980115504	20090312
CO6280593 A2	20110520	CO20100104196	20100824
EP2282643 A1	20110216	EP20090737932	20090312
JP2011520429 T2	20110721	JP20110506626T	20090312
KR20110004400 A	20110113	KR20107024128	20090312
MX2010011058 A1	20101101	MX20100011058	20101007
MX2010011058 A1	20101101	MX20100011058	20090312
PE01302010 A1	20100302	PE20090000582	20090429
RU2010148738 A	20120610	RU20100148738	20090312
TW200944131 A	20091101	TW20090109985	20090326
US2011045106 AA	20110224	US20090990593	20090312
UY31799 A1	20091110	UY20090031799	20090430
WO09132888 A1	20091105	WO2009EP52936	20090312

Priority:
EP20080155448 20080430 WO2009EP52936 20090312 EP20090737932 20090312

Probable Assignee: NESTEC SA

Assignee(s): (std): BEL RHLID RACHID ; CAVIN CHRISTOPHE ; KRAEHENBUEHL KARIN ; NESTEC SA ; PAGE NICOLAS ; RAAB THOMAS WOLFGANG ; NESTEK SA

Assignee(s): NESTEC S A

Inventor(s): (std): BEL RHLID RACHID ; CAVIN CHRISTOPHE ; CHRISTOPHE CAVIN ; KARIN KRAEHENBUEHL ; KRAEHENBUEHL KARIN ; NICOLAS PAGE ; PAGE NICOLAS ; RAAB THOMAS WOLFGANG ; RAABE THOMAS ; RACHID BEL RHLID ; WOLFGANG RAAB THOMAS

Inventor(s): THOMAS WOLFGANG RAAB ; BEL-RHLID, RACHID

Agent(s): SHELSTON IP; SHELSTON IP PTY LTD; LOMHOLT STIG BREDSTED; K AND L GATES LLP

Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BR BW BY BZ CA CF CG CH CI CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IS IT JP KE KG KM KN KP KR KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PG PH PL PT RO RS RU SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

Title: Coffee product with reduced malic acid content

Abstract: Source: US4976983A The invention relates to a coffee product which will evoke a decreased gastric acid response upon ingestion. The coffee product has been processed in such a manner that a majority of the malic acid has been removed from the coffee and, importantly, a majority of the **chlorogenic acid** has been retained.

Classifications:

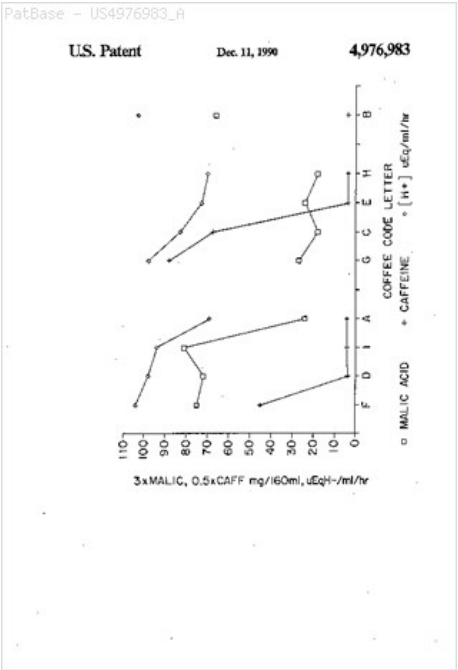
International (IPC 8-9): A23F5/10 A23F5/16 A23F5/18 (Advanced/Invention); A23F5/00 (Core/Invention)

International (IPC 1-7): A23C9/14 A23F5/00 A23F5/10 A23F5/16 A23F5/18 A23F5/20 A23L1/36 C12H1/04

CPC: A23F5/16 A23F5/163 A23F5/185

European: A23F5/16 A23F5/16D A23F5/18B

US: 426/271 426/432 426/44 426/45 426/490 426/594 426/595 426/629 426/655



Family:

Publication number	Publication date	Application number	Application date
AU199054805 A1	19901108	AU19900054805	19900507
CA2015273 AA	19901108	CA19902015273	19900425
CN1047193 A	19901128	CN19901004400	19900508
EP0397344 A2	19901114	EP19900304386	19900424
EP0397344 A3	19911106	EP19900304386	19900424
FI901961 A0	19900419	FI19900001961	19900419
JP3065140 A2	19910320	JP19900118518	19900508
NO902012 A	19901109	NO19900002012	19900507
NO902012 A0	19900507	NO19900002012	19900507
US4976983 A	19901211	US19890348627	19890508
US5132134 A	19920721	US19900625590	19901211
US5147666 A	19920915	US19910665124	19910306

Priority:

US19890348627 19890508 CA19902015273 19900425 US19900625514 19901211
US19910665124 19910306

Probable Assignee: GEN FOODS INC

Assignee(s): (std): KRAFT GENERAL FOODS INC ; KURAFUTO GENERAL FOODS INC ; GEN FOODS INC

Assignee(s): GENERAL FOODS CORP ; HIRSH KENNETH R ; SCHANBACHER LARRY M ; SHEN CHA ALICE

Inventor(s): (std): ARISU SHIEN CHIYA ; BERTKAU GEOFFREY H ; CHA ALICE S ; CHA ALICE SHEN ; DOONAN BARBARA B ; GHOSHI PARVIZ ; HAYES DENNIS F ; HIRSCH KENNETH R ; HIRSH KENNETH R ; KARMOL MARK H ; KENESU AARU HAIASHIYU ; NINI DAVID ; PARLIMENT THOMAS H ; RARII EMU SUCHIYANBAACHIYAA ; SABELLA FRANK ; SCHANBACHER LARRY M ; SHEN CHA ALICE ; SKIFF RONALD H ; KLEINER FREDRIC

Inventor(s): LARRY M SCHANBACHER ; ALICE SHEN CHA ; KENNETH R HIRSCH ; KENNETH R HIRSH

Agent(s): GRIFFITH HACK; MCFADDEN FINCHAM; OSLER HOSKIN AND HARCOURT LLP

Designated states: AT BE CH DE DK ES FR GB GR IT LI LU NL SE

Title: COFFEE AND PROCESS FOR THE PRODUCTION THEREOF

Abstract: Source: US5888549A Roasted coffee with an increased **chlorogenic acid** content of more than 2.8 percent by weight or instant coffee powder with an increased **chlorogenic acid** content of more than 8.5 percent by weight have a better compatibility. The increased **chlorogenic acid** content is achieved either by adding **chlorogenic acid** or by extracting raw coffee and adding the optionally concentrated extract to the roasted coffee.

Classifications:

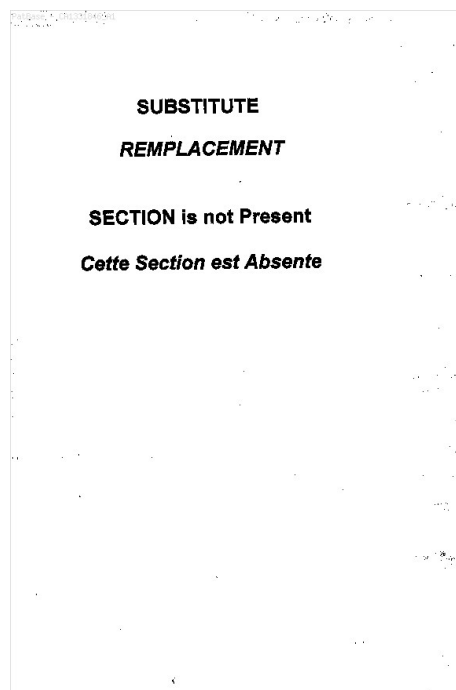
International (IPC 8-9): A23F5/00 A23F5/10 A23F5/14 A23F5/16 A23F5/20 A23F5/36 A23F5/40 (Advanced/Invention); A23F (Subclass/Invention)

International (IPC 1-7): A23F5/00 A23F5/10 A23F5/14 A23F5/20 A23F5/36 A23F5/40

CPC: A23F5/14 A23F5/16 A23F5/20 A23F5/40

European: A23F5/14 A23F5/16 A23F5/20 A23F5/40

US: 426/594 426/595



Family:

Publication number	Publication date	Application number	Application date
AT45662 E	19890915	AT19870901422T	19870203
AT60192 E	19910215	AT19870110393T	19870717
CA1331846 A1	19940906	CA19870547194	19870917
DE3760463 D1	19890928	DE19873760463	19870203
DE3767716 D1	19910228	DE19873767716	19870717
DK166559 B1	19930614	DK19870005239	19871006
DK523987 A	19871006	DK19870005239	19871006
DK523987 A0	19871006	DK19870005239	19871006
EP0256104 A1	19880224	EP19870901422	19870203
EP0256104 B1	19890823	EP19870901422	19870203
EP0299106 A1	19890118	EP19870110393	19870717
EP0299106 B1	19910123	EP19870110393	19870717
FI874360 A	19871005	FI19870004360	19871005
FI874360 A0	19871005	FI19870004360	19871005
FI93300 B	19941215	FI19870004360	19871005
FI93300 C	19950327	FI19870004360	19871005
JP63502319 T2	19880908	JP19870501384	19870203
NO169572 B	19920406	NO19870003962	19870922
NO169572 C	19920715	NO19870003962	19870922
NO873962 A	19870922	NO19870003962	19870922
NO873962 A0	19870922	NO19870003962	19870922
US5888549 A	19990330	US19930079353	19930621
WO8704598 A1	19870813	WO1987EP00051	19870203

Priority:

DE19863603575 19860206	DE19863603575 19860206	DE19873760463 19870203
EP19870901422 19870203	WO1987EP00051 19870203	CA19870547194 19870917
US19930079353 19930621	US19920827572 19920129	US19890123852 19890419

Probable Assignee: TCHIBO GMBH

Assignee(s): (std): CODE KAFFEE HANDELSGESELLSCHAFT ; CODE KAFFEE HANDEL

Assignee(s): CODE KAFFEE HANDELSGES MBH ; BALL MICHAEL ; BUCHHOLZ KLAUS ; CODE KAFFEE HANDELSGESELLSCHAFT MBH ; CODE KAFFEE HANDELSGESELLSCHAFT MBH 2000 HAMBURG D ; TCHIBO GMBH ; CODE KAFFEE HANDELSGESELLSCHAFT MBH 2000 HAMBURG DE ; LUTZ HENNING ; GOSSWEIN CLAUS F ; KOPSCH REINER ; HUBERT PETER

Inventor(s): (std): BUCHHOLZ KLAUS ; BUCHHOLZ KLAUS DR ; GOESSWEIN CLAUS ; GOESSWEIN CLAUS F ; GOESSWEIN CLAUS F DR ; GOSSWEIN CLAUS ; GOSSWEIN CLAUS F ; GOSSWEIN CLAUS F DR ; HENNING LUTZ ; HUBERT PETER ; KLAUS BUCHHOLZ ; KOPSCH REINER ; LUTZ HENNING ; LUTZ HENNING DR ; MICHAEL BALL ; PETER HUBERT ; REINER KOPSCH ; BALL MICHAEL ; BALL MICHAEL DR

Inventor(s): BUCHHOLZ DR ; BALL DR ; KOPSCH REINER D 2000 SCHENEFELD DE ; LUTZ DR ; HUBERT PETER D 2150 BUXTEHUDE DE ; GOESSWEIN DR

Agent(s): BERESKIN AND PARR LLP SENCRL SRL

Designated states: AT BE CH DE DK ES FI FR GB GR IT JP LI LU NL NO SE US

Title: MODIFIED COFFEE, METHOD OF ROASTING COFFEE BEAN, COFFEE-LIKE SUPPLEMENT AND AUXILIARY FOOD

Abstract: Source: US2008227832A A modified coffee containing 3 mg or more of a nicotinic acid compound and 10 mg or more of a Maillard reaction product per 10 g of roasted coffee beans. A coffee-like supplement containing at least one nicotinic acid compound, at least one Maillard reaction product, and/or at least one metabolite of the Maillard reaction product.

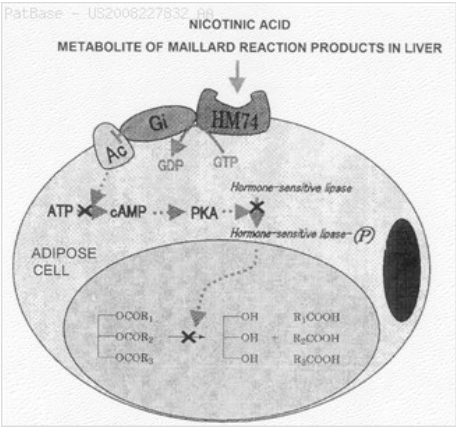
Classifications:

International (IPC 8-9): A23F5/04 A23F5/10 A23F5/18 A23F5/44 A23L1/30 A61K31/216 A61K31/401 A61K31/455 A61K31/4965 A61K36/00 A61K36/18 A61K45/00 A61P3/02 A61P3/06 A61P3/10 A61P39/00 A61P43/00 A61P9/10 (Advanced/Invention); A23F5/10 A23L1/30 A61K31/45 A61K31/455 A61K36/00 A61K36/18 A61P3/02 A61P3/06 A61P3/10 (Advanced/Non-invention); A23F5/00 A23L1/30 A61K31/21 A61K31/401 A61K31/455 A61K31/4965 A61K36/00 A61K36/18 A61K45/00 A61P3/00 A61P39/00 A61P43/00 A61P9/00 (Core/Invention); A23F5/00 A23L1/30 A61K31/45 A61K31/455 A61K36/00 A61K36/18 A61P3/00 (Core/Non-invention)

CPC: A23F5/04 A23F5/14 A23F5/20 A23L1/30 A23L1/302 A61K36/74

European: A23F5/04 A23F5/14 A23F5/20 A23L1/30 A23L1/302 A61K36/74

US: 426/595 426/648 514/356



Family:

Publication number	Publication date	Application number	Application date
CA2585592 AA	20070427	CA20052585592	20050928
CN101068472 A	20071107	CN200580041083	20050928
EP1808078 A1	20070718	EP20050790121	20050928
JP2006262890 A2	20061005	JP20050285649	20050929
JP2006296414 A2	20061102	JP20050285640	20050929
JP4771063 B2	20110914	JP20050285640	20050929
JP4771064 B2	20110914	JP20050285649	20050929
US2008227832 AA	20080918	US20050664218	20050928
WO06035998 A1	20060406	WO2005JP18394	20050928

Priority:

JP20040289202	20040930	JP20050046258	20050222	JP20050088882	20050325
WO2005JP18394	20050928	JP20050285649	20050929	JP20050285640	20050929

Probable Assignee: TAMA TLO KK

Assignee(s): (std): HARA TAKAFUMI ; KAGAMI KEISUKE ; OKA KITARO ; SUGIMOTO SAHO ; TAMA TLO CORP ; TAMA TLO KK ; TAMO TLO CORP

Inventor(s): (std): HARA TAKAFUMI ; HARA TAKASHI ; KAGAMI KEISUKE ; KITARO SUGIMOTO SAHO KAGAMI KE ; OKA KITARO ; SUGIMOTO SAHO

Inventor(s): SUGIMOTO SAHO KAGAMI KEISUKE HARA TAKAFUMI OKA

Agent(s): KIRBY EADES GALE BAKER; BIRCH STEWART KOLASCH AND BIRCH

Designated states: AE AG AL AM AT AU AZ BA BB BE BF BG BJ BR BW BY BZ CA CF CG CH CI CM CN CO CR CU CY CZ DE DK DM DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GW HR HU ID IE IL IN IS IT JP KE KG KM KP KR KZ LC LK LR LS LT LU LV LY MA MC MD MG MK ML MN MR MW MX MZ NA NE NG NI NL NO NZ OM PG PH PL PT RO RU SC SD SE SG SI SK SL SM SN SY SZ TD TG TJ TM TN TR TT TZ UA UG US UZ VC VN YU ZA ZM ZW

Title: COMPOSITIONS AND METHODS FOR TIMED RELEASE OF WATER-SOLUBLE NUTRITIONAL SUPPLEMENTS, **GREEN COFFEE EXTRACT**

Abstract: Source: US2005181044A The present invention relates to compositions of and methods for producing timed or retarded release formulations that contain **green coffee extract**, and optionally vinpocetine, L-camitine, of amylase inhibitor, niacin, Vitamin B3 (niacinamide), vitamin B6 (pyridoxine hydrochloride), vitamin B12 (cyanocobaolamin), vitamin B5 (pantothenic acid), inositol, phosphorus, iodine, and chromium and/or their dietary and nutraceutically acceptable salts of the same and/or hydrates of the active substance that provide a timed or retarded release formulation of the active substance.

Classifications:
International (IPC 8-9): A23F5/38 A23L1/30 A23L1/302 A23L1/305 A61K31/10 A61K31/7008 A61K31/715 A61K9/16 A61K9/20 A61K9/22 A61K9/26 A61K9/48 A61K9/64 A61K9/68 A61P19/00 A61P19/02 (Advanced/Invention); A23F5/24 A23L1/30 A23L1/302 A23L1/305 A61K31/095 A61K9/16 A61K9/20 A61K9/22 A61K9/26 A61K9/48 A61K9/52 A61K9/68 (Core/Invention)
International (IPC 1-7): A61K31/10 A61K9/20 A61K9/22 A61K9/26 A61K9/48 A61K9/64 A61K9/68
CPC: A61K9/1688 A23F5/385 A23L1/30 A23L1/3002 A23L1/302 A23L1/3051 A23V2002/00 A61K9/1652 A61K9/4866 A61K9/5026 A61K9/5036 A61K9/5078 A61K31/7008 A61K31/715 A61K9/5042 A61K9/5063 A23L1/0017
European: A23F5/38B A23L1/30 A23L1/302 A23L1/305A A23L1/30B A61K31/7008 A61K31/715 A61K9/16H6F A61K9/16P2 A61K9/48H6 A61K9/50K2 K23V2/00 K61K9/50H6B K61K9/50H6F
US: 424/456 424/456P 424/464 424/464P 424/468 424/468S 424/469 514/54 514/54S 514/62 514/62S 514/709

Family:

Publication number	Publication date	Application number	Application date
US2005181044 AA	20050818	US20040930560	20041209
US2005181047 AA	20050818	US20040782245	20040218
US2005181048 AA	20050818	US20040910787	20040803
US2011027357 AA	20110203	US20100900599	20101008
WO05079764 A1	20050901	WO2005US04890	20050216

Priority:
US20040782245 20040218 US20040910787 20040803 US20040930560 20041209
US20100900599 20101008

Probable Assignee: OSMOPHARM USA LLC
Assignee(s): (std): GILINSKI ISAAC ; OSMOPHARM USA ; ROMERO JAIME
Assignee(s): OSMOPHARM USA LLC
Inventor(s): (std): GILINSKI ISAAC ; ROMERO JAIME
Agent(s): NANCY JOHNSON NANCY LORD JOHNSON LTD; NANCY LORD JOHNSON LTD; ROBERT M SCHWARTZ PA
Designated states: AE AG AL AM AT AU AZ BA BB BE BF BG BJ BR BW BY BZ CA CF CG CH CI CM CN CO CR CU CY CZ DE DK DM DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GW HR HU ID IE IL IN IS IT JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MC MD MG MK ML MN MR MW MX MZ NA NE NI NL NO NZ OM PG PH PL PT RO RU SC SD SE SG SI SK SL SN SY SZ TD TG TJ TM TN TR TT TZ UA UG US UZ VC VN YU ZA ZM ZW

Title: DECAFFEINATION OF GREEN COFFEE

Abstract: Source: GB1488340A 1488340 Decaffeinating green coffee GENERAL FOODS CORP 16 June 1976 [24 June 1975] 25001/76 Heading A2B Green coffee is decaffeinated by contacting with a caffeine-deficient water extract of green coffee and removing caffeine from the resultant extract by contacting with particles of a non-ionogenic, cross-linked suspension polymer of ethylenically unsaturated molecules comprising 2-100 weight percent divinylbenzene, trivinylbenzene, alkyldivinylbenzene having 1-4 Me or Et groups in the nucleus, or alkyltrivinyl benzene having 1-3 Me or Et groups in the nucleus, and having a porosity of at least 10 percent and a surface area of at least 10 m²/g. The coffee and lean extract may be contacted in a semi-continuous manner with the lean extract passing through a series of columns containing coffee and first contacting the most extracted coffee. At the end of each cycle the most extracted coffee is discharged. The rich extract is then contacted with the polymer in batchwise or continuous manner and may then be recycled to treat further green coffee. Adsorbed solids may be eluted from the resin and non- caffeine solids may then be added to the decaffeinated beans or to the lean extract. Many suitable resin components are mentioned, the preferred resin is a divinylbenzene homopolymer or a styrene-divinyl benzene copolymer.

Classifications:
International (IPC 8-9): A23F5/16 A23F5/20 A23F5/22 (Advanced/Invention); A23F5/00 (Core/Invention)
International (IPC 1-7): A23F1/02 A23F1/10 C07D473/12
CPC: A23F5/208 A23F5/223
European: A23F5/20H A23F5/22B

Family:

Publication number	Publication date	Application number	Application date
CA1083880 A1	19800819	CA19760254770	19760614
GB1488340 A	19771012	GB19760025001	19760616

Priority:
US19750589817 19750624 CA19760254770 19760614

Probable Assignee: GEN FOODS CORP
Assignee(s): (std): GEN FOODS CORP
Assignee(s): GENERAL FOODS CORP ; HICKERNELL GARY L ; LEE CHI HANG ; ZANNO PAUL R
Inventor(s): (std): HICKERNELL GARY L ; LEE CHI HANG ; ZANNO PAUL R
Agent(s): MCFADDEN FINCHAM; OSLER HOSKIN AND HARCOURT LLP

Title: MINERAL ABSORPTION ENHANCER

Abstract: Source: US2004105908A Provided is a mineral absorption enhancing method comprising administering an effective amount of a **green coffee** bean extract. The present invention can relieve mineral deficiency by using a mineral absorption enhancer which is excellent in safety and has an excellent mineral absorption enhancing effect.

Classifications:

International (IPC 8-9): A21D2/36 A23F5/24 A23L1/30 A23L1/304 A23L2/38 A61K31/05 A61K31/192 A61K33/06 A61K33/26 A61K33/30 A61K35/78 A61K36/18 A61K36/73 A61K36/74 A61K47/46 A61P3/12 A61P3/14 (Advanced/Invention); A21D2/00 A23F5/24 A23L1/30 A23L1/304 A23L2/38 A61K31/04 A61K33/06 A61K33/26 A61K33/30 A61K36/00 A61K36/18 A61K36/185 A61K47/46 A61P3/00 (Core/Invention)

International (IPC 1-7): A21D2/36 A23F5/24 A23L1/30 A23L1/304 A61K31/05 A61K33/06 A61K33/26 A61K33/30 A61K35/78 A61K47/46 A61P3/12 A61P3/14

CPC: A23L2/38 A21D2/36 A23F5/243 A23L1/3002 A61K36/73 A23V2002/00

European: A21D2/36 A23F5/24B A23L1/30B A23L2/38 A61K35/78 A61K36/73 K23V2/00

US: 424/725 424/776 424/776P

Family:

Publication number	Publication date	Application number	Application date
DE60308297 D1	20061026	DE20036008297	20031120
DE60308297 T2	20070405	DE20036008297T	20031120
EP1424076 A1	20040602	EP20030026697	20031120
EP1424076 B1	20060913	EP20030026697	20031120
JP2004175701 A2	20040624	JP20020342134	20021126
JP4812222 B2	20111109	JP20020342134	20021126
US2004105908 AA	20040603	US20030718716	20031124
US7033623 BB	20060425	US20030718716	20031124

Priority:

JP20020342134 20021126

Probable Assignee: KAO CORP

Assignee(s): (std): KAO CORP

Inventor(s): (std): OCHIAI RYUJI ; OCHIAI TATSUSHI ; SUZUKI ATSUSHI ; TOKIMITSU ICHIRO

Agent(s): OBLON SPIVAK MCCLELLAND MAIER AND NEUSTADT PC

Designated states: DE FR GB

Title: Process for decreasing the chlorogenic acid content of green coffee.

Abstract: In a process for reducing the chlorogenic acid content of green coffee, water-soluble, acid-type substances are extracted from the green coffee beans by means of an aqueous liquid and removed from the extract. The chlorogenic acids in the extract are exchanged for a volatile carboxylic acid by means of an anion exchanger resin in the form of a volatile carboxylic acid anion which is loaded, by means of adsorption, with at least one non-acid-type coffee extract substance.

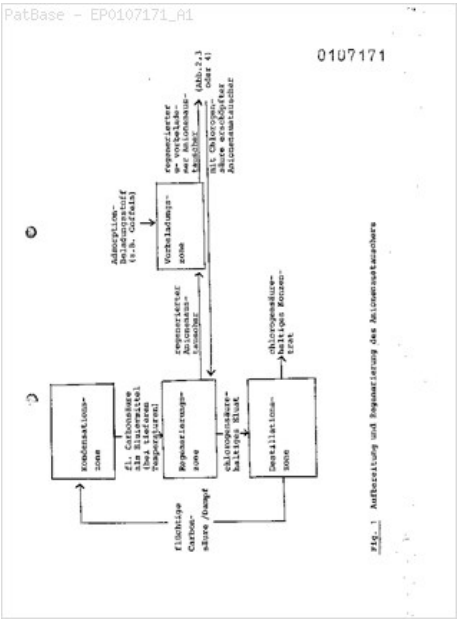
Classifications:

International (IPC 8-9): A23F5/16 A23F5/18 B01J41/04 (Advanced/Invention); A23F5/00 B01J41/00 (Core/Invention)

International (IPC 1-7): A23F5/16 A23F5/18 B01J41/04

CPC: A23F5/16 A23F5/185

European: A23F5/16 A23F5/18B



Family:

Publication number	Publication date	Application number	Application date
DE3239219 A1	19840426	DE19823239219	19821022
DK484283 A	19840423	DK19830004842	19831021
DK484283 A0	19831021	DK19830004842	19831021
EP0107171 A1	19840502	EP19830110389	19831019
ES526657 A1	19840701	ES19830526657	19831021
ES8405595 A1	19841001	ES19830526657	19831021
FI833866 A	19840423	FI19830003866	19831021
FI833866 A0	19831021	FI19830003866	19831021
JP59135840 A2	19840804	JP19830196242	19831021
NO833845 A	19840424	NO19830003845	19831021

Priority:

DE19823239219 19821022

Probable Assignee: COFFEX AG

Assignee(s): (std): COFFEX AG

Assignee(s): KOFUETSUKUSU AG

Inventor(s): (std): PEETA KUMUMA ; KUMMER PETER ; ION KONSUTAITEIN SHIUREA ; CIUREA ION CONSTANTIN DR ; CIUREA ION CONSTANTIN ; CIUREA ION CONTANTIN

Inventor(s): ION CONSTANTIN CIUREA ; PETER KUMMER ; DR CIUREA ION CONSTANTIN

Designated states: AT BE CH DE FR GB IT LI LU NL SE

Sven Knopp · Gerhard Bytof · Dirk Selmar

Influence of processing on the content of sugars in green Arabica coffee beans

Received: 25 July 2005 / Revised: 30 September 2005 / Accepted: 5 October 2005 / Published online: 29 December 2005
© Springer-Verlag 2005

Abstract Quantitative analyses of low molecular sugars in green coffees (*Coffea arabica* L. var. Acaia) that were processed in parallel either by the traditional wet or the traditional dry method, revealed a close correlation between the kind of post-harvest treatment and the contents of fructose and glucose. While in *washed* coffee beans (wet processing) only low amounts of these both hexoses were present, those in *unwashed* coffees (dry processing) were significantly higher. Model-processing experiments in the laboratory confirmed these findings. Moreover, a comparison with the untreated controls revealed that the low levels of both sugars are the consequence of a decrease in the case of wet processing, whereas they remained unchanged or even increased in the case of dry processing. Further minor sugars are also affected by post-harvest treatment. The amounts of galactose, arabinose and mannose show a similar arrangement as those for glucose and fructose, although their overall concentration is about 100-fold lower. Sucrose, the major low molecular sugar in green coffee beans, is not significantly affected by coffee processing. The influence of an active seed metabolism on the observed alterations of the sugars concentrations is discussed.

Keywords *Coffea arabica* · Glucose · Fructose · Sucrose · Green coffee · Post-harvest treatment · Coffee processing

Introduction

The world coffee market distinguishes between “washed” and “unwashed” Arabicas (*Coffea arabica* L.) depending on the processing method applied to convert the freshly harvested coffee cherries into green coffee. It is well accepted that green coffees resulting from the wet method—the so-called washed Arabicas—yield roasted beans and coffee

beverages, respectively, that are characteristically different from those produced with the dry method (i.e. unwashed Arabicas) [1, 2]. There is no doubt, that these flavour differences in part have to be attributed to differences in the thoroughness applied during either method of post-harvest treatment and the fact that only fully ripe coffee cherries are used for wet processing, whereas fruits of all stages of ripeness are utilized for dry processing [3, 4]. However, according to our previous results [5] these aspects appear to play a minor role in this context, as the typical differences in cup quality between washed and unwashed Arabicas also occurred when identical and thoroughly sorted starting material was used for either method of coffee processing. In a recent study [6] we have demonstrated for the first time that during post-harvest treatment, various metabolic processes occur inside the coffee seeds which significantly alter the chemical composition of the green beans. This metabolism becomes evident by the conversion of glutamic acid into γ -aminobutyric acid mediated by an enzymatic α -decarboxylation. The reaction is related to a physiological drought stress situation and is specific to the mode of processing applied [6].

Suchlike alterations in the pool of free amino acids—components which are considered as essential precursors of flavour and colour of the coffee brew [7]—may be suitable to explain some of the sensorial differences between washed and unwashed Arabicas. However, it seems most unlikely that changes in the spectra of amino acids are the only metabolic response of the viable coffee seed to the imposed post-harvest treatment. There are some early reports on the loss of sugars in the coffee beans during the fermentation step of wet processing [8]. Just recently, we presented evidence for an active germination-related metabolism in the seeds; this metabolism is induced during the post-harvest processing of the coffee fruits and beans, respectively [9, 10]. During seed germination soluble carbohydrates are among the first components which are affected by a resumption of an active metabolism. Next to the free amino acids, the soluble carbohydrates are considered as most prominent precursors of numerous volatile and non-volatile components of roast coffee flavour and

S. Knopp · G. Bytof · D. Selmar (✉)
Institute of Plant Biology, Technical University Braunschweig,
Germany
e-mail: d.selmar@tu-bs.de
Tel.: 49-(0)-531-391-5881
Fax: 49-(0)-531-391-8180

colour [11–13]. Earlier analyses of the concentrations of the soluble sugars in commercial green Arabica samples revealed significant variations; e.g. the values for sucrose ranging from 5 to 8.5%, and those for glucose from less than 0.01–0.45% [11, 14]. Two previous works dealing with the influence of the mode of post-harvest treatment on the sugar content of the green coffee beans rendered results contradictory to each other [15, 16]. Consequently, it is still quite unclear, if all these variations are already inherent to the seeds, or whether they are also a consequence of the post-harvest treatment. We therefore analyzed changes in the contents of low molecular carbohydrates in Arabica coffee beans submitted to the dry and wet way of processing.

Material and methods

Commercial samples

A variety of green Arabica coffees was kindly provided by the Tchibo Röstfrisch GmbH.

Batch processing

The field experiments were carried out in June and July 2002. In Brazil, fruits of *C. arabica* var. Acaiá were processed at the facilities of Ipanema Agricola, Alfenas, Minas Gerais, Brazil. For the experiments, only fully ripe and sound coffee fruits were used. This was ensured by thorough manual sorting of single batches of freshly harvested coffee cherries. The experiments were undertaken in parallel (wet, dry and semi-dry processing) and in three repetitions (semi-dry process only in two repetitions).

Wet processing

The coffee fruits were mechanically pulped using a Pinhalense drum pulper, and submitted to 22 h of underwater tank fermentation. Subsequently, the washed parchment coffee beans were dried on a separate plot of the sun terrace of the Ipanema factory Conquista. After 6 days, the final water content of 12% (wet basis) was achieved.

Dry processing

The coffee cherries from the same batch used for the wet processing (see earlier) were dried as whole fruits on a separate plot of the sun terrace. The final water content of 12% was achieved after 16 days of drying.

Semi-dry processing

Like for the wet processing, the coffee fruits were mechanically pulped using a Pinhalense drum pulper. However, for the production of semi-washed Arabica, the tank fermenta-

tion was omitted and the wet and mucilaginous parchment coffee beans were immediately dried on a separate plot of the sun terrace. After 6 days, the final water content of 12% (wet basis) was achieved.

Shipping of the experimental coffee samples

Within 4 weeks after field processing, the dry coffee samples were sent to Germany, where the parchment coffees were manually husked. The samples were subsequently frozen in liquid nitrogen and the samples were then stored at -70°C prior to the analysis.

Model processing in the laboratory

The fresh fruits of *C. arabica* were harvested on coffee plantations in Tanzania and Mexico, respectively, and directly transferred to Germany by cargo express flights. To prevent the fruits from perishing during transport, some plastic bags with ordinary ice cubes were added. The cultivars used were *C. arabica* var. KP 345 (Tanzania) and *Caturra* (Mexico). Thorough manual sorting ensured that only fully ripe and sound coffee cherries were used. The time span between harvest and model processing was less than 36 h. The germination rate was in all cases over 95% and thus not affected by shipment.

Wet model processing

The fruits were manually pulped. The mucilaginous parchment beans were then transferred into 5-l Erlenmeyer-flasks and an excess of fresh water was added. The coffee was fermented at RT for 36 h. The water was exchanged three times. The resulting parchment coffee was dried in a laboratory oven at $35\text{--}40^{\circ}\text{C}$ until the final water content of 12% (wet basis) was achieved. The beans were manually hulled and stored at -70°C prior to analysis.

Dry model processing

Mature coffee cherries were dried in an oven at $35\text{--}40^{\circ}\text{C}$ until a water content of 12% (wet basis) was achieved. The beans were manually husked and stored at -70°C prior to analysis.

Extraction and determination of low molecular sugars

To exclude variability due to individual variations, 60 sound and faultless beans were weighed and pooled as one sample, frozen with liquid nitrogen and ground to a fine powder using a Retsch MM 200 ball mill. The powder was then lyophilized and 50 mg aliquots were transferred to a centrifuge tube and mixed with 5 ml of hot ethanol ($80\% \text{ v/v}$, 80°C) plus $100 \mu\text{l}$ aqueous melezitose-solution (7 mmol/l ,

as internal standard). The mixture was extracted in an ultra sonic bath (80 °C, 10 min) and centrifuged (4000 rpm, 5 min). The pellet was washed twice at room temperature with ethanol (60% v/v). The supernatants were combined and evaporated to dryness. The remaining solutes were then resolved in 10 ml water (ELGA Maxima, >18 MΩ cm) using ultra-sonication (10 min, RT). In order to bind the phenolic substances, a small quantity of polyvinylpolypyrrolidone (PVPP) was added prior to ultra-sonication. After adjusting the total volume to 50 ml, an aliquot was centrifuged in order to remove the PVPP (4000 rpm, 5 min) and the supernatant was further purified on a Sep-Pak C18-cartridge (Waters). The clear eluate was then directly transferred to the HPAEC-PAD for the determination of the minor low molecular sugars, or was diluted four times for the determination of sucrose, respectively.

For separation and determination of the sugars a DIONEX® BIO-LC HPAEC-PAD with a DIONEX® PA20 column was used. Separation was performed by applying following concentration changes of NaOH (step and linear gradients): 17→12.5 mmol/l in 9.5 min; 12.5→28 mmol/l as step; 28 mmol/l for 8 min; 28→108 mmol/l as step; 108 mmol/l for 11.5 min). Flow was 0.5 ml/min. The column temperature was 30 °C. Detection was carried out using a DIONEX®-ED50 electrochemical detector with gold electrode. For calculation, the Chromeleon software (version 6.4) was used.

Results and discussion

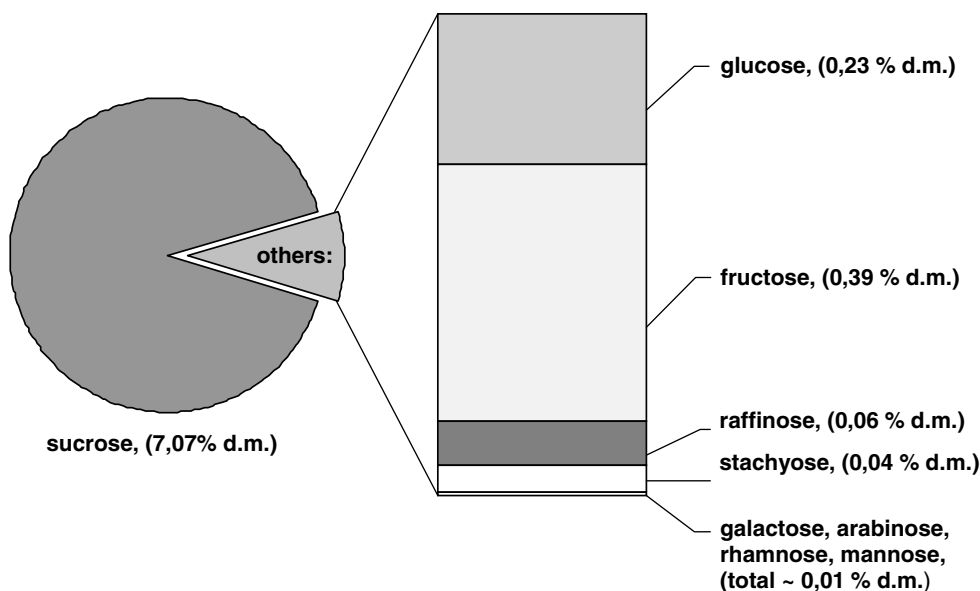
The amounts of the different low molecular carbohydrates present in green coffee differ strongly. A typical pattern is exemplified in Fig. 1, where the corresponding contents

and distribution of the sugars present in an unwashed Arabica from Brazil are mentioned. Sucrose, which in general corresponds to about 7–8% DM, accounts for more than 90% of total low molecular carbohydrates. Compared to sucrose, the monosaccharides fructose and glucose occur in levels that are about 20 times lower. The contents of the oligosaccharides stachyose and raffinose are approximately 100 times lower than the sucrose content. Finally, the monosaccharides galactose, arabinose, rhamnose, and mannose are detectable only in very low amounts.

The comparison of the different low molecular sugars in experimentally processed green coffees from Brazil revealed that some sugars (e.g. sucrose, stachyose, raffinose, and rhamnose) are not significantly affected by the way of processing applied (Fig. 2). In contrast, the contents of the two hexoses fructose and glucose appeared to be strongly influenced by post-harvest treatment. While unwashed Arabicas (green coffees prepared through dry processing) exhibited relatively high contents of fructose and glucose, the washed Arabicas (processed in parallel by the wet method) contained explicitly lower amounts of these sugars. Semi-washed green coffees, i.e. green coffees prepared in the semi-dry process, a technique that is considered to produce qualities lying intermediately between washed and unwashed coffees [2], contained also intermediate concentrations of glucose and fructose. The same pattern of differences was also observed for arabinose and mannose. Indeed, the concentrations of these two sugars are about 100-fold lower than those of glucose and fructose, respectively. However, their amounts in dry-processed coffees are significantly higher than in wet-processed ones. As already shown for glucose and fructose, also in the case of arabinose and mannose, the related amounts in semi-washed coffees lie in between wet- and dry-processed coffees.

Fig. 1 Survey on the low molecular sugars in a green coffee. The circle represents the overall content of the low molecular sugars, totalling 7.79% DM

Coffea arabica, var. Acaià, dry process, Brazil



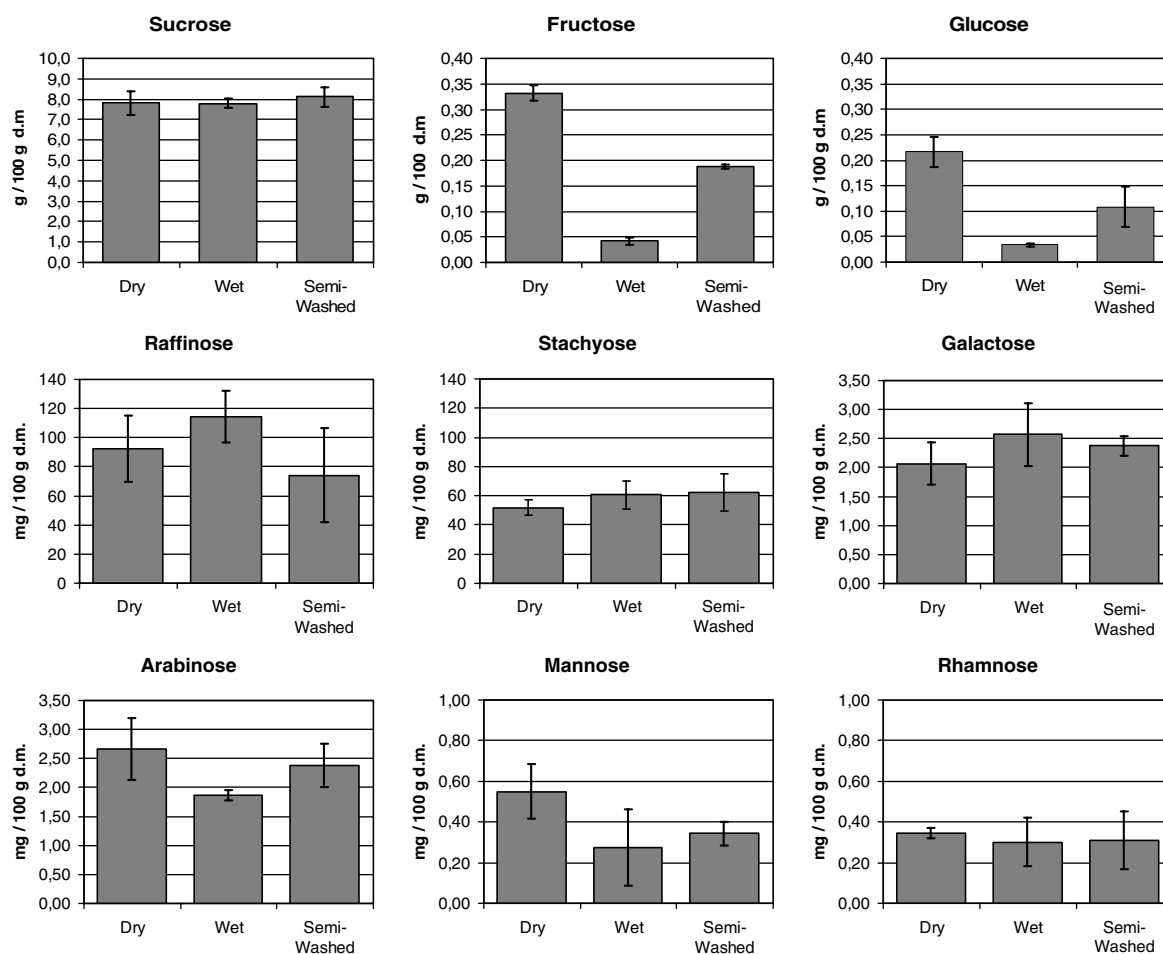
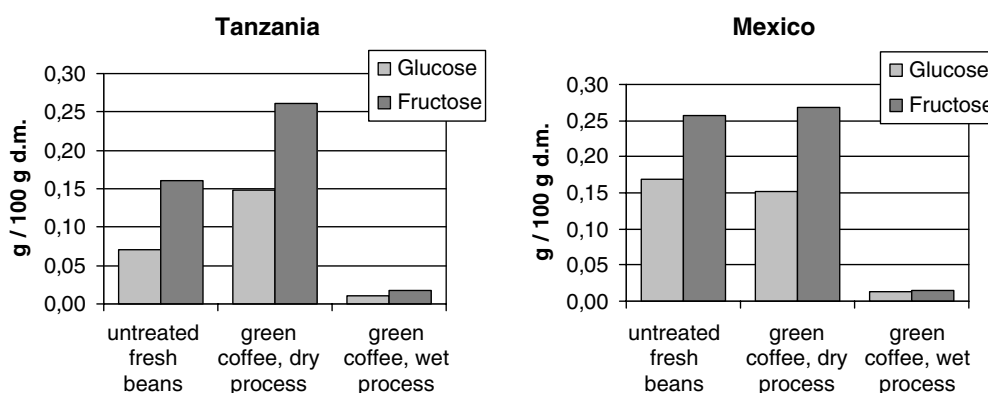


Fig. 2 Concentration of low molecular sugars in differentially processed green coffees. Due to the different magnitudes in contents, concentrations are presented in different scales

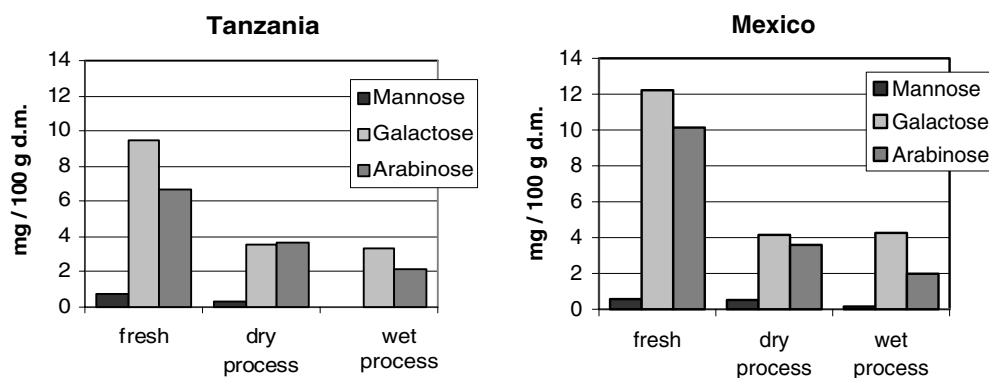
Fig. 3 Glucose and fructose concentration in fresh and differentially processed green coffees



These data so far do not allow any deduction whether the differences were a consequence of a concentration decrease in wet-processed coffee or of a rise in dry-process coffee seeds; even both possibilities could apply. Thus, a comparison with the fresh and untreated coffee sample material was required. Consequently, we prepared corresponding model processings. In two independent experiments with fresh Arabica coffee from Mexico and from Tanzania, this matter was investigated (Fig. 3).

The results from the model-processing experiments concerning the correlation between the contents of fructose, glucose, arabinose, and mannose and post-harvest treatment were fully confirmed. Moreover, it turned out again that sucrose and the other low molecular sugars were not affected by the mode of processing (data not shown). The comparison of the sugar concentrations in the model-processed green coffee beans with those in the starting material (i.e. the fresh and untreated beans) revealed that

Fig. 4 Mannose, galactose, and arabinose concentration in fresh and differentially processed green coffees



the glucose and fructose concentrations in the dry-process beans are as high as those in the untreated control, or even higher. Obviously, there is no net consumption. In contrast, the original high contents of glucose and fructose decrease during wet processing. The terminal content accounts just for 10–20% of the amount originally present in fresh seeds. Also the contents of arabinose, galactose and mannose decline during the course of post-harvest treatment (Fig. 4). Whereas the contents of mannose and arabinose decrease much stronger during wet processing than during dry processing, the galactose content declines in both treatments to the same degree, resulting in a similar galactose concentration in wet- and dry-processed beans. Again, it should be noted that the overall concentration of arabinose, galactose and mannose are about 100-fold lower than the corresponding concentration of glucose and fructose, respectively.

A decrease in sugars could principally be the consequence of a passive leaching of the low molecular substances into the environment, like it was already proposed earlier by Wootton (1973) [8]. However, while the leaching of low molecular substances upon imbibition and rehydration of dry seeds is quite a common phenomenon [17], this is rather unlikely for a still fully hydrated seed as it is represented by a coffee bean, which has just been submitted to post-harvest treatment.

Taking into account that in the recent time the coffee seed's capability for metabolic response during post-harvest treatment was repeatedly demonstrated [6, 9] it seems more likely that the decrease of the fructose and glucose contents originates from an active metabolism taking place in the coffee seeds. During the fermentation step of wet processing the oxygen concentration in the tank declines rapidly due to microbial action [18]. It is well known that under anoxic conditions, plant tissues are able to switch from respiration to alcoholic or lactic fermentation [19–21]. In contrast to the wet process, dry-processed coffee remains in a well-aerated environment throughout the treatment, in which a respiratory metabolism can be maintained until the reduction of the water content leads to a virtual shut-down of metabolic activity. As compared to respiration, fermentation processes consume exceedingly more molecules of hexoses for the generation of the same number of ATP-molecules. We therefore conclude that the decrease in glucose and fructose in wet-processed coffee beans is a consequence of a fermentation-enhanced glu-

cose turnover due to anaerobic fermentation in the coffee endosperm.

In coffee beans, also the minor sugars galactose and mannose are of special interest, because these sugars were expected to be produced when the storage carbohydrate, a galactomannan, is degraded [13]. However, mannose and galactose are present only in traces [13]. Moreover, in this study we show that the low concentrations of this two sugars even decrease during the course of processing. In plant metabolism, glucose takes part in dynamic interconversions with other sugars. In the case of mannose, a conversion into other sugars is a highly necessary step, as increased mannose levels are toxic to the cells [22, 23].

With respect to the major sugars, both, the results of the field experiments in Brazil and those of the model-processing experiments in our laboratory are in contradiction to the findings of Guyot et al. [15] referring to processing experiments with Robusta coffee. The opposite way around, these authors correlated the dry-processing method with a lower content of fructose, and wet treatment with higher fructose content. Moreover, they claimed to have found a correlation between the content of sucrose and the mode of treatment. However, already Bucheli et al. [16] disagreed with those results, after not being able to detect any influence of the post-harvest treatment on the sucrose contents, neither for Arabica nor for Robusta coffee. About the reasons for the contradictory results of Guyot et al. [15] it can only be speculated since the method used for the sugar quantification was not explicitly described. With regard to sucrose, Mazzafera et al. [24] demonstrated that maturation and presence of pathogens are important factors of influence for the sugar content in green coffee beans. Furthermore, it was demonstrated just lately, that the conditions during growth and development of the fruit, like altitude and slope exposure, have a strong impact on the sucrose contents of the beans [25]. Altogether, it appears that the sucrose concentration—in contrast to that of glucose and fructose—is determined rather by pre-harvest than by post-harvest factors.

In a previous work, we demonstrated that the mode of processing used for the production of a certain lot of commercial green coffee is causatively linked with the metabolism of the two amino acids γ -aminobutyric acid and glutamic acid in these samples [6]. We therefore suggested using the ratio of the contents of these two amino acids as a tool to

Table 1 Concentration of the major sugars in commercial green coffee samples

Species/process	Sample/province	Sugar content (% DM)		
		Sucrose	Fructose	Glucose
Arabica/dry	Ethiopia 1	8.255	0.165	0.044
	Brasil 1	9.252	0.140	0.043
	Brazil 2	8.703	0.154	0.042
	Ethiopia 2	6.301	0.008	0.005
	Brazil 3	7.605	0.015	0.006
	Mexico	9.643	0.052	0.032
	Honduras	6.923	0.050	0.028
Arabica/wet	Kenya	9.308	0.058	0.028
	Peru	8.209	0.050	0.022
	Salvador	9.890	0.047	0.021
	Cameroon	5.870	0.036	0.013
	Guatemala	8.514	0.085	0.045
	Columbia 1	8.763	0.059	0.042
	Columbia 2	8.069	0.009	0.005
	Colombia 3	7.155	0.195	0.005
	Indonesia	4.846	0.183	0.057
Robusta/dry	Ivory Coast	3.267	0.182	0.027
	Uganda	4.554	0.108	0.030
	Vietnam	3.149	0.157	0.096

chemically identify whether the coffee was produced with the dry or the wet method. In this paper we showed that also the contents of the two hexoses glucose and fructose are related to the mode of processing applied. Consequently they might serve also as a suitable tool for the chemical identification of the processing method.

In order to verify this assumption, we analysed an assortment of commercial green coffees of different proveniences (15 Arabica coffees and four Robusta coffees). For all samples, the information on the type of processing method applied was available. In Table 1, the levels of the major sugars are presented. The data confirmed the high variability of the sucrose levels in green Arabica coffees. Again, the sucrose contents appeared to be independent from both, provenience and type of processing. Remarkably, an analogous situation was found for glucose, too. The fructose values however, were found to expose the strong tendency of being relatively high in unwashed Arabicas (dry process) and—with the single exception of a sample from Colombia—relatively low in washed Arabicas (wet process). Also the Robusta coffees revealed relatively high levels of fructose, just as the unwashed Arabicas. However, since exclusively unwashed Robusta coffee was part of the assortment a relation to the way of processing must remain speculative. These data show that—due to the high variations in the sugar contents—the glucose and fructose concentrations indeed might indicate the history of post-harvest treatment. However, this feature alone does not represent a reliable tool for the exact differentiation of the processing method.

The data mentioned in this work underline that the mode of processing significantly influences the chemical composition of green coffees. Apart from the amino acids,

also the soluble carbohydrates are strongly affected by the metabolic processes occurring during the course of wet or dry processing, respectively. It is most likely that these metabolic alterations are the basis for the well known sensorial differences between wet and dry-processed coffees. However, due to the high complexity of this topic, a solid proof for a direct interrelation is still missing. Nevertheless, the data presented in this work are an important basis for the understanding of this complex topic. Analyses of the flavour profiles of corresponding samples should help to further elucidate the coherences between post-harvest treatment and coffee quality.

Acknowledgements This research project was supported by the FEI (Forschungskreis der Ernährungsindustrie e.V., Bonn), the AiF and the Ministry of Economics and Labour. AiF-Projects No.: 13234 and No.: 13588. The authors thank the Ipanema Agricola (Brazil), Kraft Foods, and the Tchibo GmbH for financial and logistic support.

References

- Streuli H (1974) Der heutige Stand der Kaffeechemie. In: Proceedings of the "6^{ème} Colloque International sur la Chimie des Cafés Verts" ASIC Paris, pp 61–72
- Illy A, Viani R (1995) Espresso coffee: the chemistry of quality. Academic Press, London San Diego
- Maier HG (1981) Kaffee. Paul Parey Verlag, Berlin Hamburg
- Sivetz M, Desrosier NW (1979) In: Sivetz M, Desrosier NW (eds) Coffee technology. Avi Publishing, Westport, CN, pp 74–116
- Selmar D, Bytof G, Knopp SE (2002) New aspects of coffee processing: the relation between seed germination and coffee quality. In: Proceedings of the "19^{ème} Colloque Scientifique International sur le Café": ASIC Paris
- Bytof G, Knopp SE, Schieberle P, Teutsch I, Selmar D (2005) Eur Food Res Technol 220:245–250
- Homma S (2001) In: Clarke RJ, Vitzthum OG (eds) Coffee—recent developments. Blackwell, Oxford, pp 50–67
- Wootton AE (1974) The dry matter loss from parchment coffee during field processing. In: Proceedings of the "16^{ème} Colloque International sur la Chimie des Cafés Verts" ASIC Paris, pp 316–324.
- Selmar D, Bytof G, Knopp SE, Bradbury A, Wilkens J, Becker R (2005) Biochemical insights into coffee processing: Quality and nature of green coffees are interconnected with an active seed metabolism. In: Proceedings of the 20^{ème} Colloque Scientifique International sur le Café": ASIC, Paris
- Selmar D, Hunecke D, Junghärtchen I, Breitenstein B, Bytof G, Knopp SE (2005) Expression of isocitrate lyase and the abundance of β -tubulin: feasible markers for the estimation of germination processes in differently processed green coffees In: Proceedings of the 20^{ème} Colloque Scientifique International sur le Café": ASIC, Paris
- Lüllmann C, Silwar R (1989) Lebensmittel Gericht Chem 43:42–43
- Tressl R, Wondrak GT, Garbe LA, Rewicki D, Krüger RP (1998) J Agric Food Chem 46:1765–1776
- Bradbury AGW (2001) In: Clarke RJ, Vitzthum OG (eds) Coffee. Recent developments. Blackwell, Oxford, pp 1–17
- Silwar R, Lüllmann C (1988) Café Cacao Thé 32:319–322
- Guyot B, Guelle D, Assemat S, Tchana E, Pomathios L (1995) Influence du mode de préparation du café vert robusta sur sa composition chimique et ses qualités organoleptiques. In: Proceedings of the "16^{ème} Colloque Scientifique International sur le Café". ASIC Paris, pp 267–277

16. Bucheli P, Meyer I, Pasquier M, Locher R (1996) Plant Physiology Biochem Special Issue: 10th FESPP Congress Florence Italy, L-12 pp 325
17. Bewley JD, Black M (1994) Seeds. Physiology of development and germination. Plenum, New York London
18. Menchú JF, Rolz C (1973) *Café Cacao Thé* 17:53–61
19. Roberts JKM, Callis J, Wemmer D, Walbot V, Jaretsky O (1984) *Proc Nat Acad Sci USA* 81:3379–3383
20. Menegus F, Cattaruzza L, Chersi A, Fronza G (1989) *Plant Physiol* 90:29–32
21. Summers JE, Ratcliffe RG, Jackson MB (2000) *J Exp Bot* 51:1413–1422
22. Stenlid G (1954) *Physiol Plant* 7:173–181
23. Stein JC, Hansen G (1999) *Plant Physiology* 121:71–79
24. Mazzafera P (1999) Chemical composition of defective coffee beans. *Food Chem* 64:547–554
25. Avelino J, Barboza B, Araya JC, Fonseca C, Davrieux F, Guyot B, Cilas C (2005) *J Sci Food Agric* 8:1869–1876