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UNION EUROPÉENNE
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ESSICA

PROJET Alcotra n° 1733 ESSICA

WP3.1.2 Analyse bibliographique des principales techniques de séchage et de débactérisation utilisées dans les 2 zones et innovantes

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Le Terre dei Savoia

DISAFA
Università degli studi di Torino

FranceAgriMer

CRIEPPAM

PRI0517214_1

ETUDE BIBLIOGRAPHIQUE RELATIVE AUX TECHNIQUES DE SECHAGE A FROID ET DE DEBACTERISATION DES PLANTES AROMATIQUES

PHASE 1 - BIBLIOGRAPHIE

CLIENT :

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A l'attention de **Monsieur Denis Cartier-Millon**

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Intervenants : Bénédicte Larinier / Magalie Wagner Le 15 octobre 2017

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SOMMAIRE

1. Contexte de la demande

La qualité microbiologique des plantes aromatiques et médicinales est un critère important pour les acheteurs. Les producteurs français et italiens s'imposent des règles d'hygiène spécifiques afin de diminuer la charge bactérienne. Ces règles concernent essentiellement les opérations entre la récolte et le conditionnement, c'est-à-dire l'étape de séchage.

Cofinancé par l'Union Européenne à travers le programme de coopération Alcotra 2014-2020, le projet de coopération transfrontalière ESSICA s'intéresse :

- Au **séchage à froid** pour conserver la qualité des plantes. Il sera expérimenté, afin de préserver la couleur et la qualité organoleptique des plantes aromatiques,
- Aux **traitements de débactérisation** pré-séchage et post-séchage.

Les producteurs de plantes aromatiques et médicinales souhaitent étudier la possibilité d'implanter des équipements de séchage à froid et de débactérisation afin de mieux maitriser la qualité de leurs productions.

L'objet de cette étude bibliographique est d'étudier les procédés existants de séchage à froid et de débactérisation en France, en Italie, et dans le monde, sur les plantes aromatiques, médicinales ainsi que sur d'autres productions agricoles comparables : les fruits et légumes.

L'étude a pour objectif de montrer les techniques mises en œuvre dans l'industrie, et celles en cours de développement qui pourraient faire l'objet d'une application pour le traitement des plantes sèches.

Par séchage à froid, en l'absence de définition officielle, on comprendra :

- séchage à température ambiante ou inférieure, avec contrôle de l'humidité
- ou utilisation du principe du réfrigérateur pour la déshumidification (séchage pouvant être avec de l'air plus chaud que l'air ambiant).

A **l'issue de cette étude bibliographique**, il est prévu que FranceAgriMer dispose d'un rapport composé de fiches de synthèse sur les différentes techniques retenues, regroupant les aspects techniques et économiques.

La méthodologie adoptée est une étude en deux phases :

- **Phase 1 : Recherches bibliographiques et sélection des technologies**

Le CTCPA a réalisé les recherches dans diverses sources bibliographiques sur les deux familles de technologie étudiées.

Les données obtenues ont été dans un premier temps évaluées et triées de façon à sélectionner les technologies les plus pertinentes.

Puis, il a été fait un point avec FranceAgriMer de façon à sélectionner aux maximum 7 technologies pertinentes devant faire l'objet d'un approfondissement

- **Phase 2** : **Approfondissement des recherches et rédaction des fiches de synthèses**

Les 7 technologies sélectionnées ont été documentées de façon à pouvoir réaliser les fiches de synthèse présentant :

-La description de la technologie, ses caractéristiques techniques,
-Les équipements, les constructeurs ou les essais selon la maturité de la technologie
-Les impacts économiques, en main-d'œuvre, et environnementaux
-La compatibilité à l'agriculture biologique, au regard de la règlementation européenne
-La liste des publications utiles.

Les recherches bibliographiques ont été réalisées en deux étapes : d'une part les technologies de séchage à froid, d'autre part les technologies de débactérisation.

2. Méthodologie de recherche : identifier et documenter les technologies

1. *Recherches bibliographiques Technologie de séchage à froid*

2.1.1. Bases de données et Internet

La notion de séchage à froid « Cold drying n'est pas explicite en recherche dans les bases bibliographiques. Soit le terme n'est pas utilisé, soit il est employé pour décrire d'autres technologie.

Pour utiliser une voie détournée, nous avons utilisé les termes descriptifs du fonctionnement de la technologie de Northwest Technology, en particulier la déhumidification et la déshydratation.

Dehumidif ou déshumidification croisé avec froid et séchage

(dehydrat and refrig*), refrig* AND dehumidif* AND (drying or dried)*

Bases de données

FSTA (dehumidif* or dehydrat*) AND (cold or refrig*) AND (drying or dried)	La sélection donne beaucoup de déchets dus aux termes freeze drying, Cold storage… Peu d'articles retenu.
Bases Editeurs Sciences direct / Scopus	quelques articles sélectionnés, mais plutôt autour du sujet. Autres technologies.
Agritrop du Cidrap	Pays en développement, pas la cible
AGRIS http://agris.fao.org/agris-search/index.do	« cold drying » 5 références dont 4 se rapportant au jambon.

Sur Internet (Google), la recherche avec l'expression « Cold drying » donne :

- la technologie COLD-DRYING SYSTEMS de Northwest Technology http://www.northwest-technology.com/index_inglese.html

- beaucoup de sites et documents qui se rapportent à la la lyophilisation, (cold drying agent).

En explorant systématiquement les réponses, on trouve cependant quelques données intéressantes qui montrent que cette question est étudiée au niveau international.

2.1.2. Brevets

Les recherches effectuées dans Espacenet avec les mots clés « Cold drying » couplé à la classe CIB (sorte de mot clés). Par principe, on réalise la recherche en combinant les mots clés et les classes pour mieux cibler les résultats, mais ce n'est pas toujours efficace, car certains brevets ont des classes de la technologie et pas celle du secteur où il s'applique.

Les résultats sont les suivants :

Classe CIB	Nb de brevet
A23 Produits alimentaires (drying foodstuffs)	70
A23L27 Spices; Flavouring agents or condiments; Artificial sweetening agents; Table salts; Dietetic salt substitutes; …	2 / 0 après lecture
A61K36 Medicinal preparations of undetermined constitution containing material from algae, lichens, fungi or plants, or derivatives thereof, e.g. traditional herbal medicine	0
Avec l'expression Cold drying, on a environ 340 résultats dont certains ont été sélectionnés à titre d'exemple. Beaucoup sont dans la classe F26B. séchage	340
A01F25/00 Storing agricultural or horticultural produce; Hanging-up harvested fruit (maturing fruit A23N15/06; arrangements in barns for preparatory treatment of tobacco ; racks for drying fruit and vegetables A01F25/12	

Ces listes de brevets (Cf fichier joint) demandent à être étudiées pour voir si quelques technologies seraient susceptible d'être intéressantes.

Il y a une très grande majorité de brevets asiatiques, principalement chinois, ce qui complique la tâche.

2. *Recherche bibliographiques Technologie de décontamination*

2.2.1. Documentation CTCPA

- Le CTCPA dispose d'une documentation régulièrement remise à jour sur les technologies de décontamination. Sur la base des connaissances acquises, nous proposons d'examiner en particulier les technologies suivantes :

- **Les hautes pressions**
- **L'acide péracétique**
- **L'ozone**
- **L'eau ozonée**
- **La vapeur sèche de peroxyde d' hydrogène (VSPH)**
- **La vapeur sous vide (VSV)**

- Le CTCPA dispose également d'une base interne de données bibliographiques résultant de sa veille (18000 références)

Une recherche bibliographique dans cette base avec les mots clés suivants a permi de compléter la liste des technologies en prenant en compte **la DIC, détente instantanée controlée**

(DECONTAMINATION OU DESINFECTION) ET (DESHYDRATATION OU AROMATE OU EPICE OU HERBE OU POUDRE)	33

2.2.2. Documentation ESSICA

A la signature du contrat, Alix Courivaud nous a transmis des documents. Sur les aspects de la décontamination, on trouve :

- Le mail de Olivier BAGARRI de l'UESS (Université européenne des senteurs et saveurs-Forcalquier) cite les projets :

- HERBARTIS (Programme europoéen de formation pour adulte sur la production artisanale de plantes aromatiques et médicinales) sur la débactérisation :

Fournisseur de stérilisation à la vapeur

Name	website	Country
Safasteril	http://www.safesteril.com/en/contact-other.php	France
RevTech Process Systems	http://www.revtech-process-systems.com/index.php/en/contact-env3	France
Tema Process B.V.	http://www.temaprocess.com/en/steam-sterilization-for-herbs-a-spices.html	Netherlands
Imtech Steri	http://www.imtech-steri.ch/ImtechFood/	Switzerland
Vicente Bravo	http://www.vicentebravo.com/esterilizacion.php	Spain

GREENFOODEC (7e PCRDT http://www.greenfoodec.eu/) a étudié quatre nouvelles technologies pour les herbes, les épices et les ingrédients végétaux secs:

Haute pression CO2 + ultrasons (HPCD + US), Plasma froid (CP), l'énergie électromagnétique (micro-ondes (MW) et Rayonnement infrarouge (IR)).

- **Le second document** est un pdf qui présente les résultats de du Projet **Spiceclean** (nove 2010).

Ce document cite les procédés courants utilisés comme étant **le traitement à la vapeur et l'ionisation.**

Il présente ensuite des effets sur les microorganisames des procédés non thermiques comme la lumière pulsée et les hautes pressions.

2.2.3. FSTA

Ci-après les recherches réalisées pour identifier les technologies appliquées aux herbes aromatiques et autres végétaux ;

N° ensemble	Recherches effectuées pour	Résultats
S7	S6 AND S3 AND S1	113*
S6	S5 OR S2	9536*
S5	decontamin*	3535*
S4	S3 AND S2 AND S1	86*
S3	(DRY* OR DRIED)	121304*
S2	SU.EXACT("DECONTAMINATION") OR (SU.EXACT("BACTERIAL CONTAMINATION") OR SU.EXACT("MICROBIAL CONTAMINATION")) OR (debacterisation OR "microbial quality")	8000*
S1	(SU.EXACT.EXPLODE("HERBS") OR SU.EXACT("SPICES")) OR (SU.EXACT("DRIED VEGETABLES") OR SU.EXACT("DRIED FRUITS") OR SU.EXACT("FRUITS DRIED") OR SU.EXACT("TEA") OR SU.EXACT("MUSHROOMS")) OR ("aromatic plants" OR "medicinal plants" or "medicinal herbs" or flower*)	45169*

Sélection de 57 articles dans les 113 références – quelques brevets. Les termes de **microbial contamination** apporte des articles qui traitent uniquement des contaminations et non des procédés de décontamination.

3. Synthèse de la phase 1 : identification des technologies

1. *Le séchage à froid*

Par séchage à froid, en l'absence de définition officielle, on comprendra :

- séchage à température ambiante ou inférieure, avec contrôle de l'humidité.
- ou utilisation du principe du réfrigérateur pour la déshumidification (séchage pouvant être avec de l'air plus chaud que l'air ambiant).

n°	Technologies	DESCRIPTION	CONTRAINTES / INTERET
1	**COLD DRYNG SYSTEM** North west Technology http://www.northwest-technology.com http://www.northwest-technology.com/pdf/nw-cold-drying-sistem.pdf Officinal plants and spices: Fruit and vegetables:. Pollen and honey Flower and Mushrooms Liquids	The drying process is the most natural method to preserve food. It well preserves most of enzymes, vitamins and mineral salts and if performed at lower temperatures it creates superior nal products. **Our "cold" technology is based on cooling systems, which refrigerate air, dehydrate and heat it up to the temperature of 30 /35°C with a 2 / 3 % residual humidity.** The cold-drying systems are based on physical principle of a dehumidier device associated with the constant air-flow in a sealed environment. A solid and soundproof container includes the whole device made of a refrigerant system, which dehydrates the air, and of a section leading to 3 0 /35°C with a lowered residual humidity. The air is blown from the lower part in the loading compartment where the product to be dried is placed on several piled-up drawers. This innovative method is called Vaporization Chain System. The payload for each cycle depends on the model and ranges from 40 kg to 1200 kg of fresh product.	Technologie partenaire retenue par ESSICA

	DALIANLELEJIAMachinery Co., Ltd. **http://www.dllljcom/index_en.html** **Cold drying serie** **ex : New cold air dryer** **http://www.dllljcom/html_products/lfj-1-1-46.html** Equipementier Chinois – description dans un mauvais anglais	A new generation of **low-temperature drying products** - **cold air dryer** is the food, chemical, pharmaceutical, aquatic products, vegetables, Cold air dryer for drying all kinds of high quality, uniform and other food and vegetables and herbs. Environmental control desiccant temperature 10-35 degrees Celsius. Dehydrating effect, the material no distortion, no color, full. Features: Three automatic modes of operation: 1, cooling drying mode - in hot and humid environment, the unit automatically run dry and cool mode, the unit heat generated by the cooling water discharged to the atmosphere 2, thermostat drying mode - in the temperature requirements, the thermostats drying , dry air under constant temperature conditions 3, heating drying mode - at low temperature cold, damp environment, the unit automatically heated drying mode, does not reduce the indoor temperature to dry. For fish, shrimp, abalone, sea cucumber, aquaculture, river fish, ginseng, mushrooms, herbs, vegetables, fruits, meat, poultry, pet food, honeysuckle, etc. Technical parameters: compressors dehydration: U.S. Taikang 3P thermal cycling devices: high-efficiency energy-saving cycle of Scale blower: 160W * 6 high-efficiency energy-saving voltage: ~ 220v ~ 380v and optional. Power: Cooling power: 3P, heating power: 2KW. Size: 2600 × 700 × 1780mm plate: 304 Stainless Steel	

	Shaoxing Shangyu **Feixiang Refrigerating Machinery Manufacture Co., Ltd.** **http://www.syfxzl.com/products12-en.asp**	Cold air drying machine is currently in the process of food drying device of choice, the cold air dryer for the food had not only maintain the original quality, but also for easy packing, storage and transport. Cold air drying machine for drying all kinds of high quality, uniform food. The control technology and performance can be comparable to similar foreign products. Environmental control desiccant temperature 10-35 degrees Celsius. Cold drying principle: Low humidity cold drying is the use of forced circulation of air between the food, so that moisture content decreased to drying process.?Forced circulation of air in the low humidity continue to absorb food in the surface water; saturated air through the evaporator, the evaporator refrigerant in the evaporator, the evaporator surface temperature dropped to the dew point temperature below the cooling air through the evaporator after?and precipitation of water, precipitation water discharged from the catchment storage body; low humidity air and then into the condenser, the condenser in the flow of hot gas from the refrigerant compressor, so the air is heated to form dry air; then and saturated?state of low humidity air-air mixture generated repeated cycles.	Ressemble fortement au précédent. Peut être un construteur et un distributeur.

	Can Tho Science and Technology Department Vietnam **Research an herb cold drying model combines two drying modes** A researcher team includes Prof. Dr. Hoang Ngoc Dong, and Ha Van Tuan from Da Nang Polytechnic University researched, proposed a cool drying model that combines two modes of low-high temperature to dry herbs. **http://en.canthostnews.vn/?tabid=230&NDID=14414**	Author group examined several practical and theoretical experiments with a real drying device, such as heat pumps, and analyzed its strengths and weaknesses during drying process, including hot-cold drying. The team also built a cold drying model that combined two high and low temperature drying modes to dry herbs, reduced its disadvantages of separately hot- cold drying process. Research team also presented operation process, and reviewed at model's weak-good points. The study can serve learning and research requirements of students, thermo-cold technology specialization engineers. Concurrently, it is also a foundation that enterprises can process and preserve herbs to reduce costs, and improve quality of products.	Pas plus d'info sur ces recherches même après aprofondissement. J'ai trouvé deux articles. A PRACTICAL RESEARCH MODEL OF THE LOW TEMPERATURE DRYING SYSTEM USING A HEAT PUMP 2008 http://www.kh-sdh.udn.vn/zipfiles/so27/r.02.dong-tri-11-7-pr13.pdf EXPERIMENTAL STUDIES FOR DRYING OAGRICULTURAL FOOD PRODUCTS AT LOW TEMPERATURE To build design software of cold convection drying system for drying agricultural products MARCH 13, 2012 BY LEAVE A COMMENT http://www.kh-sdh.udn.vn/zipfiles/sv2008-tb3/6R.son-Bui%20Tuan%20Son%20-%20Vo%20Nhu%20Quang.pdf
	WINDSON, India **https://www.windsonindia.com/dehydrated-products** Welcome to Windson, a privately owned ingredient manufacturer and supplier based in Gandhinagar, India. Our business is providing a range of high-quality ingredients to Food & Beverage, Tea, Nutraceuticals, Cosmetics and Alternative medicines.	Our product range include herbs, spices, flowers, tea ingredients, dehydrated fruits and vegetables etc. It is unique **Low Temperature Cold drying (LTCD) technology** incorporates stringent process for drying the fruit/vegetable/flower/herb in a sterilized closed room at low temperature to reduce microbial load and allow easy rehydration. This ensures that the product retains 100% natural nutrients, taste, color, flavor and aroma.	Exemple de lyophilisateurs qui décrivent leurs technologies comme Cold drying.

	Jambu drying with cold air circulation Barbosa, Alan & Valesca Rodriguez Aliceo, Tatiana & Morais Rodrigues, Fernando & Garcia da Silva Morais Rodrigues, Liliane & Ubirajara Oliveira Sabaa-Srur, Armando. (2015). Jambu drying with cold air circulation. Journal of Bioenergy and Food Science. 2. 46-54. 10.18067/jbfs.v2i2.28.	**T**he purpose of this study was to evaluate the drying process of jambu using cold air which is a technology that can add value to the horticultural food, improve the production rates and help in waste reduction. The cold air-drying of jambu is performed under temperatures around 77°F using an air conditioning system. A dehumidifier is used in order to reduce the product's relative humidity (54.6 ± 2.87). The process takes place in a room with an area of 4 square meters that remains shut during the process, which lasts a total time of 44 hours. Later, the product is stored in a high protective package to avoid moisture. The cold air-dried jambu is in accordance with the current legislation regarding microbiological aspects. Also, it is well accepted by consumers and its centesimal composition is similar to fresh jambu. Other drying techniques can also be applied, such as hot air and ultrasound. Thus, considering sanitary and sensory aspects and chemical composition, the commercialization of dried jambu is feasible in terms of transport and handling.	Le texte de ce document fait référence à la technologie du séchage au froid vs lyophilisation : Cold air drying is a simplification of the lyophilization process at atmospheric pressure, through the elimination of the freezing step. Waterremoval occurs in environments with low temperature and relative humidity, and it is kept in the liquid state during the entire process, so that products with intermediate moisture content can be obtained. This characteristic confers high stability to them without loss of plasticity. *(KUB*OTA e CALVIDAL, 1987)

2. *Technologies de décontamination*

n°	PUBLICATION	DESCRIPTION	INTERET/LIMITES
1	**Les hautes pressions**	Le traitement par hautes pressions consiste à appliquer une forte pression (entre 3000 et 6000bars en agro-alimentaire) sur un produit par l'intermédiaire d'un liquide appelé fluide depressurisation (généralement de l'eau). Les effets des hautes pressions sur la matière se traduisent par une modification de la conformation des molécules, de leurs interactions, des réactions chimiques ou encore des changements d'états. L'ensemble de ces phénomènes est àl'origine de l'impact du procédé hautes pressions sur les protéines, les glucides, les lipides et, plus globalement, sur les bactéries. Les aliments liquides ou solides, préemballés dans un emballage souple étanche, sont soumis dans une solide enceinte d'acier fermée et remplie d'un fluide (de l'eau), à une très forte pression hydrostatique, obtenue à l'aide de pompes spéciales. L'efficacité du procédé hautes pressions sur les microorganismes est dépendante d'un nombre important de facteurs, ce qui rend difficile l'extrapolation d'un produit à un autre. Chaque produit doit donc être considéré comme un cas unique. Les effets dépendent de la nature des microorganismes, de la matrice alimentaire et des paramètres du traitement. Les avantages de cette technologie sont nombreux : **Procédé athermique** : le traitement par hautes pressions se fait le plus couramment à température ambiante ou réfrigérée – il permet de traiter des produits qui ne pourraient être stabilisés thermiquement. **Pressurisation instantanée** : la transmission de cette pression se fait instantanément,par opposition à un traitement thermique. Les traitements sont donc plus rapides que les traitements thermiques.	Nécessite une étude systématique (tests de vieillissement, challenge-tests) de l'efficacité décontaminante du traitement doit être validée produit par produit avec les principaux germes d'intérêt. Cadre réglementaire : les aliments traités par Hautes Pressions à température réfrigérée ou ambiante, jusqu'à 600 MPa et 5 minutes ne doivent pas être considérés comme de Nouveaux Aliments , au sens du règlement novel Food de l'U.E) Cf. Avis ANSES 2010-SA-0193 : « les hautes pressions hydrostatiques n'entraînent pas de modification significative de la valeur nutritive, du métabolisme ou de la teneur en substances indésirables des aliments pour des barèmes de pression appliquée (500 à 600 MPa), durée de pressurisation (3 à 5 minutes) et température d'eau de l'enceinte

		Qualité organoleptique des produits : certaines caractéristiques du produit frais sont réservées- en fonction des produits, les propriétés sensorielles et organoleptiquespeuvent être conservées. Les caractéristiques nutritionnelles demeurent intactes.· **Sécurité des aliments** : détruit les micro-organismes contaminants et pathogènes(*Listeria*, *Escherichia coli*, *Samonella spp*., *Vibrio*, norovirus, etc.) .L'application du procédé sur le produit dans son emballage final empêche toutecontamination ultérieure (pas de remise en oeuvre). Application au vrac liquide depuis peu (2017).	(eau refroidie ou eau à température ambiante). » Les applications en dehors de ce cadre doivent être examinées au cas par cas (par DGCCRF et ANSES, ou directement par l'EFSA si statut Novel Food est confirmé)
2	**L'acide péracétique**	Mélange biocide composé d'acide péracétique, de péroxyde d h'ydrogène et d'acide acétique. Il est utilisé en solution aqueuse pour la décontamination microbiologique des surfaces, des emballages et des aliments (usage direct comme auxiliaire technologique) Décontamination se fait à température ambiante, très efficace, ne génère pas de rejets polluant dans l'eau, De nombreuses applications sur végétaux crus ou cuits sont déjà autorisées (Cf. arrêté Auxiliaires Technologiques du 19 octobre 2006)	Effet décontaminant (bactéricide et sporicide) très important, notamment dans les eaux de lavage des végétaux. Coûts élevés <u>Cadre réglementaire</u> : Les applications de biocides pour la décontamination de denrées d'origine végétales, sont soumises à autorisation préalable en France (décret Auxiliaires Technologiques du 10 mai 2011). Un dossier technique complet doit être soumis à la DGCCRF, pour expetise ANSES. Les applications à la décontamination de surface des denrées animales (carcasses…) sont expertisées directement par l'EFSA.

3	**La lumière pulsée**	Le traitement par lumière pulsée est un procédé athermique de préservation des aliments. Il consiste à les soumettre pendant des temps très courts de quelques microsecondes, à des flashs intenses de lumière blanche générés par des lampes au xénon, pour détruire les micro-organismes. Pour générer les flashs, l'énergie électrique est emmagasinée dans des condensateurs, puis transférée à la lampe contenant un gaz inerte, le xénon. Ce gaz ionisé émet un flash intense de lumière focalisé sur la surface de traitement par un réflecteur. La lampe émet des flashs de lumière de longueurs d'onde allant de 200 nm à 1100 nm (UV/visible/infrarouge). Chaque flash délivre une énergie intense (10 kW/cm2/flash). L'énergie transmise à l'objet éclairé, la fluence, est exprimée en joules par cm² (0,1 à 5 J/cm²). La lumière émise par le procédé lumière pulsée est 100 000 fois plus intense que la lumière émise par le soleil à la surface de la Terre. L'effet antimicrobien de la lumière pulsée est déterminé par l'énergie libérée par flash, la fréquence de flashage, le nombre de flash appliqué sur la surface à décontaminer et la distance entre le produit à traiter et la source lumineuse. La fréquence des flashs est ajustée en fonction de la vitesse de défilement des objets à traiter devant les lampes, par exemple : 2Hz , soit 2 flashs par seconde. Le principe de la destruction des microorganismes est basé sur la synergie d'action entre l'effet photochimique (UV pulsés), l'effet photothermique (température atteinte en instantané comprise entre 160°C et 200°C) et l'effet physique (pic de puissance). Cette technologie agit sur une large gamme de microorganismes : bactéries, levures, moisissures, virus, mais aussi dans certaines configurations sur les parasites et les larves d'insectes. La lumière pulsée permet de décontaminer, à froid, en ambiance sèche, en procédé continu sur ligne, la surface de nombreux types d'aliments. Toutefois, encore peu d'applications industrielles ont été validées et mises en œuvre.	<u>Cadre réglementaire</u> : Les aliments traités par Lumirère Pulsés sont considérés à priori comme de Nouveaux Aliments. Un dossier technique de demande d'autorisation complet, qui peut être soumis à DGCCRF – ANSES , ou directement à l'EFSA si le caractère Novel Aliment est avéré. L'utilisation de la Lumière Pulsée pour la décontamination de surfaces d'équipement ou d'emballages vides, est autorisées sans évaluation préalable.

4	**L'ozone**	La décontamination de surface à l'aide de substances biocides chimiques consiste à exposer l'aliment par contact direct à une substance chimique ayant des propriétés antimicrobiennes pour réduire la contamination de surface après une courte durée de contact, suivie d'une phase d'élimination du biocide. Il existe deux types de technologie : les biocides gazeux utilisés principalement pour les solides secs divisés et les biocides liquides employés pour le lavage décontaminant des aliments. L'ozone O3 et plus précisément l'air ozoné, obtenu par décharge électrique dans un courant d'air, ou d'air enrichi en oxygène, est un biocide oxydant qui détruit les microorganismes en surface mais aussi certains contaminants chimiques comme les mycotoxines. L'ozone est un oxydant puissant utilisé notamment pour le traitement de l'eau (potabilisation). Il peut oxyder les composés organiques et agit également sur les bactéries et les particules virales. Du fait de sa décomposition rapide, l'ozone n'a pas de rémanence. La production d'ozone se fait par l'enrichissement d'un courant de gaz riche en oxygène (oxygène pur ou air) en soumettant celui-ci à une décharge électrique (décharge corona), des UV ou par réaction d'électrolyse. Du fait de sa toxicité et surtout de son instabilité, l'ozone ne peut pas se stocker. Il est donc produit en continu sur le lieu d'application grâce à un générateur La décontamination chimique agit uniquement en surface, ce qui réduit l'impact sur la matrice alimentaire. Par nature, ces technologies diminuent la contamination de surface de l'aliment, mais n'ont aucun effet en profondeur, sauf pour les aliments secs poreux. En revanche, si la contamination est présente uniquement en surface, l'efficacité peut être remarquable. Les applications utilisant l'ozone gazeux sont : · Le traitement des coquilles d'oeufs,	<u>Cadre réglementaire</u> : Les applications de biocides (gazeux ou sous forme liquide) pour la décontamination de denrées d'origine végétales, sont soumises à autorisation préalable en France (décret Auxiliaires Technologiques du 10 mai 2011). Un dossier technique complet doit être soumis à la DGCCRF, pour expertise ANSES.

		· La décontamination des produits secs (poivre, pistaches avec coque, céréales, épices…) afin de réduire la contamination en spores de bactéries et de moisissures. L'efficacité de la technologie va dépendre de l'Aw et de la composition des produits, des conditions environnementales (humidité, température). En effet, les taux de décontamination obtenus sont meilleurs quand on traite des grains de céréales et de poivres entiers que lorsqu'on traite les poudres. OXYGREEN™ est un procédé autorisé pour la décontamination à l'ozone des céréales. Le procédé utilise un réacteur vertical agité, les grains sont balayés par un courant d'air ozoné. Ce procédé permet l'obtention de céréales très bien décontaminées pour la fabrication de farinesde haute qualité microbiologiques. Il réduit le taux de bactéries d'un facteur 10000, de champignons d'un facteur 1000, induit la mortalité de 99% des insectes et élimine 60 à 90%des mycotoxines. Remarque : Cette application OXYGREEN™ de l'ozone gazeux est la seule à être autorisée en droit Français.	
5	**L'eau ozonée**	Les différentes applications de l'ozone dissout dans l'eau visent à décontaminer l'eau (de réseau ou de forage), les eaux de process, et l'eau des circuits de refroidissement. L'eau ozonée peut également être utilisée : - en substitution de la chloration pour la décontamination de la surface des fruits et légumes après une étape de prélavage (laitue, pomme, pomme de terre). - dans la décontamination des surfaces des équipements de production - pour la décontamination de la surface des carcasses de viande (fortes concentrations) - dans l traitement des crustacés comme les crevettes	<u>Cadre réglementaire</u> : Les applications de biocides (gazeux ou sous forme liquide) pour la décontamination de denrées d'origine végétales, sont soumises à autorisation préalable en France (décret Auxiliaires Technologiques du 10 mai 2011). Un dossier technique complet doit être soumis à la DGCCRF, pour expertise ANSES. Les applications à la décontamination de surface des denrées animales (carcasses…) sont expertisées directement par l'EFSA

7	**La vapeur sèche de peroxyde d' hydrogène (VSPH)**	Le peroxyde d'hydrogène (H_2O_2) est un oxydant puissant capable de réagir avec des composés organiques et de nombreux composés cellulaires (protéines, lipides, acides nucléiques). Le peroxyde d'hydrogène est utilisée assez couramment en solution aqueuse (« eau oxygénée ») à concentration de 5 à 30 % dans l'eau, par exemple pour la décontamination des surfaces, des matériels ; et des emballages pour les opérations de conditionnement aseptique. Le peroxyde d'hydrogène, dont les propriétés physicochimiques sont proches de celles de l'eau, peut aussi être utilisé sous forme de vapeur : La Vapeur Sèche de Peroxyde d'Hydrogène (VSPH) est produite par un générateur spécialement conçu pour cette application. Le générateur produit de la vapeur sèche de peroxyde d'hydrogène à partir d'un flux d'air préchauffé et d'une solution de peroxyde d'hydrogène à 35%. Le gaz contenant une certaine quantité de H_2O_2 vapeur est ensuite mis en contact avec le produit à traiter dans une enceinte confinée pendant un temps donné. Le peroxyde d'hydrogène est un oxydant puissant. Utilisé sous forme gazeuse il se montre encore plus efficace pour la décontamination. Il est utilisé sous cette forme notamment dans le secteur pharmaceutique et médical pour la désinfection des surfaces et des blocs opératoires. Le peroxyde d'hydrogène oxyde tous les composés organiques de façon non spécifique , il agit également sur les microorganismes. L'action germicide du peroxyde d'hydrogène gazeux est efficace sur une large gamme de microorganismes (endospores de moisissures, spores bactériennes, bactéries végétatives, les virus, autres contaminants biologiques , y compris les prions). Le peroxyde d'hydrogène gazeux peut techniquement être utilisé pour la décontamination : - Des surfaces et des ambiances de travail : dans les ateliers ou les isolateurs - Des emballages : décontamination de la surface en contact avec les aliments en vue d'un remplissage aseptique. -Des produits secs et déshydratés (épices, fruits à coque, céréales,…) afin de réduire la contamination en spores de bactéries et de moisissures.	<u>Cadre réglementaire</u> : Les applications de biocides (gazeux ou sous forme liquide) pour la décontamination de denrées d'origine végétales, sont soumises à autorisation préalable en France (décret Auxiliaires Technologiques du 10 mai 2011). Un dossier technique complet doit être soumis à la DGCCRF, pour expertise ANSES. Les applications à la décontamination de surface des denrées animales (carcasses…) sont expertisées directement par l'EFSA Pas d'application Auxiliaires Technologiques autorisée en France à ce jour. Aucun équipementier n'est pour l'instant identifié pour proposer des installations complètes clef en main. Des générateurs de Vapeur Sèche de Peroxyde d'Hydrogène existent déjà sur le marché, (pour des application non alimentaires, notamment en hygiène hospitalière, décontamination d'instruments et de locaux) et des efforts de développements sont nécessaires pour proposer des applicateurs (=

		- Des zones de stockages après récolte des fruits et légumes - Des équipements de process	enceintes de traitement) les plus adaptés au traitement des produits secs et déshydratés.
8	**Vapeur/vide VSV**	La technologie de traitement thermique dite « vapeur sous vide » appelée aussi VSV (Vacuum-Steam-Vacuum), consiste à traiter par la vapeur vive des denrées alimentaire, pour leur décontamination, dans une enceinte résistant à la fois au vide et à la pression. Le procédé consiste à 1) instaurer dans l'enceinte contenant les produits à traiter, un vide (d'environ 0.9 bar) afin de soustraire l'air et l'humidité contenus, ; 2) à injecter de la vapeur saturée à haute température, sous pression (température comprise entre 104 à 143°C). Celle-ci se condense à la surface de l'aliment et permet d'inactiver les germes de surface. ; 3) La dernière étape vise à soumettre l'aliment à nouveau au vide pour extraire de l'amliment chaud, par évaporation, l'eau de condensation de la vapeur, et refroidir très rapidement la surface de l'aliment. Un cycle dure typiquement, seulement quelques dizaines de secondes : les temps de mise sous vide étant compris entre 0.1 et 10 secondes puis entre 0.1 et 5 secondes pour l'injection de vapeur. Le procédé VSV est un procédé HTST (High Temperature Short Time) qui permet d'être efficace pour la décontamination microbienne grâce aux hautes températures qui sont utilisées. C'est principalement la température du traitement (en milieu humide) qui mène à la destruction des germes ; etle fait d'appliquer un vide en début de cycle permet d'assurer un traitement homogène favorisant la dispersion et le contact de la vapeur avec le produit, même pour les particules poreuses de solides divisés sec. Le procédé permet de préserver en parallèle les qualités organoleptiques des produits car (i) l'application d'une haute température au produit est très courte et (ii) le refroidissement est rapide grâce à la mise sous vide en fin de cycle, ce qui permet de limiter encore plus l'impact du traitement thermique sur le produit. Le procédé peut donc être utilisé pour la décontamination de produits fragiles thermiquement.	<u>Cadre réglementaire</u> : Pas d'autorisation spécifiquement requise pour les traitements thermiques en général. Veiller à la qualité « alimentaire » de la vapeur employée (Cf. l'avis ANSES-AFSSA du 22 juin 2005 Vapeur Alimentaire 2002-SA-0317)

		Le procédé VSV est utilisé pour le séchage et la décontamination simultanées de poudres et produits secs : fruits, légumes, champignon déshydratés, épices et plantes aromatiques, graines oléagineuses, amandes et fruits à coques, … En France, la société STERIPURE, utilise cette technologie pour proposer des prestations de service pour la décontamination d''herbes, épices, fruits secs, fruits et légumes déshydratés et graines lorsque les produits présentent une charge bactérienne élevée en salmonelle, E-coli, moisissures, levures, infestations (insectes, larves). Les volumes traités vont de 500 kg à plusieurs tonnes. (http://www.steripure.fr/)	
9	**Détente instantanée controlée (DIC)**	La DIC (Détente Instantanée Contrôlée) est un traitement de type HTST (High Temperature Short Time) avec une durée de traitement thermique allant de quelques secondes à une minute (selon le produit et les contraintes de qualité). Cette technologie consiste à faire subir à un produit alimentaire en particules divisées, et préchauffé, une chute abrupte de pression (détente instantanée) amenant le produit à une pression relativement basse (généralement inférieure à 5 kPa). Le traitement thermique préalable est le plus souvent réalisé par injection de vapeur (température de 60°C à 150°C) couplée à une pression élevée (de 0.1 à 1 MPa de vapeur d'eau). La vitesse de passage puis l'équilibre thermodynamique induisent la vaporisation rapide d'une certaine quantité d'eau au sein de la matière. La courte durée de cette étape de l'opération réduit considérablement les phénomènes d'échange et de transfert thermique entre le produit et le milieu extérieur. Le phénomène de vaporisation par détente sans échange de chaleur avec l'extérieur, est baptisé « autovaporisation ». Le mode d'action permettant d'expliquer l'impact de la technologie DIC sur les microorganismes n'est pas encore complétement élucidé.	<u>Cadre réglementaire</u> : Pas d'autorisation spécifiquement requise pour les traitements thermiques en général. Veiller à la qualité « alimentaire » de la vapeur employée (Cf. l'avis ANSES-AFSSA du 22 juin 2005 Vapeur Alimentaire 2002-SA-0317)

		Plusieurs mécanismes ont été proposés pour expliquer l'inactivation des microorganismes par DIC. La température du traitement contribue bien entendu à l'inactivation des germes, et le fait d'appliquer un vide poussé juste avant l'injection de vapeur permet au produit d'atteindre très rapidement la température de la vapeur injectée, ce qui favorise la dispersion et le contact de la vapeur vers le produit et provoque une destruction thermique desmicroorganismes. La dépressurisation rapide qui intervient en fin de traitement provoque un refroidissement rapide et surtout le phénomène d'autovaporisation qui va induire des contraintes mécaniques au niveau de la structure cellulaire des microorganismes menant à la lyse des cellules et donc à leur destruction. -La technologie DIC est utilisée pour la déshydration des fruits,légumes et céréales (fraises, pommes, herbes aromatiques, riz, etc…). La technologie présente l'avantage de réduire le temps de séchage (24 à 63% plus faible que le temps de séchage traditionnel), d'obtenir des produits jusqu'à 5% d'humidité seulement et de préserver les qualités organoleptiques des produits. Certains aliments très humides nécessitent un prétraitement de séchage partiel avant d'appliquer le procédé DIC au produit. -La DIC peut être utilisée principalement, pour la décontamination des produits secs et pulvérulents (épices, ail…), Selon la société Abcar-dic (http://www.abcar-dic.com/fr/), des centaines de produits alimentaires, cosmétiques, pharmaceutiques sont aujourd'hui décontaminés avec succès : épices et herbes fraîches ou déshydratées ail, champignons, herbes algues. La matière première peut être traitée sous forme de feuilles, morceaux ou poudre. La technologie sertégalement à décontaminer des produits laitiers de type baby food.	

4. Conclusion

Ces éléments ont été présentés à la réunion intermédiaire du 19 octobre 2017 dans le but de choisir 7 technologies à développer dans des fiches de synthèse. Lors de cette réunion, Magali Wagner du CTCPA a évoqué également la technologie de la zéodratation, moins répandue.

Après discussion, les participants ont sélectionné les 3 technologies de séchage et 4 technologies de débactérisation suivantes.

- Zéodratation
- Séchage basse température – pompe à chaleur
- Séchage température ambiante sur claies

- Décontamination – acide peracétique
- Décontamination – ozone liquide
- Décontamination – ozone gazeux
- Décontamination – vapeur sous vide + compléments d'information sur les procédés Spirajoule et Revtech

Ces fiches de présentation et de qualification des technologies seront étudiés de façon approfondie par le CRIEPPAM dans l'étape suivante afin de retenir celles qui seront expérimentées dans le projet.

Le système de séchage assisté par pompe à chaleur semble le plus pertinent au regard de l'ensemble de vos besoins et contraintes (préservation des qualités organoleptiques, coût énergétique maîtrisé, technologie robuste…). Ce choix reste à discuter au regards des contraintes individuelles de chaque fabricant.

Concernant la débactérisation, une utilisation de l'acide péracétique semble plus facile à mettre en œuvre car le produit n'est que peu dangereux pour les utilisateurs (contrairement à l'ozone). Il conviendra tout de même de valider l'impact oxydatif de l'APA sur les huiles essentielles et les caractéristiques organoleptiques. Nous vous recommandons d'utiliser l'APA avant le séchage afin d'éviter une trop forte prolifération des micro-organismes au cours de celui-ci. Néanmoins, il faudra être vigilant à maintenir le séchoir propre afin d'éviter la recontamination post décontamination

ANNEXES

ANNEXE 1

Séchage à froid – Bases de données et Internet

Recherche : Cold Drying

Mathematical modeling of low temperature high velocity (LTHV) drying in foods

Auteur : Kilic, A

Infos sur la publication : Journal of Food Process Engineering 40.2 (2017): e12378.

Résumé : The main purpose of this study is the mathematical modeling of low temperature and high velocity (LTHV) drying method with different temperatures and its comprehensive evaluations in fish. For this purpose, 200 g of trout (*Oncorhynchus mykiss*) was dried with a single layer dryer by using 7 m/s air velocity and ~40-50% relative humidity at 4, 10, 15 and 20°C. Based on the experiments, weight loss (percentage), final moisture content and drying times were determined. Twenty-three different mathematical models were applied to the observed data to perform a nonlinear regression analysis and the result was comprehensively evaluated by using 14 evaluation criteria. Moreover, the exponential forms of thin-layer drying curves of fish samples were derived. Consequently, the most suitable mathematical models were selected for the LTHV drying conditions considering evaluation criteria. In this regard, the most suitable six models (Logarithmic, Midilli-Kucuk, Demir *et al*., Hii *et al*., Balbay-Sahin and Alibas) were selected for the LTHV drying at 4°C that is the most suitable drying temperature for food quality. After comprehensive evaluations, it was understood that some of the evaluation criteria give same results in similar drying conditions as the residual sum of squares (*RSS*), total sum of squares (*SST*) and sum of squares (*SSE*). Practical Applications. LTHV drying method is a cold drying process that performed at very low temperatures (≤20°C) and high velocities (≤7 m/s). LTHV drying refers an indoor thin-layer drying of food products, which is entirely exposed to the cold drying air moving throughout the food product. In the open literature, this new drying method has some preservative effects on food quality especially at 4°C. In addition, it is well known that the drying equations can easily be applied to industrial drying applications. In this regard, thin-layer LTHV drying equations can contribute to the drying characteristics of perishable and semidried food. This study allows researchers to select the suitable drying equations and provide which of them should be preferred. The study also provides a comprehensive evaluation of mathematical models for specific products.© 2016 Wiley Periodicals, Inc.

Langue: Anglais

Sujet: Fish and marine products -- Fish and fish products; DRIERS; DRYING; EQUIPMENT; MODELLING; MOISTURE CONTENT; TEMP.; TEMPERATURE; TROUT; WEIGHT; WT.

Effect of picking and drying process on biogenic amines formation in salted threadfin bream (Nemipterus hexodon)

Auteur : Yu-feng, Chen; Yan-yan, Wu; Jian-chao Deng; Huang, Hui; Lai-hao, Li; Xian-qing Yang; Qi, Bo; Wan-jun, Zhou

Infos sur la publication : Science and Technology of Food Industry No. 20 (2015): 83-91.

Langue: Chinois

Sujet: Fish and marine products -- Fish and fish products; AMINES; BIOGENIC AMINES; DRYING; FISH; FISH PRODUCTS; FOOD SAFETY ANIMAL FOODS; PICKLING; SALT; SALTED FISH; TEMP.; TEMPERATURE; THREADFIN BREAM

Cold drying of hops on the Friedrich organic farm

Auteur : Anonymous

Infos sur la publication : Brauwelt 153.32 (2013): 954-956.

Résumé : Cold drying of organic hops by incorporation of a drier into an existing kiln is described, with regard to advantages for energy conservation and aroma intensity of dried hops.

Langue: Allemand

Sujet: Alcoholic and non-alcoholic beverages -- Beer and other brewed beverages; AROMA; DRYING; ENERGY; ENERGY CONSERVATION; HOPS

Process optimization for raw ham

Auteur : Budesheim, A

Infos sur la publication : Fleischwirtschaft 92.10 (2012): 52-54.

Résumé : Optimization of processes for manufacture of raw ham is discussed with reference to 5 stages of the optimization process: identification of aims; analysis of the *status quo* of processing; identification of improvements; definition of measures to be taken; and implementation. Process stages considered include: loading of smoking trolleys; cold drying; the ripening and smoking program; duration of process stages; process control of the relation between product moisture content and the RH of the air; and duration of smoking.

Langue: Allemand

Sujet: Meat, poultry and game -- Porcine meats and products; DRY HAM; HAM; PROCESS CONTROL

Raw ham. process control determines safety

Auteur : Mittich, S; Bareuther, G; Dickbertel, K; Wilke, T; Erdmann, R

Infos sur la publication : Fleischwirtschaft 89.12 (2009): 44-47.

Compressed air supplies: lower costs and greater safety

Auteur : Ruppelt, E; Bahr, M

Infos sur la publication : Brauwelt 148.24 (2008): 680-684.

Evaluation of process parameters in the O/W/O multiple emulsion method for flavor encapsulation

Auteur : Cho, Y H; Park, J

Infos sur la publication : Journal of Food Science 68.2 (2003): 534-538.

Shellac and carnauba waxing of Delicious apples held in refrigerated storage studied

Auteur : Fellman, J K; Drake, S R; Mattheis, J M

Infos sur la publication : Good Fruit Grower 43.19 (1992): 16-18, 20-21.

Résumé : The response of different sized (125 and 88) Delicious apples to shellac and carnauba waxes applied at varying rates (0, 15 and 30 ml/min), different wax drying temp. and refrigerated storage after waxing was studied. Waxed apples were passed into a commercial hot drying tunnel operating at 60°C or a cold wax drying apparatus operating at 0°C, for 2 min. After drying, fruits were placed in pulp fibre trays, boxed and placed in cold storage (1°C). Results showed that small apples were affected more by the differences in drying tunnel temp. Time required to reach $^{7}/_{8}$ cool was greatest in hot-dried, small apples tray-packed in boxes. Core temp. change in small (size 125) apples (+2.32°C) was more pronounced when compared to size 88 fruit (+0.33°C). Cold drying of shellac-waxed apples increased susceptibility to the whiting phenomenon, but an 8 day ripening period minimized all incidence of whiting. Results suggest that a high rate of wax (30 ml/min) tended to maintain a high sensory acceptance. Cold drying of wax did not enhance appearance when compared to hot wax drying, except for shellac wax after 45 days storage. When averaged sized apples (size 113) were subjected to hot or cold air drying, little difference in quality attributes were noted. Whiting of shellac wax is apparently minimized by holding waxed apples in refrigerated storage for <1 month after packing. The relationship between appearance scores and waxing was linear, with good scores for appearance directly related to high wax application.

Langue: Anglais

Sujet: Fruits, vegetables and nuts; APPLES; COATING; FRUITS SPECIFIC; PROCESSING; SENSORY PROPERTIES; WAXES

The holding period in manufacture of dry ham

Auteur : Poma, J P

Infos sur la publication : Viandes et Produits Carnes 13.2 (1992): 55-58.

Résumé : The holding stage (a cold drying operation) after curing of dry hams is discussed, with reference to: the role of this holding period (partial drying and salt equilibration); the RH, temp., air flow and duration of holding; practical aspects of implementation of this process; monitoring the process; equipment; and effects on sensory and microbiological quality of the ham.

Langue: Français

Sujet: Meat, poultry and game; DRY HAM; HAM; MEAT PRODUCTS

Lyophilization or cryodesiccation. A method for cold drying of food products

Auteur : Gac, A

Infos sur la publication : Bulletin Technique d'Information No. 322 (1977): 497-499, 516.

Résumé : The process of freeze-drying is described, in which a product is frozen, and water is removed by application of heat in a vacuum; water sublimes from the product at a temp. of approx. -30° C in a vacuum of 1-2 mm Hg, and is recondensed onto a refrigeration plate. To finish the process, the temp. is raised to 30° C while maintaining the vacuum, to drive off adsorbed water, and the dry product is packaged under vacuum or an inert gas. Advantages are retention of shape and colour during drying, but the process is expensive and uneconomic with any but premium products.

Langue: Français

Sujet: Engineering; FOODS; FREEZE DRYING; FREEZE-DRYING; PACKAGING

New method for the cold drying of seeds

Auteur : Serini, G

Infos sur la publication : Tecnica Molitoria 25.9/10 (1974): 332-336.

Résumé : The method, which involves the use of silica gel, can be applied in 2 variations: by circulation of air completely dried by passage over silica gel (for large-scale applications); and by agitation of the seeds in a closed vessel containing a suitable amount of silica gel (primarily for small-scale applications). The first method was tested with beans, maize and peas of initial moisture contents of 18.1, 33.7 and 71.9%, respectively, and the second with watermelon seeds, beans, maize and peas of 35.40, 45.33, 36.88 and 66.60% moisture, respectively. Drying time was up to 40-46 h with the first method and up to 40 h with the second (peas up to 100 h). The results showed that the method gave good results, without diminishing the germination capacity of the seeds.

Langue: Italien

Sujet: Engineering; BEANS; CORN; DRYING; PEAS; SEEDS

Cold storage and cold drying of corn

Auteur : Shove, G C

Infos sur la publication : Muehle 108.33 (1971): 482-484.

Résumé : See American Miller and Processor (1967) **95** (3) 28-30 for original publication of this article.

Autre titre: Die Kuhllagerung von Mais und die Kuehltrocknung

Langue: Allemand

Sujet: Cereals and bakery products; COLD STORAGE; CORN; DRYING; STORAGE COLD

Recherche : (dehumidif* or dehydrat*) AND (cold or refrig*) AND (drying or dried)

Sélection de quelques articles

Document 5 sur 311

Design and application of the mini heat pump system for drying and low-temperature preservation

Auteur : Dao-ning, Feng; Sun, Jian; Li, Li; Zhi-chun, Li; Jin-feng, Sheng

Infos sur la publication : Food & Machinery No. 2: 81-84. (2017)

Résumé : A small drying and refrigerating dual-purpose heat pump system for batch processing agriculture products was developed. The system was featured with low cost, improved structure of insulated room and new wet discharge-cycle air duct. Heat pump selection of mixed refrigerant aimed at the drying highest temperature and the lowest refrigeration temperature respectively was 75°C and 5°C. These reach results demonstrated that the system was stable, meet the design requirements of the high limit temperature and dehydrate rate in dry heating mode, and work well in keep-fresh mode.

Langue: Chinois

Sujet: Engineering -- Equipment and processes; AGRICULTURAL PRODUCTS; CROPS; DRYING; EQUIPMENT; PROCESSING; PROCESSING EQUIPMENT; PUMPS; REFRIGERATION

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Optimization of cold-air drying of Apostichopus japonicus and comparison with other drying method

Auteur : Chen, Zihao; Wang, Maojian; Zhang, Jian; Hou, Zhigang; Yuexin Jing; Wang, Gongming; Zhao, Yunping; Liu, Fang

Infos sur la publication : Food Science, China 38.12: 196-203. (2017)

Résumé : The present work was done to optimize the process conditions for cold-air drying (CAD) of pickled *Apostichopus japonicus* by the combined use of one-factor-at-a-time method (OFAT) and response surface methodology (RSM). The response variable was the weighted average of sensory scores and dehydration rate. A comparison of CAD, vacuum freeze drying (VFD), hot-air drying(HAD) and vacuum microwave drying (VMD) was performed in terms of the quality of dried products. Results showed that the optimal cold-air drying conditions were determined as follows: vacuum desalination time, 4.2 h; drying temperature, 19 °C; and wind speed, 1.70 m/s, resulting in a weighted average of 0.77. With respect to nutrient retention, VFD and CAD were better than HAD and VMD. In terms of heat shrinkage, the drying methods were in the decreasing order of HAD, VMD, CAD and VFD with only a marginal difference being observed between CAD and VFD, while they followed the decreasing order of CAD, VFD, HAD and VMD in terms of rehydration rate. In terms of textural characteristics, CAD and VFD were better than HAD and VMD. These results showed that CAD was more practical in industrial production.

Langue: Chinois

Sujet: Fish and marine products -- Other marine animals and macroalgae; AIR; AIR DRYING; AIR SPEED; DESALINATION; DRYING; NUTRIENTS; PICKLES; SALT; SEA CUCUMBERS; SEA FOODS; SHRINKAGE; TEMP.; TEMPERATURE; TEXTURE; VACUUM

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Dried flower or dried fruit production method and production apparatus

Infos sur la publication : Japanese Patent Application (2017)

Résumé : Problem to be solved. To provide a dried flower or dried fruit production method and production apparatus in which the drying of flowers and fruits can be accelerated and a dried flower and dried fruit having the quality such as shape and color tone well maintained can be produced.

Solution. The dried flower or dried fruit production method includes placing flowers or fruits in a high vacuum environment exhibiting a gauge pressure of -60 to -95 kPa and cutting off the inhalation of the outside air, as well as drying while heating to 40 to 60°C and carrying out the dehumidification. The high vacuum environment preferably is an environment exhibiting a gauge pressure of -70 to -92 kPa. The dehumidification preferably is carried out by dew-condensing the moisture content within a vacuum drying chamber 11 by a refrigeration dehumidification unit 21. The time required for the drying is 10 to 24 hours.

Informations sur le brevet: JP 2016199503; A; FG Co. Ltd; JP; JP; JP 2015080972; 10 avril 2015 (20150410); Iwata, S

Langue: Japonais

Sujet: Fruits, vegetables and nuts -- Patents; DRIED FOODS; DRIED FRUITS; DRYING; EDIBLE FLOWERS; FRUITS DRIED; PATENTS; PLANTS; PRESSURE; VACUUM; VACUUM DRYING; VEGETABLES SPECIFIC

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Spilanthol content in the extract obtained by supercritical CO2 at different storage times of Acmella oleracea L

Auteur : Barbosa, A F; Pereira, C. de S. S.; Mendes, M F; Junior, R. N. de C.; de Carvalho, M G; Maia, J G S; Sabaa-Srur, A U O

Infos sur la publication : Journal of Food Process Engineering 40.3: e12441. (2017)

Résumé : The effect of the storage time on spilanthol content in the extract from Jambu obtained by supercritical CO_2 was evaluated on respect of their chemical properties. Lyophilized Jambu and partially dehydrated with cold air circulation was stored in an oven at 40°C for 195 days. After different storage times (0, 21, 41, 89 and 195 days), the samples were submitted to supercritical fluid extraction at the same operational condition of 300 bar and 40°C. The obtained extracts were analyzed by ^{1}H and ^{13}C NMR and GC-MS. The extract from lyophilized Jambu and from different storage times provided the respective spilanthol content, % (storage days): 1.07 (lyophilized); 0.68 (0); 0.41 (21); 0.31 (41); 0.41 (89) and 0.42 (195). These determinations allowed the identification of the constant presence of spilanthol as the major metabolite in the extracts, regardless of storage time, revealing the viability of the market for this product in chemical composition. Practical Applications. This paper showed the presence of spilanthol in all the extracts from a supercritical fluid, despite of the different storage times that the raw material (Jambu) was submitted, proving that it did not suffer degradation. This result is significant because spilanthol is considered the most special metabolite present in Jambu. Moreover, it has many biological properties and confers flavor with tingling and salivation during consumption. © 2016 Wiley Periodicals, Inc.

Langue: Anglais

Sujet: Additives, spices and condiments -- Spices and essential oils; AMIDES; DRIED FOODS; FREEZE DRIED FOODS; HERBS; PLANT EXTRACTS; PLANTS; STORAGE

Document 33 sur 311

Effect of vacuum microwave drying on the quality and storage stability of strawberries

Auteur : Bruijn, J de; Rivas, F; Rodriguez, Y; Loyola, C; Flores, A; Melin, P; Borquez, R

Infos sur la publication : Journal of Food Processing and Preservation 40.5: 1104-1115. (2016)

Résumé : The aim of this study was to determine how vacuum-assisted microwave drying (VMD, 50C, 6 kPa for 3 h) affects the quality attributes and shelf life of dehydratedstrawberries. Changes of quality attributes such as color, texture, and rehydration, shrinkage, polyphenol contents, antioxidant activity, and physicochemical and sensory properties were assessed after VMD. Vacuum packed, dehydrated strawberries were stored at 20C in the dark for 6 months. Decay of anthocyanins, flavonoids and polyphenols, and antioxidant activity was determined and modeled according to first-order kinetics. VMD resulted to minimum color difference. Texture changed by increased mechanical resistance and stiffness, and decreased toughness after VMD. Sensory attributes were between 3.5 and 4.3 on 5-point intensity hedonic scale. Anthocyanins were the most unstable components in strawberries after VMD and storage, assessing the strawberry shelf life to 68 days. Finally, VMD is a promising technology that can be used to maintain fruit quality and extend shelf life. Practical Applications. Drying is particularly important for handling and distribution of agricultural products with

high moisture content and limited shelf life such as fruits and vegetables. The main objective of drying is to reduce moisture content to a level where microbial spoilage and deteriorative chemical reactions of agricultural products are minimal. However, the degradation of nutrients in food during convective hot air drying results to quality loss. Therefore, new drying equipment and drying techniques have to be designed and studied. Vacuum-assisted microwave drying is an emerging dehydration method that may be efficient to preserve quality characteristics of food and additionally leads to shorten effective drying time. The purpose of this study was to determine the effects of vacuum-assisted microwave drying and subsequent product storage on the quality attributes and shelf life of strawberry fruits. This preservation technique may avoid freezing or refrigeration of fruit. © 2015 Wiley Periodicals, Inc.

Langue: Anglais

Sujet: Fruits, vegetables and nuts -- Berries; ANTIOXIDATIVE ACTIVITY; DRYING; MICROWAVE DRYING; MICROWAVES; PACKAGING; PHYSICAL PROPERTIES; PHYSICOCHEMICAL PROPERTIES; PROCESSING; REHYDRATION; SHELF LIFE; STABILITY; STORAGE; STRAWBERRIES; TEXTURE; TOUGHNESS; VACUUM; VACUUM DRYING; VACUUM PACKAGING

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Effects of gaseous O3 and modified atmosphere packaging on the quality and shelf-life of partially dehydrated ready-to-eat pepper strips

Auteur : Horvitz, S; Cantalejo, M J

Infos sur la publication : Food and Bioprocess Technology 8.8: 1800-1810. (2015)

Résumé : The efficacy of gaseous O_3 (0.7 µl l^{-1}, 3 min) together with different modified atmospheres (5/5 and 10/5 kPa O_2/kPa CO_2, respectively) was investigated for extending the shelf-life of partially dehydrated red pepper strips stored at 8 ± 1 °C. Changes in gas composition inside the packages, physicochemical, nutritional, sensory and microbiological quality were periodically evaluated. The best results were obtained in the O_3-treated samples stored under a modified atmosphere of 5 kPa O_2/5 kPa CO_2. In effect, the reduction in the pH, the loss of lightness, red colour and firmness and microbial growth were greater and were detected earlier in the control samples and in those peppers stored with 10 kPa O_2. Based on these results, the shelf-life of the peppers held in 10 kPa O_2/5 kPa CO_2 was 42 days, whereas packing the peppers with 5 kPa O_2/5 kPa CO_2 extended the shelf-life of the samples up to 59 days. Thus, the combination of O_3, partial dehydration and modified atmosphere packaging could be effective in maintaining the quality and extending the shelf-life of ready-to-eat partially dehydrated pepper strips. ©Springer Science+Business Media New York 2015.

Langue: Anglais

Sujet: Fruits, vegetables and nuts -- Other vegetables (including macrofungi); CAPSICUMS; COLD STORAGE; COLOUR; DRIED FOODS; DRIED VEGETABLES; FIRMNESS; MICROBIOLOGICAL QUALITY; MODIFIED ATMOSPHERE PACKAGING; OZONE; PACKAGING; PH; PROCESSED FOODS; READY TO EAT FOODS; RED PEPPERS; SHELF LIFE; STORAGE COLD; VEGETABLES

Document 42 sur 311

Post harvest ozone fumigation of wine grape before and during dehydration

Auteur : Botondi, R; Sanctis, F de; Moscatelli, N; Vettraino, A M; Mencarelli, F; Catelli, C

Infos sur la publication : Industrie delle Bevande 44.256: 5-10. (2015)

Résumé : Grapes, variety Pignala, were used in this experimental consisting of three theses: control, untreated sample, continuous ozone-treated [(1.5 g/h of ozone gas for 18 hours and then treated with 0.5 g/h for 4 hours/day (O_3 cont.)], and 18-hour-ozone-treated one [(1.5 g/h of ozone gas for 18 hours (O_3 18h)]. After these treatment, all samples were placed in 3 different cold stores at 10°C, relative humidity of 50% and a forced air ventilation of 1,5 m/sec. until to reach a weight loss of 35%. The above conditions were also applied to the untreated grapes with exception of the ozone gas application. Chemical and metabolic changes due to the effect of drying procedures and ozone treatments have been studied at starting time (t0), post-treatment with ozone for 18 hours, 20% and 35% of weight loss. On three theses were performed the following tests: dehydration, soluble solids content, titratable acidity, total polyphenols, total anthocyanins, moulds and yeast count. All analyses didn't show statistically significant differences among three theses after being treated with post-treatment ozone (18h). On the contrary, important differences have been found concerning ozone treatment after dehydration: as a matter of fact, both in polyphenols and anthocyanins assays, it has been proven to stimulate a greater antioxidants extractability, compared to control sample and continuous ozone-

treated one. Ozone, even at18 hours treatment, was very effective in the reduction of 50% of fungi and yeasts keeping a low CFU values during dehydration.

Langue: Italien

Sujet: Alcoholic and non-alcoholic beverages -- Wines; COLD STORAGE; DISINFECTION; DRYING; FUNGI; OZONATION; PHYSICAL PROPERTIES; PHYSICOCHEMICAL PROPERTIES; STORAGE COLD; WINEMAKING GRAPES; YEASTS

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Novel infrared dry blanching, infrared blanching and infrared drying technologies for food processing

Infos sur la publication : United States Patent Application Publication (2014)

Résumé : This invention relates to food processing and, in particular, blanching and dehydration of foods. Conventional blanching and dehydration requires use of steam and forced hot air. This invention is the first to effectively use infrared radiation energy to perform simultaneous blanching and dehydration of fruits and vegetables. Since this technology does not involve the addition of steam or water in the process of blanching, it has been named "infrared dry-blanching" (IDB) technology. IDB is intended to be a replacement for current steam, water and/or microwave blanching methods. It can be used to produce many kinds of value-added dried, refrigerated, frozen and dehydrofrozen foods such as fruit and vegetable products. In general, the advantages of IDB include (1) uniform heating which enhances energy efficiency and limits damage from over-heating, (2) capability of zone heating to address differential density, (3) ability to treat large or small lots with the same piece of equipment, (4) portability, since equipment can be built on wheels, and (5) a safe, non-toxic process with no harmful side-effects to humans or the environment.

Informations sur le brevet: US 20140287109; A1; United States of America, Department of Agriculture; US; US; US 917797; 13 août 2004 (20040813); Pan, Z; McHugh, T H

Langue: Anglais

Sujet: Fruits, vegetables and nuts -- Patents; BLANCHING; CHILLED FOODS; DRIED FOODS; DRYING; FROZEN FOODS; FRUITS; INFRARED RADIATION; IR DRYING; PATENTS; REFRIGERATED FOODS; VEGETABLES

Document 93 sur 311

Drying system for cold chambers

Infos sur la publication : German Federal Republic Patent Application (2011)

Résumé : An air-dehumidification system for use in cold stores, chillers etc. in the food industry is described.

Informations sur le brevet: DE 102010018347; A1; Hellmann-HYGREX Luft- und Klimatechnik GmbH; DE; DE; DE 102010018347; 27 avril 2010 (20100427); Hellmann, R

Langue: Allemand

Sujet: Engineering -- Patents; AIR; CHILLERS; COLD STORES; COOLING; DRYING; EQUIPMENT; PATENTS; STORAGE COLD

Document 110 sur 311

Food drying method and apparatus

Infos sur la publication : Japanese Patent Application (2009)

Résumé : A process and equipment for rapid and uniform drying of foods are based on conveying the food through an enclosure at controlled temp. and RH, with jets of dehumidified cold air. The driedfood has good flavour retention.

Informations sur le brevet: JP 2009213357; A; Maekawa Seisakusho KK; JP; JP; JP 2008057066; 06 mars 2008 (20080306); Omura, T; Hamada, T; Terada, M; Usami, H

Langue: Japonais

Sujet: Engineering -- Patents; DRIED FOODS; DRIERS; DRYING; FLAVOUR; PATENTS

Document 125 sur 311

Dry cold by removal of water vapour. Climate improvement in cooled production spaces by retrofitting of industrial driers

Auteur : Hellmann, C

Infos sur la publication : Fleischwirtschaft 86.5: 53-56. (2006)

Résumé : Condensation of water vapour on the surface of food products if they are moved from a colder to a warmer location is discussed with reference to: possibilities for elimination of this problem by lowering the dewpoint temp. of ambient air to below product temp.; dehumidification systems; single room air conditioning; required conditions for workers in refrigerated facilities; retrofitting the air conditioning system in a beef cutting unit; cooling, drying and UV C sterilization of air in air conditioning units; and possible applications in washing and scalding facilities in the meat industry.

Langue: Allemand

Sujet: Meat, poultry and game -- General aspects; AIR; AIR CONDITIONING; FOOD FACTORIES; MEAT; MEAT FACTORIES

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Post harvest studies on herb and oil of Mentha arvensis, L

Auteur : Shalaby, A S; El-Gamasy, A M; El-Gengaihi, S E; Khattab, M D

Infos sur la publication : Egyptian Journal of Horticulture 15.2: 213-224. (1988)

Résumé : A comparison was made of the dehydration of mint (Mentha arvensis L.) under shed conditions (27-30°C) or in an electric oven at 60°C. Moisture content was determined in plants before and after drying and before oil distillation. Post-dehydration storage of mint in kraftpaper bags, polyethylene bags, or synthetic jute-like bags was investigated. Samples were taken every 2 months for oil content detn. The oil samples were kept either in a refrigerator at 5°C or at room temp. (about 27°C). Results showed that air drying was the preferred technique since the oil content was maintained. Mean oil contents of 2.236 and 0.214%, resp., were assayed from air and oven drying. No significant effects were noted due to type of bag or storage period (up to 1 yr), the stored mint keeping its oil content without significant change. GLC analysis of the fresh oil revealed the presence of 18 compounds, of which 13 were identified. Menthol is the major constituent (64.20%) followed by cineol (15.0%). Following the phytochemical conversion of the microconstituents under different storage conditions, the oil constituents could be classifed into 6 groups with respect to their fluctuation or stability during the storage period.

Langue: Anglais

Sujet: Additives, spices and condiments; DRYING; ESSENTIAL OILS; FLAVOURINGS; MINT; OILS; SPICES; STORAGE

Document 185 sur 311

Dehumidifier assisted large scale deep-bed drying of grains

Auteur : Ting, K C

Infos sur la publication : Drying Technology 5.1: 129-140. (1987)

Résumé : The performance of a compression refrigeration type dehumidifier/heat pump with controllable discharge air dry bulb temp.(described in detail) was investigated as part of a large scale commercial soybean drying process. Results were compared with computer simulated results of unconditioned ambient air soybean drying (without the dehumidifier). The dehumidified and reheated air removed 743 kg of water from 130 m^3 of soybeans in 24 h, vs. 85 kg using ambient air. Because the dehumidifier achieved this improved performance without increasing the air temp., the grain damage was minimized. [From En summ.]

Langue: Anglais

Sujet: Fruits, vegetables and nuts; DRYING; HUMIDITY; SOYBEANS

Sciences direct – Scopus

Multi-stage continuous and intermittent microwave drying of quince fruit coupled with osmotic dehydration and low temperature hot air drying / Séchage par micro-ondes continu et intermittent de coing couplé à la déshydratation osmotique et au séchage à l'air chaud à basse température.

Jalal Dehghannya, Seyed-Hamed Hosseinlar, Maryam Khakbaz Heshmati

Department of Food Science and Technology, University of Tabriz, Tabriz 51666-16471, Iran

Innovative Food Science & Emerging Technologie Available online 7 October 2017 In Press,

http://www.sciencedirect.com/science/article/pii/S1466856417306720

Ces dernières années, **l'utilisation de micro-ondes intermittentes (IM)** pour sécher les aliments a été prise en considération comme l'une des nouvelles méthodes de séchage dans l'industrie alimentaire. L'objectif de cette recherche était de sécher des morceaux cubiques de fruits de coing prétraités par une solution osmotique de saccharose à l'aide d'un **séchage à l'air chaud (HA) IM à basse température (40 °C)** afin d'étudier les effets de ce procédé sur l'amélioration de la qualité du produit séché. Les variables du procédé comprenaient la solution osmotique de saccharose dans 5 niveaux de concentration de 0 (contrôle), 10,30,50 et 70 % (p/p) et dans 4 puissances de 0 (contrôle), 360,600 et 900 W, avec 4 rapports d'impulsions de 1,2,3 et 4.

Modeling of a convective-infrared kiwifruit drying process
International Journal of Hydrogen Energy
Volume 42, Issue 28, 13 July 2017, Pages 18005-18013
http://www.sciencedirect.com/science/article/pii/S0360319917300344

This paper aims to evaluate the experimental performance of a **convective-infrared system with heat recovery (CIRHR) at different drying temperatures (40, 45, 50 and 55 °C)** and 0.5 m/s air velocity and also to discuss and predict the performance of system on energy consumption and drying kinetics of sliced kiwifruit using artificial neural networks (ANNs). The energy efficiency values were obtained between 2.85% and 32.17%. The ANN model was used to predict the energy consumption of the system and moisture content of the kiwifruit. The back-propagation learning algorithm with Levenberg–Marquardt (LM) and Fermi transfer function were used in the network. The coefficient of determination (R^2), the root means square error (RMSE) and the mean absolute percentage error (MAPE) were calculated as 0.99, 0.001 and 0.34, respectively. It can be concluded that predicted values are in good agreement with experimental results.

Innovative freeze-drying process based on self-heat recuperation technology
Journal of Cleaner Production
Volume 168, 1 December 2017, Pages 1244-1250
http://www.sciencedirect.com/science/article/pii/S0959652617320784

Freeze drying is a drying technology that removes water from a target by sublimation of ice to vapor. Drying at low temperature and pressure (below the triple point) results in fewer physical and chemical changes to the dried products compared with the changes observed when using other drying technologies, leading to producing a high quality product. However, the weak point of freeze-drying technology is its large energy consumption. It is therefore necessary to reduce the energy required for the freeze-drying process and the energy costs of production so that this technology can be extended to the drying of other products. In this paper, a new energy-saving freeze-drying process based on the concept of self-heat recuperation technology was proposed. The energy required for the proposed process was compared with a conventional technique using a commercial process simulator. From the

simulation results, more than 80% of the energy required for drying can be saved by using the proposed process.

Nutritional and active ingredients of medicinal chrysanthemum flower heads affected by different drying methods

Industrial Crops and ProductsVolume 104, 1 October 2017, Pages 45-51

http://www.sciencedirect.com/science/article/pii/S0926669017302510

Drying treatments are considered to be the crucial step to preserve the plant's beneficial properties in the post-harvest processes. This paper mainly discussed the effects of four drying methods on quality of medicinal chrysanthemum flower heads, in order to providing the **optimal drying conditions** for different drying methods. The experimental design included: **microwave drying, steam kill-enzyme torrefaction, kill-enzyme torrefaction and oven drying**. The results showed that: (1) the contents of flavone and chlorogenic acids significantly increased with the increase of microwave power. However, microwave treatments significantly decreased amino acid content in flower heads. The optimal microwave power and microwave time were about 680–850 W and 8–13 min, respectively. In four drying methods, microwave drying was the most suitable method for keeping the higher contents of flavone, vitamin C and soluble sugar, considering efficiency and the energy consuming; (2) the contents of flavone and chlorogenic significantly increased with the increase of steam kill-enzyme time. However, the contents of amino acid, soluble sugar and vitamin C rose firstly and then decreased with the increase of steam kill-enzyme time. The optima steam kill-enzyme time was about 2–4 min; (3) the contents of flavone, chlorogenic acid and vitamin C increased firstly and then decreased with the increase of kill-enzyme time. Kill-enzyme torrefaction treatments significantly increased soluble sugar content. The optimal kill-enzyme time was about 0.5–1 min; and (4) the optimal oven temperature was about 55–65 °C, which could simultaneously gain the higher contents of active and nutritional ingredients in flowers. So, we should consider the specific conditions of each processing method when we choose the drying method.

Study on drying methods and their influences on effective components of loquat flower tea

LWT - Food Science and Technology

Volume 63, Issue 1, September 2015, Pages 14-20

http://www.sciencedirect.com/science/article/pii/S0023643815002431

Different drying methods and their influences on effective components contents of loquat flower tea were investigated in this study. The determination of total polyphenols (TP), total flavonoids (TF), free amino acid (AA), caffeine and triterpene acids showed relatively higher contents were found at full-bloom stage and in petal tissue. This stage flower was dried to produce loquat flower tea by methods of freeze drying, microwave drying, vacuum drying and hot-air drying, respectively. The results showed that four water-soluble components contents in tea prepared **by freeze drying** were the highest. Those by **microwave drying** increased firstly, then decreased with power, with the maximum at 420 W. **In vacuum-dried tea**, total polyphenols content (TPC) and total flavonoids content (TFC) reduced with temperature, but for AA, it increased with temperature. **In hot-air dried** flower tea, TPC and TFC exhibited a similar tendency as those by microwave dry, with the maximum at 80 °C and minimum at 40 °C. For AA, it increased with temperature. The contents of caffeine, triterpene acid in tea prepared by all drying methods showed no significant difference. It was concluded that the methods of freeze drying and microwave drying at 420 W can protect the effective components preferably.

Internet

Etude de 2010 sur des équipements pour PPAM - données économiques énergétiques, liste de fournisseurs déshumidificateurs
Relu par Bert Candaele – CRIEPPAM
http://www.maraibio.fr/medias/files/le-sechage-des-ppam-par-deshumidification.pdf

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Etude de la déshumidification de l'air pour les applications de séchage dans les régions humides
Revue des Energies Renouvelables SMSTS'08 Alger (2008) 135 – 144
H. Derbal*, M. Belhamel , A. Benzaoui et A. Boulemtafes

http://www.cder.dz/download/smsts08_17.pdf

Ce travail consiste à proposer une solution à l'un des problèmes les plus sérieux rencontrés dans les techniques de séchage qui est l'implantation des installations de séchage dans les régions où le taux d'humidité est très élevé. La solution proposée est la déshumidification de l'air avant son introduction au séchoir. Trois méthodes sont proposées: par adsorption, par absorption et par réfrigération. L'analyse des trois procédés nous a permis de choisir la déshumidification par adsorption vu sa simplicité, son coût, et sa moindre génération des gaz à effet de serre. Ce procédé à tendance à réchauffer l'air ambiant ce qui représente un point très favorable pour le séchoir qui est alimenté par l'air chaud.
Mots clés: Déshumidification – Séchage – Adsorption – Absorption – Réfrigération.

DALIANLELEJIA Machinery Co., Ltd. **http://www.dlllj.com/index_en.html**

Cold drying serie
ex : New cold air dryer **http://www.dlllj.com/html_products/lfj-1-1-46.html**

A new generation of low-temperature drying products - cold air dryer is the food, chemical, pharmaceutical, aquatic products, vegetables and other processing of the preferred drying equipment, drying machine drying by the cold air over the food can not only maintain the original quality, and easier to package, storage, transport. Cold air dryer for drying all kinds of high quality, uniform and other food and vegetables and herbs. Control technology and its performance can be comparable with similar foreign products. Environmental control desiccant temperature 10-35 degrees Celsius. Dehydrating effect, the material no distortion, no color, full. Features: Three automatic modes of operation:
1, cooling drying mode - in hot and humid environment, the unit automatically run dry and cool mode, the unit heat generated by the cooling water discharged to the atmosphere 2, thermostat drying mode - in the temperature requirements, the thermostats drying , dry air under constant temperature conditions 3, heating drying mode - at low temperature cold, damp environment, the unit automatically heated drying mode, does not reduce the indoor temperature to dry.
Dry and cold food cold drying principle is the use of low temperature and humidity forced circulation of air between the food, so that gradually reduce the water content to dry process. Low temperature and humidity of air in forced circulation of continuous absorption of food surface moisture; saturated air through the evaporator, the refrigerant evaporator in the evaporation,Evaporator surface temperature dropped to the dew point temperature below the cooling air through the evaporator and after the precipitation of water, precipitation water discharged from the catchment storage body; low temperature and humidity of air and then into the condenser, the condenser in the flow from the compression machine high-temperature gaseous refrigerant, so

the air is heated to form dry air; then mixed with the saturated air to generate repeated low temperature and humidity of air circulation. For fish, shrimp, abalone, sea cucumber, aquaculture, river fish, ginseng, mushrooms, mushrooms, herbs, vegetables, fruits, meat, poultry, pet food, honeysuckle, etc.
Technical parameters:
compressors dehydration: U.S. Taikang 3P thermal cycling devices: high-efficiency energy-saving cycle of Scale blower: 160W * 6 high-efficiency energy-saving voltage: ~ 220v ~ 380v and optional. Power: Cooling power: 3P, heating power: 2KW. Size: 2600 × 700 × 1780mm plate: 304 Stainless Steel

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Alibaba **Low Temperature Cold Drying Technology Dill Leaves**
https://www.alibaba.com/product-detail/Low-Temperature-Cold-Drying-Technology-Dill_50035321844.html

Product Name Dried Dill Leaves
Shelf Life 2 Years
Color Green
Processing Type Raw
Shape Sliced
Style Dried
Drying Process AD
Crop 2016
Packing in 25 kg pp bags or according to customer's requirments.

COLD drying : Une fois le produit accepté, il est trié selon sa taille et sa couleur, déshydraté (lentement à l'ombre ou mécaniquement), broyé et emballé.

Jambu drying with cold air circulation

Barbosa, Alan & Valesca Rodriguez Aliceo, Tatiana & Morais Rodrigues, Fernando & Garcia da Silva Morais Rodrigues, Liliane & Ubirajara Oliveira Sabaa-Srur, Armando. (2015). Jambu drying with cold air circulation. Journal of Bioenergy and Food Science. 2. 46-54. 10.18067/jbfs.v2i2.28.

The purpose of this study was to evaluate the drying process of jambu using cold air which is a technology that can add value to the horticultural food, improve the production rates and help in waste reduction. Initially, the vegetable is washed in water in order to remove residual impurities. Then, the roots are removed. The raw material is sanitized with 200 ppm (mg.L -1) of sodium hypochlorite (10 minutes). Therefore, the final rinse is carried out with a 5 ppm sodium hypochlorite bath for 10 minutes with the subsequent drainage of this water. The cold air-drying of jambu is performed under temperatures around 77°F using an air conditioning system. A dehumidifier is used in order to reduce the product's relative humidity (54.6 ± 2.87). The process takes place in a room with an area of 4 square meters that remains shut during the process, which lasts a total time of 44 hours. Later, the product is stored in a high protective package to avoid moisture. Jambu centrifugation is not performed because its leaves are fragile. The cold air-dried jambu is in accordance with the current legislation regarding microbiological aspects. Also, it is well accepted by consumers and its centesimal composition is similar to fresh jambu. Other drying techniques can also be applied, such as hot air and ultrasound. Thus, considering sanitary and sensory aspects and chemical composition, the commercialization of dried jambu is feasible in terms of transport and handling.

Jambu drying with cold air circulation
https://www.researchgate.net/publication/281399167_Jambu_drying_with_cold_air_circulation

Dans l'article :
Cold air drying is a simplification of the lyophilization process at atmospheric pressure, through the elimination of the freezing step. Water removal occurs in environments with low temperature and relative humidity, and it is kept in the liquid state during the entire process, so that products with intermediate moisture content can be obtained. This characteristic confers high stability to them without loss of plasticity. (KUBOTA e CALVIDAL, 1987)

Advanced Low Temperature Cold Dried (LTCD) Freeze drying?

http://www.rosundehydration.com/carrot-powder.html

We process our fruit, vegetable, herbal and flower products using low temperature, cold drying technology which enables effective drying of our products without losing their flavour, aroma and colour.

Dehydration Drying Technology
Rosun dehydration technology utilizes a combination of vacuum pressure and microwave energy to deliver a high speed and a low temperature ingredient dehydration process. The technology is an efficient and cost effective method used to dry fruits and vegetables.

Cantho Vietnam

Research an herb cold drying model combines two drying modes
A researcher team includes **Prof. Dr. Hoang Ngoc Dong, and Ha Van Tuan from Da Nang Polytechnic University r**esearched, proposed a cool drying model that combines two modes of low-high temperature to dry herbs.
http://en.canthostnews.vn/?tabid=230&NDID=14414

Author group examined several practical and theoretical experiments with a real drying device, such as heat pumps, and analyzed its strengths and weaknesses during drying process, including hot-cold drying.
The team also built a cold drying model that combined two high and low temperature drying modes to dry herbs, reduced its disadvantages of separately hot- cold drying process.
Research team also presented operation process, and reviewed at model's weak-good points.
The study can serve learning and research requirements of students, thermo-cold technology specialization engineers. Concurrently, it is also a foundation that enterprises can process and preserve herbs to reduce costs, and improve quality of products.

Site du Information and Documentation Center under Can Tho Science and Technology Department
Address: 118/3 Tran Phu street, Cai Khe ward, Ninh Kieu district, Can Tho city Tel: 0710 3824031 - Fax: 0710 3812352 Email: tttlcantho@cantho.gov.vn

A PRACTICAL RESEARCH MODEL OF THE LOW TEMPERATURE DRYING SYSTEM USING A HEAT PUMP 2008
http://www.kh-sdh.udn.vn/zipfiles/so27/r.02.dong-tri-11-7-pr13.pdf

EXPERIMENTAL STUDIES FOR DRYING OAGRICULTURAL FOOD PRODUCTS AT LOW TEMPERATURE
To build design software of cold convection drying system for drying agricultural products
MARCH 13, 2012 BY LEAVE A COMMENT
http://www.kh-sdh.udn.vn/zipfiles/sv2008-tb3/6R.son-Bui%20Tuan%20Son%20-%20Vo%20Nhu%20Quang.pdf

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Naturex introduces cold-processed 100% fruit and vegetable powders
By Caroline Scott-Thomas Foodnavigator
07-Apr-2013

The BRIS process uses ambient temperature air which has been dried using heating and silica gel to a few percent relative humidity, in a counter current drying tower.
Le procédé BRIS utilise de l'air ambiant à température ambiante qui a été séché à l'aide de gel de silice et de chauffage à une humidité relative de quelques pourcent, dans une tour de séchage à contre-courant.

http://www.ift.org/~/media/food%20technology/pdf/2013/08/0813_col_ingredients_2.pdf?fullsite=true

Towering Dried Fruit Powder Quality

On the other side of the Atlantic exists another kind of technology that was developed to spray-dry apples, tomatoes, and carrots into powder while preserving not only their nutrients, but also their flavor, color, and texture. What some might say transcends standards of spraydrying is the BIRS tower located in Burgdorf, Switzerland, and named after the famous Birs river that flows through the area.

Reaching a height of 250 feet, the BIRS tower is the tallest spray-drying facility in the world.

According to Frederic Randet, Business Manager at Naturex (www.naturex.com), Avignon, France, droplets of pulp are sent from the top of the tower, and ground airflow counters their fall, allowing for gentle drying at temperatures of less than 50° C. The result is a coldtemperature processed natural powder containing no additional carriers.

In contrast, usual spray-drying systems generally involve juice concentrates mixed with maltodextrin and heat greater than 130° C that leads to loss of nutrients, flavor, color, and texture. “This cold drying takes more than a minute because it takes a long time for the pulp to losewater and become a natural powder,” Randet says. “We really preserve all the nutrients due to the high tower. It’s like a garden in powder with all the aspects of nutrients, colors, flavor, and taste.”

The BIRS-quality powders work well in applications such as dehydrated soups and sauces, bakery , goods, and in baby food. Baby food is one of the biggest markets for the products because of fondness for clean labeling, as well as the nature and flavor of the product. The difference rests in starting from pulp instead of juice concentrate mixed with maltodextrin. “The best example , is apple sauce,” Randet says.

ANNEXE 2

Séchage à froid - Brevets

WO2017121260 (A1) — 2017-07-20

DRYING SYSTEM COMBINING HOT AIR DRYING AND COLD AIR DRYING

Inventeur(s) CHEN YILONG [CN];
HU SHUCHUAN [CN]; ZHANG YANFENG [CN] Demandeur(s) ZHONGYING CHANGJIANG INT NEW ENERGY INVEST CO LTD [CN]
Classification: - internationale F24J2/00; F26B21/00; F26B25/00; F26B9/02 – F24J2/00; F26B21/00; F26B25/00; F26B9/02

A drying system combining hot air drying and cold air drying comprises a solar greenhouse (1), an air condenser (2), a water-bath deduster (9), a heat source, an air heater (4), a smoke refrigerating device, an air cooler (8), pipes connected to the devices, and valves (13.1-13.5) and a fan (7.1-7.6) disposed on the pipes. The solar greenhouse (1) is a sealed structure, and the air condenser (2) is a cylindrical structure. The heat source is connected to the air heater (4). An air inlet of the solar greenhouse (1), an air outlet of the air condenser (2) and an outlet of the air heater (4) communicate with one another by means of the pipes. An air outlet of the solar greenhouse (1) communicates with an air box (2.1) above the air condenser (2) by means of the pipe. A smoke outlet of the air heater (4) is connected to the smoke refrigerating device. Energy is utilized at multiple levels on the system, thereby improving the thermal efficiency of drying.

CN105767849 (A) — 2016-07-20

Microwave assisted fluidized cold wind drying method

Inventeur(s) ZHANG ROUJIA; WANG YIFEN; LUAN DONGLEI; JIAO YANG +
Demandeur(s) UNIV SHANGHAI OCEAN +
Classification: - A23L3/50; A23L3/54

The present invention relates to a microwave assisted fluidized cold wind drying method. The cold wind drying method includes the following four steps: a cleaning pretreatment, a first phase fluidized cold wind drying, a second phase fluidized microwave and fluidized cold wind combined drying, and a third phase fluidized and cold wind drying. The advantages are as follows: the method enables the food materials to be more even in heat and mass transfers in the drying process, the microwave-assisted cold wind drying is used, and the method solves the problems that the traditional cold wind drying time is long and the efficiency is low. At the same time, carbon dioxide is used as a drying medium, the oxidative browning caused by contact of food and air during the drying processes is effectively avoided, and the drying quality of the food is improved.

La présente invention porte sur une méthode de séchage par vent froid fluidisé assistée par micro-ondes. La méthode de séchage par vent froid comprend les quatre étapes suivantes: un prétraitement de nettoyage, un séchage par vent froid fluidisé en première phase, un séchage combiné par micro-ondes et vent froid fluidisé en deuxième phase et un séchage par vent froid fluidisé en troisième phase. Les avantages sont les suivants: la méthode permet d'obtenir des matériaux alimentaires plus homogènes dans les transferts de chaleur et de masse dans le processus de séchage, le séchage par vent froid assisté par micro-ondes est utilisé, et la méthode résout les problèmes que le temps de séchage par vent froid traditionnel est long et l'efficacité est faible. En même temps, le dioxyde de carbone est utilisé comme milieu de séchage, le brunissement oxydatif causé par le contact des aliments et de l'air pendant les processus de séchage est efficacement évité et la qualité de séchage des aliments est améliorée.

CN105758126 (A) — 2016-07-13

Roxburgh anoectochilus terminal bud microwave variable-frequency cold drying method and dedicated device

Inventeur(s) ZHANG YUEHUA; ZHANG SHENGYUE +
Demandeur(s) GONGXIANG HERB (YONGTAI) BIOTECHNOLOGY CO LTD +
Classification: - F26B15/18; F26B23/08; F26B25/00; F26B3/347 – F26B15/18; F26B23/04; F26B25/00; F26B25/001; F26B3/347; F26B2200/02

The invention relates to a roxburgh anoectochilus terminal bud microwave variablefrequency cold drying method and a dedicated device.Undried roxburgh anoectochilus terminal buds are dried with a closed microwave variable-frequency drying device, the microwave variable-frequency drying device comprises one or more unit heating boxes communicated inside, and each unit heating box comprises a heating cavity and a microwave generator generating microwaves in the heating cavity; the roxburgh anoectochilus terminal buds are input through an inlet, one or more unit heating boxes are communicated in sequence from a feed inlet to a discharge outlet of the microwave variable-frequency drying device, and the roxburgh anoectochilus terminal buds are dried through the heating cavities in sequence; meanwhile, a heat dissipation system and a moisture exhaust system are started at the same time, moisture generated during drying of the roxburgh anoectochilus terminal buds is exhausted, and circulating ventilation and heat dissipation are conducted on the microwave generators at the same time; the roxburgh anoectochilus terminal buds are dried repeatedly till the humidity of the dried roxburgh anoectochilus terminal buds reaches a set threshold value.The method and device have the advantage that by drying the roxburgh anoectochilus terminal buds through microwaves, the internal physiological structure of the roxburgh anoectochilus terminal buds is not damaged, so that it is guaranteed that nutrients in the roxburgh anoectochilus terminal buds are not lost.

L'invention concerne un procédé de séchage à froid à fréquence variable hyperfréquence de bourgeons terminaux de roxburgh anoectochilus et un dispositif dédié. Le dispositif de séchage à fréquence variable de micro-ondes comprend une ou plusieurs boîtes de chauffage d'unité communiquées à l'intérieur, et chaque boîte de chauffage d'unité comprend une cavité de chauffage et un générateur de micro-ondes générant des micro-ondes dans la cavité de chauffage; les boîtes terminales de roxburgh anoectochilus sont introduites par une entrée, une ou plusieurs boîtes de chauffage sont communiquées séquentiellement d'une entrée d'alimentation à une sortie de décharge du dispositif de séchage à fréquence variable hyperfréquence et les bourgeons terminaux de roxburgh anoectochilus sont séchés à travers les cavités chauffantes en séquence; pendant ce temps, un système de dissipation de la chaleur et un système d'évacuation de l'humidité sont démarrés en même temps, l'humidité générée pendant le séchage des bourgeons terminaux de roxburgh anoectochilus est épuisée et la ventilation et la dissipation de la chaleur sont conduites simultanément sur les générateurs de micro-ondes; les bourgeons terminaux de roxburgh anoectochilus sont séchés à plusieurs reprises jusqu'à ce que l'humidité des bourgeons terminaux de roxburgh anoectochilus séchés atteigne une valeur seuil fixée. Le procédé et le dispositif ont l'avantage qu'en séchant les bourgeons terminaux de roxburgh anoectochilus par micro-ondes, la structure physiologique interne des bourgeons terminaux de roxburgh anoectochilus n'est pas endommagée, de sorte qu'il est garanti que les éléments nutritifs des bourgeons terminaux de roxburgh anoectochilus ne sont pas perdus.

CN206192097 (U) — 2017-05-24

Cold condensate recovery system of drying device technology in advance
Inventeur(s) WEI TINGTING; LI QING; CHEN GANG; HUANG XUEQUN; REN JING; XU LIN; GUO YUNFEI
Demandeur(s) WUHUAN ENG CO LTD +
Classification: - internationale F26B25/00

The utility model discloses a cold condensate recovery system of drying device technology in advance has solved the problem that the cold condensate recovery resistance of present low pressure steam is big, can't realize automatic control, the interior ponding of indirect heating equipment. Technical scheme includes the desiccator, condensate discharge pipe link bit in the low pressure liquor condensate groove of below of desiccator, low pressure liquor condensate groove's top is equipped with the atmospheric valve, is equipped with the condensation liquid pump on the outlet pipe of bottom, be equipped with first manometer on the condensate discharge pipe of desiccator, be equipped with the second manometer in the low pressure liquor condensate groove, the output of first manometer and second manometer is connected with pressure controller's input, pressure controller's output and atmospheric valve are connected. The utility model discloses the system is simple, the good reliability, can realize that automatic control, operation are stable, can guarantee that the desiccator in succession, under the prerequisite of normal operating, fully retrieve the tubular desiccator and trade thermogenetic condensate.
Le modèle d'utilité décrit un système de récupération de condensat à froid de la technologie de dispositif de séchage à l'avance a résolu le problème que la résistance de récupération de condensat froid de la vapeur à basse pression actuelle est grande ne peut pas réaliser le contrôle automatique de l'équipement de chauffage indirect. Le schéma technique comprend le dessiccateur, le tuyau de décharge de condensat bit dans la cannelure de condensation de la liqueur basse pression au-dessous du dessiccateur, la canette de condensat basse pression est équipée de la soupape atmosphérique, est équipée de la pompe de liquide de condensation sur le tuyau de sortie du fond, être équipé d'un premier manomètre sur le tuyau d'évacuation de condensat du dessiccateur, être équipé du second manomètre dans la rainure de condensat de la liqueur basse pression, la sortie du premier manomètre et du second manomètre est reliée à l'entrée du régulateur de pression, la sortie du régulateur de pression et la vanne atmosphérique . Le modèle d'utilité indique que le système est simple, la bonne fiabilité, peut réaliser que le contrôle automatique, le fonctionnement sont stables, peut garantir que le dessiccateur successivement, sous condition de fonctionnement normal, récupère complètement le dessiccateur tubulaire et commercialise le condensat thermogénétique.

CN204949317 (U) — 2016-01-13

Utilize used heat cold air drying marine product device

Inventeur(s) SUN LIANG; XU GUANGYING + (SUN LIANG, ; XU GUANGYING) Demandeur(s) UNIV ZHEJIANG OCEAN + (ZHEJIANG OCEAN UNIVERSITY) Classification: - internationale A23B4/03 - coopérative

The utility model provides an utilize used heat cold air drying marine product device, including first pipeline, the shelf, first forced draught blower, first hot water tank, first runner dehumidifier, first suction pump, the first pond that thaws, first extension board, first fretwork, first round pin axle, the second extension board, the second fretwork, second round pin axle, the cylinder, scissor arm, the second hot water tank, the second pond that thaws, the second suction pump, the drying chamber, the second forced draught blower, a second cooler, the second pipeline, the second valve, second runner dehumidifier, a first cooler, first valve, a controller, first pivot, first runner, first casing, first belt, first motor, first moisture absorption cloth, first drier, the second pivot, the second runner, the second casing, the second belt, the second motor, second moisture absorption cloth and second drier, install first forced draught blower under the shelf, first forced draught blower passes through the pipeline and links to each other with first runner dehumidifier, the utility model has the advantages that: low temperature helps guaranteeing the quality of marine product.

Le premier modèle comprend un premier pipeline, une étagère, un premier ventilateur à tirage forcé, un premier réservoir d'eau chaude, un premier déshumidificateur de coureur, une première pompe d'aspiration, un premier bassin qui dégèle, une première plaque d'extension, le deuxième échangeur, le second échangeur, le cylindre, le bras de ciseaux, le deuxième réservoir d'eau chaude, le deuxième bassin qui décongèle, la deuxième pompe d'aspiration, la chambre de séchage, la deuxième un premier

refroidisseur, une première vanne, un contrôleur, un premier pivot, un premier coulisseau, un premier carter, une première courroie, un premier moteur, un premier chiffon d'absorption d'humidité , deuxième sécheur, second deuxième moteur, second tapis, second tapis, second tapis, deuxième tapis d'absorption d'humidité et deuxième sécheur, installer le premier ventilateur à tirage forcé sous la tablette, premier tirage forcé Le modèle d'utilité a les avantages suivants: la basse température aide à garantir la qualité du produit marin.

CN204907763 (U) — 2015-12-30

Cold air drying tealeaves recovery unit

Inventeur(s) HUANG JIANJUN + (HUANG JIANJUN) Demandeur(s) HUANG JIANJUN + (HUANG JIANJUN) Classification: - internationale A23F3/06 - coopérative

The utility model discloses a cold air drying tealeaves recovery unit, including the cold air drying tealeaves recovery unit body, the cold air drying tealeaves recovery unit body is including cold wind device, controlling means and dry bucket, controlling means sets up the both sides at the cold wind device, each controlling means is respectively through cool air hose and dry bucket both sides fixed connection, the cold wind device is including condenser and fan, the cold wind device is connected with cold wind recovery unit, the top of dry bucket is provided with the gas vent, inside one side of dry bucket is provided with temperature sensor, dry bucket outside is provided with the display, dry bucket middle part is provided with the feeding switch, dry bucket one side is provided with the cold wind export, the cold wind export is through cold wind recovery tube and cold wind recovery unit fixed connection, this cold air drying tealeaves recovery unit can will have the cold wind recycle of a large amount of cold energies, and suitable wind speed can be adjusted through observing the display to can be more even and rapid carry cold wind in dry barrel.

Le module d'utilité décrit une unité de récupération de tealeaves de séchage à air froid, comprenant le corps d'unité de récupération de tealeaves de séchage à air froid, le corps de récupération de tealeaves de séchage à air froid comprenant un dispositif de vent froid, des moyens de commande et un seau sec. le dispositif d'air froid comprend le condenseur et le ventilateur, le dispositif de vent froid est relié à l'unité de récupération du vent froid, le sommet du seau à sec est le seau sec à l'extérieur est fourni avec l'affichage, la partie centrale du seau sec est fourni avec le commutateur d'alimentation, seau sec d'un côté est fourni avec l'exportation du vent froid, l'exportation de vent froid est par le tube de récupération du vent froid et la connexion fixe de l'unité de récupération du vent froid, cette unité de récupération de tealeaves de séchage à l'air froid peut avoir le refroidissement du vent froid cle d'une grande quantité d'énergies froides et la vitesse appropriée du vent peut être ajustée en observant l'affichage pour être plus uniforme et porter rapidement le vent froid dans le canon sec.

CN205090657 (U) — 2016-03-16

Toast cold -stored integration system device suitable for fruit vegetables are drying in air source Inventeur(s)

Inventeurs ZHANG QIAN; ZOU SHUPING; MENG YI'NA; XU MINGQIANG; ZHANG JIAN; MA YAN; TAI XIAOLIANG + (ZHANG QIAN, ; ZOU SHUPING, ; MENG YI'NA, ; XU MINGQIANG, ; ZHANG JIAN, ; MA YAN, ; TAI XIAOLIANG) Demandeur(s) AGRICULTURAL PRODUCTS STORAGE AND PROC RES INST XINJIANG ACAD OF AGRICULTURAL SCIENCES + (AGRICULTURAL PRODUCTS STORAGE AND PROCESSING RESEARCH INSTITUTE, XINJIANG ACADEMY OF AGRICULTURAL SCIENCES) Classification: - internationale A23B7/02; A23B7/04; F25B29/00; F26B23/00 –

The utility model provides a toast cold -stored integration system device suitable for fruit vegetables are drying in air source, including heating refrigeration double -purpose room, toast cold -stored double -purpose room, automatically controlled cabinet, the integrative master control unit of heat engine water receiving tank and double -purpose, organism in the integrative master control unit of double -purpose is two -layer panel frame construction, organism upper strata panel right side end is equipped with new air intake, left side end below hangs the temperature -sensing probe, be equipped with the return air inlet between two -layer panel, install the fan under the new air intake, a fan side -mounting condenser, the condenser below is equipped with the water collector, respectively install aviation baffle and air distributing plate about condenser one side, the other hydrofuge wind channel that sets up of one side panel of new air intake right - hand member perpendicular to organism upper strata panel, organism left side below sets up the main set, the main set bottom is equipped with the water receiving tank. The utility model discloses with the stoving of fruit vegetables, cold -stored combining, realize two kinds of functions of set of equipment stoving refrigeration, there are extensive practicality and novelty to agricultural product processing industry

Le modèle d'utilité fournit un dispositif de système d'intégration à froid stocké à froid, adapté aux légumes de fruits qui sèchent dans la source d'air, y compris la chambre de réfrigération de chauffage à double usage, la salle à double usage refroidie par immersion à froid, l'armoire à commande automatique, réservoir d'eau de réservoir de moteur et à double usage, l'organisme dans l'unité de contrôle maître intégrative de double-usage est à deux couches cadre de construction du panneau, l'organisation du panneau supérieur strates côté droit est équipé d'une nouvelle entrée d'air, sonde de détection, être équipé de l'entrée d'air de retour entre le panneau à deux couches, installer le ventilateur sous la nouvelle entrée d'air, un condenseur monté sur le ventilateur, le condensateur ci-dessous est équipé du collecteur d'eau, installer le déflecteur d'aviation et plaque de distribution d'air à propos du condenseur d'un côté, l'autre canal de vent d'hydrofuge qui met en place un panneau latéral de nouvelle entrée d'air droit membre droit perpendiculaire à org panneau supérieur de strates d'anisme, l'organisme côté gauche met en place l'ensemble principal, le fond de jeu principal est équipé du réservoir de réception d'eau.

Le modèle d'utilité décrit avec la cuisson des légumes-fruits, combinés à froid, réaliser deux types de fonctions de l'ensemble de l'équipement de réfrigération, la pratique et la nouveauté dans l'industrie de transformation des produits agricoles.

ANNEXE 3

Décontamination- FSTA

Document 1 sur 57

Slow-release chlorine dioxide gas treatment to reduce Salmonella contamination on spices for small-scale processors

Auteur : Golden, C; Mark, B; Kerr, W; Harrison, M

Infos sur la publication : Journal of Food Protection 80.Suppl. A: 147. (2017)

Résumé : Introduction. *Salmonella* is a major food safety concern in spices. Multiple studies have shown chlorine dioxide's (ClO_2) effectiveness at reducing microbial levels on produce and other food products. Spices treated with ClO_2 generated from self-contained sachets could be a potential antimicrobial treatment for small-scale processors and distributors. Purpose. This study determined the effectiveness of a slow-releasing ClO_2 gas generated from self-contained sachets to reduce *Salmonella* contamination on spices and to see if this treatment would be applicable on a small-scale. The combined effect of ClO_2 gas treatment and storage time on *Salmonella* levels on spices was evaluated. Methods. Three different spices (black peppercorns, sesame seeds, and cumin seeds) were inoculated with a cocktail of five different nalidixic acid resistant *Salmonella* strains by soaking and mixing the spices in the cocktail for 30 min. The inoculated spices were then dried in a biosafety hood for 24 h. Spices were treated with 0, 100, 200, or 500 mg ClO_2/kg spice using a self-contained, slow-release ClO_2 media in a rotating tumbler for 12 h. Immediately after treatment, and at days 1, 10, and 30 post-treatment, samples were plated to enumerate surviving *Salmonella*. Results. When compared to the control treatment, each concentration of ClO_2 was effective in reducing *Salmonella* contamination for all three spices tested. Out of the three different concentrations of ClO_2 tested, 500 mg/kg decreased *Salmonella* levels by > 2.0 logs at day 0. *Salmonella* levels stayed relatively consistent across the first 10 days of post-treatment storage, but levels decreased by at least an additional 0.5 logs by day 30. Significance. Chlorine dioxide gas provides a quality, non-heat alternative treatment, especially for smaller-scale operations to reduce *Salmonella* contamination in spices. The versatility of being able to use the treatment at many points in the supply chain also makes it desirable.

Langue: Anglais

Sujet: Additives, spices and condiments -- Spices and essential oils; ANTIBACTERIAL ACTIVITY; BACTERIA; BACTERIAL CONTAMINATION; BLACK PEPPER; CHLORINE DIOXIDE; CONFERENCE POSTERS; CONFERENCE PROCEEDINGS; CONTAMINATION; CUMIN; FOOD SAFETY PLANT FOODS; GASES; INHIBITION; MICROORGANISMS; OXIDIZING AGENTS; POUCHES; SACHETS; SALMONELLA; SESAME SEEDS; SPICES; STORAGE

Document 2 sur 57

Single-step enrichment followed by real-time PCR detection of low levels of sub-lethally injured Salmonella in low-moisture ready-to-eat foods

Auteur : Olishevskyy, S; St-Laurent, C; Hellmer, A; Buzinhani, M; Giuffre, M

Infos sur la publication : Journal of Food Protection 80.Suppl. A: 285. (2017)

Résumé : Introduction. Low-moisture foods form an integral part of the modern human diet. Despite the fact that *Salmonella* cannot grow in low-moisture environment, these bacteria remain viable at low levels for extended periods of time and present a major cause of reported foodborne illness outbreaks related to the consumption of foods with low-water activity. Purpose. The objective of this study was to optimize and validate application of alternative single-step enrichment to detect low levels of sub-lethally injured *Salmonella* with a real time PCR assay in low-moisture ready-to-eat foods. Methods. Peanut butter (25 g), raisin (25 g) and raw almond (375 g) samples were artificially contaminated with different sublethally injured by heating or desiccation *Salmonella* strains and stabilized for 14 days prior to testing. For each matrix, five uncontaminated, 20 low level and five high level contaminated samples were enriched at 35°C in 75-750 mL Actero™ *Listeria* Enrichment Media, and then processed with the DuPont™ BAX® System Real-Time PCR Assay for *Salmonella* to compare with the samples tested according to the US FDA BAM 5 reference method. Additionally, efficacy of the alternative method was confirmed with various low-moisture ready-to-eat foods closely related to the validated matrices. A total of 505 samples of 25 g each, including dried or dehydrated fruits such as apricot, apple, date and cranberry; nuts such as cashew, walnut and pecan; and natural, crunchy and honey peanut butter were artificially contaminated with different levels (0.2-10 MPN/sample) of sublethally injured *Salmonella* and tested using the alternative method. Results. According to the Probability of Detection, the alternative method showed equivalent performance to the reference method. No false positive or false negative results were observed. Significance. The alternative method offers the capability of detecting *Salmonella* in low-moisture ready-to-eat foods after only 16 hours of enrichment, thereby significantly reducing presumptive reporting time in comparison with the reference method.

Langue: Anglais

Sujet: Fruits, vegetables and nuts -- General aspects (fruits and vegetables); BACTERIA; BACTERIAL CONTAMINATION; CONFERENCE POSTERS; CONFERENCE PROCEEDINGS; CONTAMINATION; DRIED FRUITS; ENRICHMENT TECHNIQUES; FOOD SAFETY PLANT FOODS; FRUITS DRIED; MICROBIOLOGICAL TECHNIQUES; MICROORGANISMS; MOISTURE CONTENT; NUTS; PCR; PEANUT BUTTER; PEANUTS; PROCESSED FOODS; READY TO EAT FOODS; REAL TIME PCR; SALMONELLA; SPREADS

Document 3 sur 57

Qualitative detection of fungal contamination in paprika powder

Auteur : Vyhnanek, T; Machalkova, Z; Trojan, V; Hanacek, P; Safrankova, I; Havel, L

Infos sur la publication : Journal of Food Safety 37.1: e12296. (2017)

Résumé : Dried red pepper is one of the most commonly used spices in many parts of the world. In this study molecular biology methods were applied for detection of contamination in nine samples of paprika powder. Internal Transcribed Spacer (ITS) regions were selected for sequencing as they have a high variability between species and organisms and therefore are an appropriate tool for taxonomic identification. The sequence analysis of the ITS regions were identified by high sequence similarity with the ITS regions of many microscopic fungi, especially representatives of the class *Ascomycota* and several other yeast species. This work was a qualitative rather than a quantitative detection, so the extent to which fungi and yeasts were present in the samples is unknown. However, supplied quality certificates (microbiological data) indicated the overall quality of samples. Harmful microorganisms were identified in the paprika powder samples and the likely mode of contamination was identified. Practical Applications. The presence of undesirable pathogens can be a serious problem for consumers, especially contamination by microscopic fungi that have the potential to produce mycotoxins. Today's conventional methods for determining contamination by microorganisms are time consuming and can be difficult to identify some less common types of pathogens. Fungal DNA (ITS regions) sequences of the class *Ascomycetes* were identified from samples of sweet and hot paprika powder. © 2016 Wiley Periodicals, Inc.

Langue: Anglais

Sujet: Additives, spices and condiments -- Spices and essential oils; CONTAMINATION; DRIED FOODS; FOOD SAFETY PLANT FOODS; FUNGI; INSTANT FOODS; MICROBIAL CONTAMINATION; MICROBIOLOGICAL QUALITY; MICROORGANISMS; PAPRIKA; POWDERS; SPICES

Document 4 sur 57

Is gamma radiation suitable to preserve phenolic compounds and to decontaminate mycotoxins in aromatic plants? A case-study with Aloysia citrodora Palau

Auteur : Pereira, E; Barros, L; Antonio, A L; Verde, S C; Santos-Buelga, C; Ferreira, I. C. F. R.; Rodrigues, P

Infos sur la publication : Molecules 22.3: 347 [13.]. (2017)

Résumé : This study aimed to determine the effect of gamma radiation on the preservation of phenolic compounds and on decontamination of dry herbs in terms of ochratoxin A (OTA) and aflatoxin B1 (AFB1), using *Aloysia citrodora* Palau as a case study. For this purpose, artificially contaminated dry leaves were submitted to gamma radiation at different doses (1, 5, and 10 kGy; at dose rate of 1.7 kGy/h). Phenolic compounds were analysed by HPLC-DAD-ESI/MS and mycotoxin levels were determined by HPLC-fluorescence. Eleven phenolic compounds were identified in the samples and despite the apparent degradation of some compounds (namely verbasoside), 1 and 10 kGy doses point to a preservation of the majority of the compounds. The mean mycotoxin reduction varied between 5.3% and 9.6% for OTA and from 4.9% to 5.2% for AFB1. It was not observed a significant effect of the irradiation treatments on mycotoxin levels, and a slight degradation of the phenolic compounds in the irradiated samples was observed.

Langue: Anglais

Sujet: Additives, spices and condiments -- Spices and essential oils; AFLATOXIN B1; AFLATOXINS; CONTAMINATION; DECONTAMINATION; FOOD SAFETY PLANT FOODS; GAMMA IRRADIATION; HERBS; IRRADIATION; OCHRATOXIN A; OCHRATOXINS; PHENOLS

Document 5 sur 57

Public and private standards for dried culinary herbs and spices-Part II: production and product standards for ensuring microbiological safety

Auteur : Schaarschmidt, S; Spradau, F; Mank, H; Banach, J L; Fels-Klerx, H. J. van der; Hiller, P; Appel, B; Braeunig, J; Wichmann-Schauer, H; Mader, A

Infos sur la publication : Food Control 70 : 360-370. (2016)

Résumé : Dried culinary herbs and spices (DCHS) are minor food components with widespread use. Despite their low water activity, some microorganisms-including pathogenic and toxigenic ones-can survive in DCHS. The addition of microbial contaminated DCHS to ready-to-eat food in combination with improper food storage can pose a serious health risk for the consumer. In the past, several food-borne disease outbreaks were related to microbial contaminated spices. The aim of this study was to provide an overview on (i) spice/herb production standards important for promoting food safety by preventing microbial contaminations, (ii) public and private standards providing microbiological criteria to assess the microbiological safety of DCHS, and (iii) product testing performed by DCHS producing/processing businesses to comply with these standards. For that, a literature search and a survey among herb/spice businesses were conducted. Several good practices and production guidelines specific for the primary production and/or processing of culinary herbs and spices were found. Microbiological criteria specific for DCHS are usually rare, but some national standards (mostly of non-EU member states) as well as recommendations by private bodies could be identified. By EU law, no mandatory microbiological criteria specific for DCHS are laid down. The survey indicated a frequent application of business-to-business agreements. The microbiological quality of DCHS was tested by the survey participants mainly in a routine manner by checking every lot or based on buyer-seller agreements. Risk-based testing was less common, which differed to chemical safety testing. Upon import into the EU, testing appeared to be performed predominantly in a routine manner for the pathogenic bacteria *Salmonella* spp., sulphite-reducing clostridia (including *Clostridium perfringens*), *Bacillus cereus*, and *Staphylococcus aureus*. All rights reserved, Elsevier.

Langue: Anglais

Sujet: Additives, spices and condiments -- Spices and essential oils; CONTAMINATION; DRIED FOODS; FOOD BUSINESS; FOOD SAFETY PLANT FOODS; GOOD MANUFACTURING PRACTICE; GUIDELINES; HERBS; IMPORTS; MICROBIAL CONTAMINATION; MICROBIOLOGICAL QUALITY; MICROORGANISMS; PATHOGENS; QUALITY CONTROL; RISKS ASSESSMENT; TRADE

Document 6 sur 57

Long-term survival of the Shiga toxin-producing Escherichia coli O104:H4 outbreak strain on fenugreek seeds

Auteur : Knodler, M; Berger, M; Dobrindt, U

Infos sur la publication : Food Microbiology 59 : 190-195. (2016)

Résumé : A major outbreak of Shiga toxin-producing *Escherichia coli* (STEC) O104:H4 occurred in Germany in 2011. The epidemiological investigation revealed that a contaminated batch of fenugreek seeds (*Trigonella foenum-graecum)* was the most probable source of the pathogen. It was suggested that the most probable point of contamination was prior to leaving the importer, meaning that the seed contamination with STEC O104:H4 should have happened more than one year before the seeds were used for sprout production. Here, we investigated the capacity of STEC O104:H4 and closely related pathogenic as well as non-pathogenic *Escherichia coli* strains for long-term survival on dry fenugreek seeds. We did not observe a superior survival capacity of STEC O104:H4 on dry seeds. For none of the strains tested cultivatable cells were found without enrichment on contaminated seeds after more than 24 weeks of storage. Our findings suggest that contamination previous to the distribution from the importer may be less likely than previously assumed. We show that seeds contaminated with *E. coli* in extremely high numbers can be completely sterilized by a short treatment with bleach. This simple and cheap procedure does not affect the germination capacity of the seeds and could significantly improve safety in sprout production. All rights reserved, Elsevier.

Langue: Anglais

Sujet: Additives, spices and condiments -- Spices and essential oils; BACTERIA; BACTERIAL CONTAMINATION; BLEACHING; BLEACHING AGENTS; CONTAMINATION; ESCHERICHIA; ESCHERICHIA COLI; FENUGREEK; FOOD SAFETY PLANT FOODS; GERMANY; GERMINATION; GERMINATION CAPACITY; MICROORGANISMS; SEEDS; SHIGA LIKE TOXINS; SPICES; STERILIZATION; STORAGE; TOXINS; VEGETABLES SPECIFIC

Document 7 sur 57

Method and an alternative device for decontamination of tea

Infos sur la publication : French Patent (2016)

Résumé : We propose a method and an alternative device for decontamination of tea and other dried plants minimizing the loss of flavour. The process is to circulate in a reactor 1 by a screw device without screws, rolling mat or gravity, substrate, tea or dried plants, and subjecting the substrate to a brief exposure to microwaves 2.3 simultaneously with a cold gas fluid 4.5, so as to allow inactivation of microorganisms such as cells, viruses or bacteria, spores, fungi, molds, insects... by fragmentation of the nucleic acids and/or disruption of the cells/or carbonization of hydrated compounds.

Informations sur le brevet: FR 3010869; B1; FR; FR; FR 1302235; 26 septembre 2013 (20130926); Ugolin, N G; El Baroudi, H

Langue: Français

Sujet: Alcoholic and non-alcoholic beverages -- Patents; CONTAMINATION; DECONTAMINATION; EQUIPMENT; MICROWAVES; PATENTS; PROCESSING; PROCESSING EQUIPMENT; TEA

Document 8 sur 57

Application of PCR-DGGE to the study of dynamics and biodiversity of microbial contaminants during the processing of Hibiscus sabdariffa drinks and concentrates

Auteur : Ndiaye, N A; Hamdouche, Y; Kane, A; Cisse, M; Berthiot, L; Toure-Kane, N C; Montet, D

Infos sur la publication : Fruits 71.3: 141-149. (2016)

Résumé : Introduction. Bissap (*Hibiscus sabdariffa* L.) is a common plant in the tropics. In Senegal, the calyces are used to make a popular juice. In the food industry, small and medium-sized enterprises (SMEs) are responsible for the transformation of bissap calyces into drinks, concentrates, jam, etc. In spite of the very low pH of the juice (pH < 3), problems of contamination and fermentation are often observed in the final products post-pasteurization. They are mainly due to *Pseudomonas* spp., *E. coli*, *Klebsiella* spp. and *Pichia opuntiae*. To solve this issue, monitoring of the microbial ecology was performed during the full process of bissap products. Methods and results. Fresh calyces and dried mixed calyces of the two varieties of *Hibiscus sabdariffa* ("Koor" and "Vimto"), as well as juice samples, were collected at every stage of the processing of a bissap drink and syrup in a Senegalese SME. The monitoring of microbial flora was performed by using molecular fingerprinting. The molecular technique PCR-DGGE was employed to evaluate the microbial dynamics using bacterial 16S rDNA, yeast 26S rDNA and 28S rDNA mold profiles at each critical stage of the process. Results and discussion. The genetic profiles generated contributed to identifying the critical points in the manufacturing processes. A multivariate analysis based on the presence or absence of spots in the denaturing gradient electrophoresis gels (DGGE) showed that the microbial flora (bacteria, yeasts, molds) of bissap evolved during the following phases: harvest (fresh flower), drying (dried calyces) and processing (before filtration, after pasteurization and before packaging). Conclusion. Our work contributed to determining the microorganisms responsible for the microbial contamination of the final products, and highlighted the origin of these contaminants. The most important critical point was identified as the pasteurization step.

Langue: Anglais

Sujet: Alcoholic and non-alcoholic beverages -- Other beverages; BEVERAGE CONCENTRATES; BEVERAGES; COLORANTS; CONCENTRATES; CONTAMINATION; FOOD SAFETY BEVERAGES; MICROBIAL CONTAMINATION; MICROORGANISMS; PLANTS; PROCESSING; ROSELLE

Document 9 sur 57

Microorganisms in vacuum stored flower bee pollen

Auteur : Dinkov, D

Infos sur la publication : Journal of Bacteriology and Virology 46.4: 258-268. (2016)

Résumé : Contamination with sanitary microorganisms from Enterobacteriaceae, Pseudomonadaceae, Staphylococcaceae, Micrococcaceae and Bacillaceae families in flower bee pollen from Bulgaria after one-year vacuum-packed cold storage has been found. Dried flower bee pollens intended for human consumption were with high incidence rate of contamination with *Pantoea* sp. (*P. agglomerans*and *P. agglomerans* bgp6) (100%), *Citrobacter freundii* (47%), *Proteus mirabilis* (31.6%), *Serratia odorifera* (15.8%) and *Proteus vulgaris* (5.3%). Bee pollens were also positive for the culture of microorganisms from Staphylococcaceae, Micrococcaceae and Bacillaceae families: *Staphylococcus hominis* subsp *hominis*, *Staphylococcus epidermidis*, *Arthrobacter globiformis*, *Bacillus pumilis*, *Bacillus subtilis* and *Bacillus amyloliquefaciens*. It was concluded that, if consumed directly, the vacuum-packed cold stored dried bee pollen, harvested according hygienic requirements from bee hives in industrial pollution-free areas without intensive crop production, is not problem for healthy human.

Langue: Anglais

Sujet: Sugars, syrups and starches -- Honeys and natural syrups; BACTERIA; BACTERIAL CONTAMINATION; COLD STORAGE; CONTAMINATION; DRIED FOODS; FOOD SAFETY; HONEYS; MICROORGANISMS; PACKAGING; POLLEN; STORAGE COLD; VACUUM; VACUUM PACKAGING

Document 10 sur 57

Microbiological quality of selected spices and herbs including the presence of Cronobacter spp

Auteur : Garbowska, M; Berthold-Pluta, A; Stasiak-Rozanska, L

Infos sur la publication : Food Microbiology 49 : 1-5. (2015)

Résumé : The cultivation of spices and herbs in parts of the world characterized by warm climate and high humidity provides excellent conditions for the development of microorganisms, including the undesirable ones. The aim of this study was to determine the microbiological quality of spices and herbs available on the Polish market, considering the occurrence of *Cronobacter* species bacteria. Analyses covered 60 samples of commercial spices and herbs, including 38 samples of dried herbs (basil, bay leaves, thyme, oregano, tarragon, marjoram, dill, parsley, rosemary, lovage) and 16 samples of seasoning blends as well as 6 samples of spices seeds and fruits (pimento, black pepper, coriander). All samples were tested for the total count of aerobic mesophilic bacteria (TAMB) and for the presence of *Cronobacter* spp. In most of the samples of spices and herbs (60.0%), the TAMB did not exceed 10^4 CFU/g, and the level regarded as unacceptable (>10^6 CFU/g) was not identified in any of the samples. The presence of *Cronobacter* spp. was demonstrated in 10 (16.7%) samples of the analyzed products, however these were mainly samples of herbs (basil, tarragon, parsley) and one sample of a seasoning blend (Provence herbs). The highest microbiological contamination (TAMB) was found in samples of herbs (oregano, tarragon, basil) and in ready seasoning blends, in 21.1% and 25.0% of which the total count of aerobic mesophiles was in the range of 10^5-10^6 CFU/g. In all samples of spices seeds and fruits (coriander, black pepper and pimento), the total count of aerobic bacteria reached <10^4 CFU/g. Results achieved in the study indicate good hygienic conditions in the production process of spices and herbs available on the Polish market. The study demonstrated also that dried spices and herbs may be carriers of *Cronobacter* species bacteria, though their presence in not often detected in products of this type. All rights reserved, Elsevier.

Langue: Anglais

Sujet: Additives, spices and condiments -- Spices and essential oils; BACTERIA; BACTERIOLOGICAL QUALITY; CONTAMINATION; CRONOBACTER; FOOD SAFETY PLANT FOODS; HERBS; MICROBIAL CONTAMINATION; MICROBIOLOGICAL QUALITY; MICROORGANISMS; POLAND; SPICES

Document 11 sur 57

Hydrosols of orange blossom (Citrus aurantium), and rose flower (Rosa damascena and Rosa centifolia) support the growth of a heterogeneous spoilage microbiota

Auteur : Labadie, C; Ginies, C; Guinebretiere, M H; Renard, C. M. G. C.; Cerutti, C; Carlin, F

Infos sur la publication : Food Research International 76.Part 3: 576-586. (2015)

Résumé : Hydrosols are hydrodistillation products of aromatic plants. They contain less than 1 g/L of dispersed essential oils giving organoleptic properties. Hydrosols are subjected to microbial proliferation. Reasons for spoilage have to be found in the nature of substrates supporting growth and of microbiological contaminants. The composition in essential oils and the microbiota of 22 hydrosol samples of *Citrus aurantium* L. ssp. *amara* L. (orange blossom), *Rosa damascena* Miller (rose D.), and *Rosa centifolia* L. (rose C.) flowers were analyzed to determine the factors responsible for decay. The median concentrations in essential oils were 677 mg/L for orange blossom hydrosols, 205 mg/L for rose D. hydrosols, and 116 mg/L for rose C. hydrosols. The dry matter content of these hydrosols varied between 4.0 mg/L and 702 mg/L, and the carbohydrate content varied between 0.21 mg/L and 0.38 mg/L. These non-volatile compounds were likely carried over during distillation by a priming and foaming effect, and could be used as nutrients by microorganisms. A microbial proliferation at ambient temperature and also at 5 °C has been observed in all studied hydrosols when stored in a non-sterile container. In contaminated hydrosols, maximal counts were about 7 $\log_{10}$ CFU/mL, while the French pharmacopeia recommends a maximal total bacterial count of 2 $\log_{10}$ CFU/mL. Neither yeast nor mold was detected. The isolated microbial population was composed of environmental Gram-negative bacteria, arranged in four major genera: *Pseudomonas* sp., *Burkholderia cepacia* complex, and presumably two new genera belonging to *Acetobacteraceae* and *Rhodospirillaceae*. Among those bacteria, *Burkholderia vietnamiensis* and *Novosphingobium capsulatum* were able to metabolize volatile compounds, such as geraniol to produce 6-methyl-5-hepten-2-one or geranic acid, or phenylethyl acetate to produce 2-phenylethanol. EO concentrations in hydrosols or cold storage are not sufficient to insure microbiological stability. Additional hurdles

such as chemical preservatives or aseptic packaging will be necessary to insure microbial stability. All rights reserved, Elsevier.

Langue: Anglais

Sujet: Additives, spices and condiments -- Spices and essential oils; BITTER ORANGES; CARBOHYDRATES; CITRUS FRUITS; CONTAMINATION; DRY MATTER; ESSENTIAL OILS; FLOWERS; HYDROCARBONS; MICROBIAL CONTAMINATION; MICROORGANISMS; PLANTS; REFRIGERATED STORAGE; REFRIGERATION; ROSES; STORAGE COLD

Document 12 sur 57

Decontamination method for dry powder products

Infos sur la publication : French Patent Application (2015)

Résumé : The present invention relates to a method for decontamination of dry powdered food products such as chocolate powder, powdered milk, cereals, spices, or similar said method is characterized in that it comprises at least the following steps of i) applying dry heat at a temperature between 100 and 150 °C to said powdery food products positioned in a chamber for a specified period, and ii) introducing, prior to or simultaneously, in said chamber, a dry gas at a pressure between 1 and 5 bar, in order to avoid evaporation of the water contained in the endospore. Another object of the invention concerns a device for the decontamination of powdery food products using said method.

Informations sur le brevet: FR 3012295; A1; France, Universite de Bourgogne, France, Institute National Superieur des Sciences Agronomiques de l Alimentation & de l Environnement; FR; FR; FR 1360510; 28 octobre 2013 (20131028); Gervais, P; Hauck, T J; Perrier, C J

Langue: Français

Sujet: Hygiene and toxicology -- Patents; CEREALS; CHOCOLATE POWDERS; CHOCOLATE PRODUCTS; CONTAMINATION; DECONTAMINATION; DRIED FOODS; EQUIPMENT; INSTANT FOODS; MILK; MILK POWDERS; PATENTS; PROCESSING; PROCESSING EQUIPMENT; SPICES

Document 13 sur 57

Impact of remote plasma treatment on natural microbial load and quality parameters of selected herbs and spices

Auteur : Hertwig, C; Reineke, K; Ehlbeck, J; Erdogdu, B; Rauh, C; Schluter, O

Infos sur la publication : Journal of Food Engineering 167.Part A: 12-17. (2015)

Résumé : The decontamination efficiency of a non-thermal remote plasma application for dry and heat sensitive products was investigated. Therefore three different types of herbs and spices (pepper seeds, crushed oregano and paprika powder) with various surface-to-volume ratios were treated with plasma processed air up to 90 min and the inactivation of their native microbial flora was examined. Furthermore the impact of the plasma treatment on the product color was determined. The remote plasma treatment reduced the native microbial flora of the pepper seeds and the paprika powder by more than $3\log_{10}$ after 60 min treatment time. However remote plasma treatment of red paprika powder resulted in a considerable loss of redness after a treatment time of ≥5 min. The lower inactivation of the native microbial flora of oregano of $1.6\log_{10}$, was related to the much lower initial microbial load. The treatment had only a minor impact on the pepper seed's and oregano's color (ΔE^* up to 10.2 and 20.0, respectively). All rights reserved, Elsevier.

Langue: Anglais

Sujet: Additives, spices and condiments -- Spices and essential oils; COLOUR; CONTAMINATION; DECONTAMINATION; HERBS; INHIBITION; NONTHERMAL PROCESSES; OREGANO; PAPRIKA; PEPPER; PROCESSING; SPICES

Document 14 sur 57

Controlling bacterial pathogens in low-water activity foods and spices

Auteur : Farakos, S S; Keller, S; Bean, D; Doren, J van; Bennett, W; Kornacki, J

Infos sur la publication : Journal of Food Protection 78.Suppl. A: 12. (2015)

Résumé : Low water activity (aw) and dried foods such as dried dairy and meat products, grain-based and dried ready-to-eat cereal products, powdered infant formula, peanut and nut pastes, as well as flours and meals

have increasingly been associated with product recalls and foodborne outbreaks due to contamination by pathogens such as *Salmonella* spp. and enterohemorrhagic *E. coli*. In particular, recent foodborne outbreaks and product recalls related to Salmonella-contaminated spices have raised the level of public health concern for spices as agents of foodborne illnesses. Presently, most spices are grown outside the U.S., mainly in 8 countries: India, Indonesia, China, Brazil, Peru, Madagascar, Mexico and Vietnam. Many of these countries are underdeveloped and spices are harvested and stored with little heed to sanitation. The FDA has regulatory oversight of spices in the United States; however, the agency's control is largely limited to enforcing regulatory compliance through sampling and testing only after imported foodstuffs have crossed the U.S. border. Unfortunately, statistical sampling plans are inefficient tools for ensuring total food safety. As a result, the development and use of decontamination treatments is key. This symposium will provide an understanding of the microbial challenges to the safety of low aw foods and provide a historic backdrop to the paradigm shift now highlighting low aw foods as vehicles for foodborne pathogens. Up-to-date facts and figures of foodborne illness outbreaks and product recalls will be provided. Special attention will be given to the uncanny ability of *Salmonella* to persist under dry conditions in food processing plants and foods. A lecture is specifically dedicated to processing plant investigations, providing practical approaches to determining sources of persistent bacterial strains in the industrial food processing environment. A lecture will also address the range of decontamination processes for spices.

Langue: Anglais

Sujet: Additives, spices and condiments -- Spices and essential oils; AW; CONFERENCE ABSTRACTS; CONFERENCE PROCEEDINGS; CONTAMINATION; COUNTRIES; DECONTAMINATION; FOOD SAFETY; FOODS; SALMONELLA; SPICES; WATER ACTIVITY

Document 15 sur 57

Decontamination of W ithania somnifera by gamma irradiation and its effect on antioxidant activities

Auteur : Choi, Jong-Il; Srinivasan, Periasamy; Park, Hyun

Infos sur la publication : Journal of Food Quality 38.3: 213-220. (2015)

Résumé : The current investigation was carried out to study the effect of gamma irradiations on decontamination of *W ithania somnifera* and its antioxidant activity. *W . somnifera* dry roots were packed and irradiated at doses of 1-10 kGy following the storage at 4°C within a week. At the dose of 10 kGy, the microbial contamination was lowered below detection level. Glycowithanolides are known for antioxidant components present in *W . somnifera*. The antioxidant activity of *W . somnifera* extract was investigated by measuring 1,1-diphenyl-2-picrylhydrazyl, hydroxyl and superoxide radical-scavenging activities. These activities were increased in samples extracted from the irradiated roots at 10 kGy. The extraction yield of the glycowithanolides was considered as one of the reasons for the increase of antioxidant activities of the extract. Practical Applications. *W ithania somnifera* is an important medicinal plant and has been widely used in India and other parts of the world as a home remedy for several diseases. Gamma irradiation has been used as a phytosanitary treatment of food and herbal materials. The present study was conducted to evaluate the effect of gamma irradiation on decontamination of *W . somnifera* and its effect on the antioxidant properties. These results suggest that gamma irradiation can be applied for phytosanitary of other herbal plants. © 2015 Wiley Periodicals, Inc.

Langue: Anglais

Sujet: Food sciences -- Compositional and nutritional aspects; ANTIOXIDATIVE ACTIVITY; CONTAMINATION; DECONTAMINATION; GAMMA IRRADIATION; IRRADIATION; MEDICINAL PLANTS; PLANTS; REFRIGERATED STORAGE; REFRIGERATION; ROOTS; STORAGE COLD

Document 16 sur 57

Atmospheric pressure plasma treatment of black peppercorns inoculated with Salmonella and held under controlled storage

Auteur : Sun, Shengqian; Anderson, N M; Keller, S

Infos sur la publication : Journal of Food Science 79.12: E2441-E2446. (2014)

Résumé : Spices, including black pepper, are a source of microbial contamination and have been linked to outbreaks of salmonellosis when added to products that undergo no further processing. Traditional thermal processing employed to reduce microbial contamination can lead to losses of heat-sensitive compounds. Thus, alternative processes such as atmospheric pressure plasma (APP) are desirable. The purpose of this research was to determine the efficacy of APP in the destruction of *Salmonella* inoculated on the surface of peppercorns. Secondarily, we examined the effect of storage on the subsequent inactivation of *Salmonella* on the surfaces of black peppercorns by APP. Black peppercorns inoculated with a cocktail of *Salmonella enterica* serotypes Oranienburg, Tennessee, Anatum, and Enteritidis were stored at 25 °C, 33% relative humidity (RH); 25 °C, 97%

RH; and, 37 °C, 33% RH for 10 d and additionally at 25 °C, 33% RH for 1 and 30 d then treated with APP. Results showed that *Salmonella* populations decreased significantly ($P< 0.05$) with respect to the treatment time, but where not related to previous storage conditions ($P> 0.05$). Approximately a 4.5- to 5.5-log_{10} reduction in population was achieved after 60 to 80 s treatment. A combination of treatments, storage and 80 s of plasma, may achieve a total reduction on the order of 7-log_{10}CFU/g. These findings support the potential of APP to decontaminate *Salmonella* on the surfaces of black peppercorns and other dry foods and illustrate that a multiple hurdle approach may prove effective for achieving significant reductions of *Salmonella* in many low-moisture foods. Practical Application. Spices, including black pepper, which often is added to ready-to-eat food as final decoration or flavoring, has raised public health concerns due to outbreaks of salmonellosis. APP is a desirable and effective technology that is able to decontaminate pathogens while maintaining product quality. In this research, APP was shown to significantly reduce levels of *Salmonella* on the surfaces of black peppercorns. About a 5-log_{10} reduction could be achieved with 80-s treatment by APP. Storage conditions did not significantly affect the application of APP.

Langue: Anglais

Sujet: Additives, spices and condiments -- Spices and essential oils; CONTAMINATION; DECONTAMINATION; FOOD SAFETY PLANT FOODS; HUMIDITY; NONTHERMAL PROCESSES; PEPPERCORNS; PROCESSING; RH; SALMONELLA; SPICES; STORAGE

Document 17 sur 57

The microbiological safety of low water activity foods and spices

Infos sur la publication : 2014.

Résumé : This book, which is part of the "Food Microbiology and Food Safety" series, provides an understanding of the microbial challenges to the safety of low a_w foods, and a historic backdrop to the paradigm shift now highlighting low a_w foods as vehicles for foodborne pathogens. It also provides regulatory testing guidelines and recommendations as well as guidance through methodological and sampling challenges to testing spices and low a_w foods for the presence of foodborne pathogens. It contains 22 chapters divided under six parts with the following headings: Introduction and overview (2 chapters); Pathogen persistence and control in low a_w foods and processing plants (4 chapters); Low a_w food commodities of interest (11 chapters); Product testing (2 chapters); Low a_w food decontamination (2 chapters); and Research needs (1 chapter). Individual chapters are entitled: The microbiological safety of spices and low-water activity foods: correcting historic misassumptions (pp. 3-13); Challenges in the control of foodborne pathogens in low-water activity foods and spices (pp. 15-34); Adaptation of pathogenic microorganisms to dry conditions (pp. 37-48); Transcriptomic responses of *Salmonella* species to desiccation and low-moisture environments: extending our knowledge of how bacteria cope with low-moisture stress (pp. 49-66); Processing plant investigations: practical approaches to determining sources of persistent bacterial strains in the industrial food processing environment (pp. 67-83); Dry cleaning, wet cleaning, and alternatives to processing plant hygiene and sanitation (pp. 85-96); Spices (pp. 99-114); Dried dairy-based products (pp. 115-126); Low-water activity meat products (127-164); Dried ready-to-eat cereal products (pp. 165-175); Powdered infant formula (pp. 177-211); Nuts and nut pastes (pp. 213-244); Flour and meal (pp. 245-267); Chocolate and confectionary (pp. 269-293); Salty snack foods (pp. 295-314); Pet foods (pp. 315-327); Dried teas and herbs (pp. 329-344); Regulatory testing guidelines and recommendations (pp. 347-366); Methodological and sampling challenges to testing spices and low-water activity food for the presence of foodborne pathogens (pp. 367-386); Irradiation, microwave, and alternative energy-based treatments for low-water activity foods (pp. 389-401); Heat and steam treatments (pp. 403-424); and Research gaps and needs pertaining to microbial pathogens in spices and low-a_w foods (pp. 427-439). A 4pp. index is also provided.

Langue: Anglais

Sujet: Hygiene and toxicology -- Microbiological aspects; ANALYTICAL TECHNIQUES; AW; BOOKS; CONTAMINATION; DECONTAMINATION; FOOD FACTORIES; FOOD SAFETY; FOODS; PATHOGENS; SPICES; WATER ACTIVITY

Éditeur: Gurtler, J B; Doyle, M P; Kornacki, J L

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Mycobiota and identification of aflatoxin gene cluster in marketed spices in West Africa

Auteur : Gnonlonfin, G J B; Adjovi, Y C; Tokpo, A F; Agbekponou, E D; Ameyapoh, Y; Souza, C de; Brimer, L; Sanni, A

Infos sur la publication : Food Control 34.1: 115-120. (2013)

Résumé : Fungal infection and aflatoxin contamination were evaluated on 114 samples of dried and milled spices such as ginger, garlic and black pepper from southern Benin and Togo collected in November 2008-January 2009. These products are dried to preserve them for lean periods available throughout the year. Fungal contamination was evaluated after plating on selective media with a total of 20 fungal genera identified, ranging from 7 in garlic to 14 in ginger. Ginger and pepper showed high incidence of fungal contamination compared to garlic that had lower levels of fungal contamination. Species of *Aspergillus* were dominant on all marketed dried and milled spices irrespective of country. Gene characterization and amplification analysis showed that most of the *Aspergillus flavus* isolates possess the cluster genes for aflatoxin production. Aflatoxin B1 assessment by Thin Layer Chromatography showed that only garlic (1 sample) and ginger (4 samples) were naturally contaminated with aflatoxin B1 ranging from 390 µg/kg to 1045 µg/kg respectively. Previous reports have mostly highlighted the risk of mycotoxin exposure from staple crops and vegetables in Africa, but such risks now need to be evaluated further for other products such as dried and milled spices. All rights reserved, Elsevier.

Langue: Anglais

Sujet: Additives, spices and condiments -- Spices and essential oils; AFLATOXINS; ASPERGILLUS; BENIN; BLACK PEPPER; CONTAMINATION; FOOD SAFETY PLANT FOODS; GARLIC; GENES; GENETICS; GINGER; MICROBIAL CONTAMINATION; MICROORGANISMS; SPICES; TOGO

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Comparison of food processing retention factors of 137Cs and 40K in vegetables

Auteur : Tagami, K; Uchida, S

Infos sur la publication : Journal of Radioanalytical and Nuclear Chemistry 295.3: 1627-1634. (2013)

Résumé : Removal of radiocesium from food by processing is of great concern following the accident of TEPCO's Fukushima Daiichi Nuclear Power Plant accident. To provide more Cs removal rates, we studied the applicability of K data using edible plant samples. Values were compared for ^{137}Cs and ^{40}K of the food processing retention factors, F_r (total activity in processed food/total activity in raw food), and they were found to be close to the 1:1 line and highly correlated (R = 0.96, p < 0.001). Thus, K can be an analogue to estimate radiocesium removal rates by food processing of vegetables. Using the literature K values, we calculated the K removal rates (%), that is, (1 - F_r) × 100, for ten vegetable types to provide potential Cs removal rates. The average percentage K removal were as follows: driedpulses, 33; fresh pulses, 15; leafy vegetables, 52; fruit vegetables, 7; flower vegetables, 44: root crops, 18; tubers, 16; ferns, 93: mushrooms, 32; and others, 30. ©Akademiai Kiado, Budapest, Hungary 2012.

Langue: Anglais

Sujet: Fruits, vegetables and nuts -- General aspects (vegetables); BAMBOO; BOILING; BUTTERBUR; CONTAMINATION; CS; DECONTAMINATION; FOOD SAFETY PLANT FOODS; FUNGI EDIBLE; GARLIC; HERBS; K; KOMATSUNA; LEAFY VEGETABLES; LEGUMES; MUGWORT; MUSHROOMS; PICKLING; POTASSIUM; PULSES; RADIOELEMENTS; RADIOISOTOPES; SPINACH; TUBERS; VEGETABLES SPECIFIC

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Microbial decontamination of vegetables and spices using cold plasma treatments

Auteur : Kim, Jung Eun; Kim, In-Hah; Min, Sea C

Infos sur la publication : Korean Journal of Food Science and Technology 45.6: 735-741. (2013)

Résumé : Effects of cold plasma treatment (CPT) against *Salmonella* Typhimurium inoculated on cabbage and lettuce, naturally occurring bacteria in black pepper powder and red pepper powder, and *Bacillus cereus* inoculated onto red pepper powder were investigated. The numbers of *Salmonella* Typhimurium on cabbage and lettuce were reduced by 1.5±0.2 CFU/cm^2 (900 W, 5 min) and 1.1±0.1 log CFU/cm^2 (900 W, 10 min), respectively. The numbers of naturally occurring aerobic bacteria in both black pepper powder and red pepper powder were reduced by 2.3±0.3 and 0.6±0.2 log CFU/g, respectively. The numbers of *B. cereus* vegetative cells on red pepper powder were reduced by 1.5±0.1 log CFU/g, but the numbers of spores remained unchanged. The inhibition of *Salmonella*Typhimurium on cabbage was adequately described by Fermi's model and the Weibull model. The predicted optimum treatment power and time for *Salmonella* Typhimurium inoculated onto cabbage were 746 W and 6.8 min, respectively. Our results indicated that CPT represents a useful method for microbial decontamination of vegetables and spices.

Langue: Coréen

Sujet: Fruits, vegetables and nuts -- Other vegetables (including macrofungi); AEROBES; BACILLUS; BACILLUS CEREUS; BLACK PEPPER; CABBAGES; CAPSICUMS; CONTAMINATION; DECONTAMINATION; DRIED FOODS; FOOD SAFETY PLANT FOODS; INSTANT FOODS;

LETTUCES; MICROBIAL SPORES; MICROORGANISMS; POWDERS; RED PEPPERS; SALMONELLA; SALMONELLA TYPHIMURIUM; SPICES

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Effects of steam and vacuum administration during decontamination on essential oil content in herbal medicines

Auteur : Lange, H; Schwarzer, K; Dammann, A; Mueller, U; Richert-Poeggeler, K R; Krueger, H

Infos sur la publication : Journal of Applied Botany and Food Quality/Angewandte Botanik 85.1: 34-40. (2012)

Résumé : Saturated steam decontamination is an application for the elimination of microorganisms from the surfaces of different materials. This technique was optimized for the treatment of dried spices or pharmaceuticals, which could have been contaminated with microorganisms during cultivation, processing, storage or transport. The described saturated steam decontamination is based on the Lemgo process. This method does not kill microorganisms, but removes them physically from the surface. Effects of steam temp. of 120 and 100°C for 20 s with a subsequent flash vacuum of 20 s were measured. Applications of flash vacuum as well as saturated steam heated to 120°C were also tested separately. Impacts of these parameters on essential oil content and on the surface of different medicinal plants such as marjoram, oregano, fennel and eucalyptus were analysed using GC and SEM. Especially in herbal drugs with glandular trichomes such as marjoram and oregano, severe surface destruction was visible accompanied by high losses of essential oil from 93% in marjoram tissue to 59% in oregano tissue. For fennel and eucalyptus, which possess protected essential oil storage cells, only minor or no reduction of volatiles was observed during exposure to saturated steam. A positive correlation was shown between stability of essential oil cavities and essential oil content preservation.

Langue: Anglais

Sujet: Additives, spices and condiments -- Spices and essential oils; CONTAMINATION; DECONTAMINATION; ENERGY; ESSENTIAL OILS; EUCALYPTUS; FENNEL; FOOD SAFETY PLANT FOODS; HERBS; MARJORAM; MICROORGANISMS; OREGANO; PLANTS; STEAM; STEAMING; TEMP.; TEMPERATURE; VACUUM; VEGETABLES SPECIFIC

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Physical, sensory and chemical changes of herbal drugs after saturated steam decontamination

Auteur : Lange, H; Krueger, H; Dammann, A; Schwarzer, K; Mueller, U

Infos sur la publication : Zeitschrift fuer Arznei- & Gewuerzpflanzen 17.4: 174-181. (2012)

Résumé : Investigations were conducted to assess efficacy of the Lemgo saturated steam treatment/rapid evacuation process for decontamination of herbs, spices etc., and effects of the process on chemical, physical and sensory properties of the treated material. Trials were conducted on linseed, fennel seed, marjoram, nasturtium leaves/stems and dried onion pieces. Total plate count and aerobic spore count were determined, together with colour, sensory properties, and contents of essential oils and other compounds of importance for quality of the materials studied. Total plate count and aerobic spore count were decreased by a factor of up to 10^4, reaching the detection limit of 100 cfu/g. Quality parameters of linseed were unaffected by this decontamination process. Fennel underwent a 7% loss of essential oil; its appearance was unaffected. ≥86% of the essential oil in marjoram was lost during the decontamination process. Nasturtium samples lost 16% of the initial glucotropaeoline content; dried onion pieces lost 18% of the initial content of cysteine sulfoxide. Nasturtium samples showed only moderate changes in colour, but dried onion pieces showed noticeable browning.

Langue: Anglais

Sujet: Additives, spices and condiments -- Spices and essential oils; COLOUR; CONTAMINATION; DECONTAMINATION; ENERGY; ESSENTIAL OILS; FENNEL SEEDS; HERBS; LINSEEDS; MARJORAM; MICROBIOLOGICAL QUALITY; OILSEEDS; ONIONS; PHYTOCHEMICALS; PLANTS; SENSORY PROPERTIES; SPICES; STEAM; STEAMING; VACUUM

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Microbiological and toxicological quality of dried herbs

Auteur : Vitullo, M; Ripabelli, G; Fanelli, I; Tamburro, M; Delfine, S; Sammarco, M L

Infos sur la publication : Letters in Applied Microbiology 52.6: 573-580. (2011)

Résumé : Aims: The microbiological and toxicological quality of 51 samples of dried herbs (*Melissa officinalis*, *Salvia officinalis*, *Malva sylvestris*, *Matricaria chamomilla*, *Alchemilla vulgaris* and *Centaurea cyanus*) cultivated in family-managed farms in Molise Region (Italy) was evaluated. Methods and Results: All the samples were analysed by using conventional methods, and for samples preparation, an alternative Washing and Shaking (WaS) protocol was developed to reduce release of antimicrobial compounds. None of the samples were of unsatisfactory quality with respect to aflatoxin B1, and only three samples from *Malva sylvestris* exceeded the limit of total aflatoxins according to Recommendation 2004/24/EC. The International Commission on Microbiological Specifications for Foods limits for mesophilic bacteria and total coliforms were exceeded in the 29.4 and 3.9% of samples, respectively: 7.8% of samples also exceeded the limit for *Escherichia coli* established by European Spice Association. When the "WaS" method was used, higher microbial counts were obtained, especially for *A. vulgaris*, *S. officinalis* and *M. officinalis*. Conclusions: Herbs cultivated in family-managed small agricultural areas showed a good microbiological and toxicological quality, irrespectively of preliminary washing or selection procedures. Significance and Impact of the Study: Herb matrices may contain antimicrobial activity which should be considered when applying the conventional microbiological methods for sample preparation. Alternative preparation protocols may have advantages to reduce antimicrobial effects and should be further evaluated. © 2011 The Authors. Letters in Applied Microbiology © 2011 The Society for Applied Microbiology.

Langue: Anglais

Sujet: Additives, spices and condiments -- Spices and essential oils; AFLATOXINS; CONTAMINATION; DRIED FOODS; FOOD SAFETY PLANT FOODS; HERBS; MICROBIAL CONTAMINATION; MICROORGANISMS

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Odor active compounds content in spices and their microencapsulated powders measured by SPME

Auteur : Wojtowicz, E; Zawirska-Wojtasiak, R; Adamiec, J; Wasowicz, E; Przygonski, K; Remiszewski, M

Infos sur la publication : Journal of Food Science 75.8: S441-S445. (2010)

Résumé : Within this study, main odorants of marjoram and thyme (linalool and thymol) were determined in spices and microencapsulated powders using solid-phase microextraction (SPME). Analyses were conducted on selected batches of spices before and after decontamination and on microencapsulated powders prepared for technological purposes (improvement of aroma in decontaminated spices). Conditions of SPME analyses were determined for individual compounds and matrices. Determination of total and surface contents of compounds and the percentage dependencies between encapsulated and surface aroma made it possible to identify the best powders in terms of their quality. © 2010 Institute of Food Technologists®.

Langue: Anglais

Sujet: Additives, spices and condiments -- Spices and essential oils; ALCOHOLS; AROMA COMPOUNDS; CONTAMINATION; DECONTAMINATION; DRIED FOODS; ENCAPSULATION; HERBS; INSTANT FOODS; LINALOOL; MARJORAM; MICROENCAPSULATION; PHENOLS; POWDERS; TERPENOIDS; THYME; THYMOL

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Assessment of the microbiological safety of dried spices and herbs commercialized in Spain

Auteur : Sospedra, I; Soriano, J M; Manes, J

Infos sur la publication : Plant Foods for Human Nutrition 65.4: 364-368. (2010)

Résumé : Spices and herbs are natural products or their blends that must be free of extraneous matter content. Conventional production of these products implicates a number of hygienic problems so spices and herbs may be exposed to a wide range of microbial contamination during pre- and post-harvest and they can present high microbial counts. In this study, we have analyzed the microbial qualityof 53 samples of spices and dry herbs collected from Spanish markets detecting a contamination of samples of spices with mesophilic aerobic counts (10%) and Enterobacteriaceae (20%). The analysis from herbs showed that the percentage of contamination was 26% in both microbiological values. Pathogenic microorganisms like *Staphylococcus aureus*, *Yersinia intermedia*, *Shigella* spp., *Enterobacter*spp., *Acinetobacter calcoaceticus* and *Hafni alvei* were also isolated from spices and herbs. These unsatisfactory results showed a poor microbiological quality. Spices and dry herbs are used as ingredients in a variety of products prepared in different ways, this fact suggests the need to provide a control system to improve the quality of herbs and spices. ©Springer Science+Business Media, LLC 2010.

Langue: Anglais

Sujet: Additives, spices and condiments -- Spices and essential oils; FOOD SAFETY PLANT FOODS; HERBS; MICROBIOLOGICAL QUALITY; SPAIN; SPICES

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Colonization of toxigenic fungi on coffee – from flowering to processing

Auteur : Lava, M B; Deepa, S; Shetty, P H; Anu Appaiah, K A

Infos sur la publication : Journal of Food Science and Technology 46.4: 339-342. (2009)

Résumé : Ochrotoxin A in coffee is regarded as a potential hazard. Earlier reports suggest that the toxin is present in the outer husk rather than in the bean. A detailed investigation was conducted on the colonization of coffee beans by toxigenic fungi, such as *Aspergillus carbonarius*, *A. flavus* and *A. ochraceus*, from plant to processing. Results indicate that colonization mainly occurs during post-harvest treatment. Among the types of drying areas used, concrete/cement floored yards were found to be ideal, because colonization by fungi was inhibited. During processing, a high incidence of fungal colonization was observed in the low grade coffee bean-like bits and blacks. However, occurrence of these fungi on coffee plants was negligible. Hence, results suggest that drying of coffee beans under controlled conditions can reduce the incidence of fungal contamination.

Langue: Anglais

Sujet: Alcoholic and non-alcoholic beverages -- Tea and coffee; ASPERGILLUS; COFFEE; COFFEE BEANS; DRYING; FOOD SAFETY BEVERAGES; MICROBIAL CONTAMINATION; MICROORGANISMS; PROCESSING

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Efficacy of vacuum microwave drying in microbial decontamination of dried vegetables

Auteur : Yaghmaee, P; Durance, T

Infos sur la publication : Drying Technology 25.4--6: 1099-1104. (2007)

Résumé : The efficacy of vacuum microwave drying and a combination of microwave processing at atmospheric pressure + vacuum microwave drying on decontamination of freshly grated carrots and parsley leaves from naturally occurring microorganisms was studied. Samples were dried to <8% moisture content under microwave radiation (2450 MHz, 1.8 kW) with either full vacuum or combination of 12 min atmospheric pressure and 46 min vacuum process. During microwave treatment under vacuum, the microbial population was reduced gradually as the exposure time increased, while in the combined method, a dramatic decrease in microbial counts after 5 min exposure to microwave radiation at atmospheric pressure was observed.

Langue: Anglais

Sujet: Fruits, vegetables and nuts -- General aspects (vegetables); CARROTS; CONTAMINATION; DECONTAMINATION; DRYING; FOOD SAFETY PLANT FOODS; MICROBIOLOGICAL QUALITY; MICROWAVES; PARSLEY; SPICES; VACUUM; VACUUM DRYING

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Effect of germicidal UVC light on fungi isolated from grapes and raisins

Auteur : Valero, A; Begum, M; Leong, S L; Hocking, A D; Ramos, A J; Sanchis, V; Marin, S

Infos sur la publication : Letters in Applied Microbiology 45.3: 238-243. (2007)

Résumé : This study sought to examine the ways in which UVC light affects the different genera of fungi commonly isolated from grapes, with the aim of understanding changes in mycobiota during grape ripening and possible applications for preventing grape decay during storage. Spores of *Aspergilluscarbonarius*, *A. niger*, *Cladosporium herbarum*, *Penicillium janthinellum* and *Alternaria alternata*(between 100 and 250 spores/agar plate) were UVC irradiated for 0 (control), 10, 20, 30, 60, 300 and 600 s. Plates were incubated at 25°C and colonies were counted daily for up to 7 days. *A.alternata*and *A. carbonarius* were the most resistant fungi. Conidial germination in these species was reduced by approx. 25% after 10 s of exposure, compared with >70% reduction for the remaining species tested. *P. janthinellum* spores were the most susceptible at this wavelength. UVC exposures of 300 s prevented growth of all isolates studied, except for *A. alternata*. Results suggest that UVC irradiation plays a major role in selecting for particular fungi that dominate the mycobiota of drying grapes and that UVC irradiation of harvested grapes could prevent germination of contaminanting fungi during storage or further dehydration.

Langue: Anglais

Sujet: Fruits, vegetables and nuts -- Other fruits; DECAY; DRYING; FRUITS DRIED; FUNGAL SPORES; GRAPES; MICROBIAL CONTAMINATION; MICROBIAL SPORES; MICROORGANISMS; RAISINS; SPOILAGE; ULTRAVIOLET RADIATION; UV RADIATION

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Method for removing agricultural chemical from agricultural product

Infos sur la publication : Japanese Patent Application (2006)

Résumé : A method for removing agricultural chemical residues from agricultural produce such as tea leaves, coffee beans, rice, wheat or medicinal plants is described. Produce is heated and driedusing superheated steam at a temp. of 180–280°C. Tea leaves are steamed for 60–180 s, while husked barley and rice is heated for 2–4 min.

Informations sur le brevet: JP 2006325405; A; Terabondo KK; JP; JP; JP 2005149289; 23 mai 2005 (20050523); Matsunaga, M; Iwamoto, M

Langue: Japonais

Sujet: Hygiene and toxicology -- Patents; AGRICULTURAL PRODUCE; CONTAMINATION; CROPS; DECONTAMINATION; FOOD SAFETY PLANT FOODS; HEATING; PATENTS; PESTICIDES

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Efficacy of home washing methods in controlling surface microbial contamination on fresh produce

Auteur : Kilonzo-Nthenge, A; Chen, Fur-Chi; Godwin, S L

Infos sur la publication : Journal of Food Protection 69.2: 330-334. (2006)

Résumé : Much effort has been focused on sanitation of fresh produce at the commercial level; however, few options are available to the consumer. This study aimed to determine the efficacy of various cleaning methods in reducing bacterial contamination on fresh produce in a home setting. Lettuce, broccoli, apples and tomatoes were inoculated with *Listeria innocua* and then subjected to combinations of the following cleaning procedures: soaking for 2 min in tap water, Veggie Wash solution, 5% vinegar solution or 13% lemon solution; rinsing under running tap water; rinsing and rubbing under running tap water; brushing under running tap water; and wiping with wet or dry paper towel. Presoaking in water before rinsing significantly reduced bacteria in apples, tomatoes and lettuce, but not in broccoli. Wiping apples and tomatoes with wet or dry paper towel showed lower bacterial reductions compared with soaking and rinsing procedures. Blossom ends of apples were more contaminated than the surface after soaking and rinsing; similar results were observed between flower section and stem of broccoli. Reductions of *L. innocua* in both tomatoes and apples (2.01–2.89 log cfu/g) were more than in lettuce and broccoli (1.41–1.88 log cfu/g) when subjected to the same washing procedures. Reductions of surface contamination of lettuce after soaking in lemon or vinegar solutions were not significantly different from those achieved by soaking lettuce in cold tap water ($P > 0.05$). It is therefore suggested that educators and extension workers might consider it appropriate to instruct consumers to rub or brush fresh produce under cold running tap water before consumption.

Langue: Anglais

Sujet: Fruits, vegetables and nuts -- General aspects (fruits and vegetables); APPLES; BROCCOLI; CLEANING; FOOD SAFETY PLANT FOODS; LETTUCES; LISTERIA; LISTERIA INNOCUA; MICROBIAL CONTAMINATION; MICROORGANISMS; RINSING; SOAKING; TOMATOES

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A removal method of agricultural chemical residues on root crops and new functional foods derived from its process

Infos sur la publication : PCT International Patent Application (2005)

Résumé : A method for removing residual agricultural chemicals in root vegetables and a novel functional food product prepared using the method is described. Root vegetables, including ginseng, garlic, balloon flower and wild lanceolate root, are washed, sterilized, inoculated with fungal spores from *Phellinus linteneus*, *Inonotus obliquus,Agaricus blazei*, *Ganoderma lucidum*, *Antrodia camphorata* and *Sparassis crispa* and the inoculated vegetables are cultivated and then dried. The interaction of the fungal spores with the vegetables decomposes any agricultural chemicals remaining on the vegetables and improves their functionality.

Informations sur le brevet: WO 2005044022; A1; WO; KR; KR 2003078887; 08 novembre 2003 (20031108); Park, Dong Ki

Langue: Anglais

Sujet: Fruits, vegetables and nuts -- Patents; CONTAMINATION; DECONTAMINATION; FUNCTIONAL FOODS; FUNGI; GARLIC; GINSENG; PATENTS; ROOT VEGETABLES; VEGETABLES SPECIFIC

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Recovery of coliforms, Escherichia coli type 1 and Salmonella species from rooibos tea (Aspalathus linearis) and decontamination by steam

Auteur : du Plessis, H J; Roos, I M M

Infos sur la publication : Phytophylactica 18.4: 177-181. (1986)

Résumé : Recovery of coliforms (Escherichia coli type 1) and Salmonella spp. from rooibos tea and evaluation of its decontamination by steam was investigated. 384 samples of rooibos tea (prepared from fermented twigs of Aspalathus linearis left to dry for 8-24 h at 24-38°C in the open) were analysed for E. coli type 1, whereas tea and water samples (water used in fermentation) were collected at various stages of processing and analysed for total aerobic, coliform and Salmonella spp. using standard plate count techniques. Decontamination by steam was carried out by exposing 5 mm thick layers of tea to steam for 2, 3, 4 and 5 min, followed by incubation at 37°C (24 h). Results are tabulated showing high incidence of coliform bacteria including E. coli type 1 and Salmonella spp. in processed rooibos tea. Rapid increase of coliforms (1.1×10^4 to 3.7×10^7) in a 24 h period indicated that they are probably involved in the fermentation process. Recovery of Salmonella serotypes from fermentation heaps indicated that they multiplied rapidly during the fermentation process. Final batches of tea contained high numbers of E. coli and Salmonella which could cause large-scale contamination and it was therefore advisable to decontaminate rooibos tea before marketing. Steam treatment of the tea effectively reduced bacterial numbers and the moisture content of the treated tea increased by only 19.2-23.7%; e.g. 2 min treatment reduced coliforms from 1.7×10^6 to <10 colony forming units/g. Furthermore, steam treatment did not affect organoleptic properties of the tea.

Langue: Anglais

Sujet: Alcoholic and non-alcoholic beverages; COLIFORMS; CONTAMINATION; CROPS; DECONTAMINATION; ENERGY; ESCHERICHIA; PLANT FOODS; PLANTS; ROOIBOS TEA; SALMONELLA; STEAM; STEAMING; TEA; TEAS

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Process for drying, stabilising, decontaminating and disinfestation of medicinal or seasoning plants using a microwave oven

Infos sur la publication : French Patent Application (1985)

Résumé : The use of a microwave oven to prepare dry medicinal plants from fresh plants results in a final plant product having improved appearance, preserved colour of the flowers and leaves, the products being stabilized by destruction of their enzyme systems, without any appreciable rise in temp. This simple, quick and relatively economical process also has the advantages of microbial decontamination and disinfestation of the plants.

Informations sur le brevet: FR 2553873; A1; FR; Allorge, L P

Langue: Français

Sujet: Engineering; CONTAMINATION; DECONTAMINATION; MICROWAVE OVENS; MICROWAVES; OVENS; PATENTS; PLANTS; STERILIZATION

Document 34 sur 57

Radiation decontamination of dry food ingredients and processing aids

Auteur : Farkas, J

Infos sur la publication : Journal of Food Engineering 3.4: 245-264. (1984)

Résumé : This review of decontamination of dry food ingredients using radiation procedures is presented under the following headings: alternative methods for reducing the microbial contamination of dryingredients; radiation decontamination of spices, dried vegetables and sugar; radiation decontamination of texturizing agents and protein preparations; radiation decontamination of enzyme preparations; storage stability of irradiated dry ingredients; the economic feasibility of radiation treatment of dry ingredients; the wholesomeness of irradiated dry ingredients; process control and occupational safety aspects; the legislative status of radiation treatment of dry ingredients; and commercialization of radiation treatment of dry ingredients.

Langue: Anglais

Sujet: Additives, spices and condiments; CONTAMINATION; DECONTAMINATION; DRIED FOODS; DRIED VEGETABLES; FOODS; INGREDIENTS; IRRADIATION; RADIATION; REVIEWS; SAFETY; SPICES; STABILITY; STORAGE; SUGAR; VEGETABLES

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Effect of gamma irradiation on the sterilization of red pepper powder

Auteur : Kwon, J H; Byun, M W; Cho, H O

Infos sur la publication : Journal of the Korean Society of Food and Nutrition 13.2: 188-192. (1984)

Résumé : To investigate hygienic status of commercial red pepper powder, one sample was directly prepared from raw red pepper, and the other was a commercial powder. The status of microbial contamination, effect of irradiation for sterilization, and physicochemical changes during 3 months of storage were studied. Total bacterial counts of commercial red pepper powders were 3.83 to 6.68 × 10^6/g and coliforms were present in some products. All microorganisms were removed by irradiation at 9 kGy and no microorganisms reappeared until after 3 months of storage at room temp. D_{10} values of total viable bacteria in red pepper powders were 1.52-1.58 kGy. Chemical components (moisture, total and reducing sugars) decreased slightly during storage. Contents of capsanthin and capsaicin were partly affected by the high dose of irradiation but the difference between unirradiated and irradiated groups diminished on storage.

Langue: Coréen

Sujet: Additives, spices and condiments; CAPSICUMS; DRIED FOODS; GAMMA RAYS; INSTANT FOODS; IRRADIATION; MICROBIAL CONTAMINATION; MICROORGANISMS; PEPPER; PEPPERS; POWDERS; SPICES

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A review on spices - present status of decontamination techniques such as gamma irradiation

Auteur : Gottschalk, H M

Infos sur la publication : Food Irradiation Information No. 7: 7-30. (1977)

Résumé : This review discusses the importance of spices in commerce, their use in foods (as ground spices, essential oils, oleoresins, essences and emulsions, dry soluble or dispersed spices), chemical constituents, contamination, variation in quality and adulteration, methods of sterilization by heat, chemical and radiation treatments (radappertization, radicidation), effects of irradiation on various spices and spice mixtures, effects of storage on irradiated spices, effects of irradiation on chemical constituents of spices, and legislation.

Langue: Anglais

Sujet: Additives, spices and condiments; CONTAMINATION; DECONTAMINATION; GAMMA RAYS; IRRADIATION; REVIEWS; SPICES

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Microbiological quality of certain spices

Auteur : Krishnaswamy, M A; Patel, J D; Nair, K K S; Muthu, M

Infos sur la publication : Indian Spices 11.1/2: 6-11. (1974)

Résumé : Preliminary observations on the profile of microbial contamination of black pepper, dry ginger, cardamon and dehydrated onion are reported. Different types of organisms, the total incidence of which ranged (standard plate count) from 3.7 × 10^3 to 9 × 10^7 organisms/g, included coliforms, yeasts and moulds, aerobic thermophiles and sporeformers and mesophilic putrefactives. The effect of fumigation with ethylene oxide and methyl formate was complete destruction of coliforms, yeasts and moulds at the lowest concn. used (64 mg/l.) in cardamon, turmeric finger and powder, black pepper, dry ginger, red chillies and sambar powder. Total microbial load was also progressively decreased by dosages of ≤160 mg/l.

Langue: Anglais

Sujet: Additives, spices and condiments; FUMIGANTS; MICROBIAL CONTAMINATION; MICROORGANISMS; SPICES

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Microbiological contamination of dried vegetables

Auteur : Murphy, R P

Infos sur la publication : Process Biochemistry 8.10: 17-19. (1973)

Résumé : In this review, the types of microorganisms normally encountered in dried foods are listed and their sources are considered. The contamination of dried vegetables during freeze-drying or air-drying is discussed.

Langue: Anglais

Sujet: Fruits, vegetables and nuts; CONTAMINATION; DRIED FOODS; DRIED VEGETABLES; MICROBIAL CONTAMINATION; MICROORGANISMS; VEGETABLES

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Decontamination of whole black pepper using different cold atmospheric pressure plasma applications

Auteur : Hertwig, C; Reineke, K; Ehlbeck, J; Knorr, D; Schlueter, O

Infos sur la publication : Food Control 55 : 221-229. (2015)

Résumé : Whole black pepper is a dry product, which is often naturally contaminated with bacterial endospores and sometimes also with human pathogens like Salmonella. Dry pepper itself is a shelf-stable product, but if it is incorporated into high moisture minimally processed food, the microorganisms can reduce the shelf-life of the final product and/or can cause foodborne diseases. In this study the antimicrobial effect of two different atmospheric pressure plasma applications for the decontamination of whole black pepper was investigated. Naturally contaminated peppercorns and with *Bacillus subtilis* spores, *Bacillus atrophaeus* spores and *Salmonella enterica* inoculated ones were treated using a plasma jet or a microwave-driven remote plasma. Surface color and the content of essential oils and piperine was measured. *S. enterica*, *B. subtilis* spores and *B. atrophaeus* spores were reduced by 4.1, 2.4 and 2.8 log, respectively, after 30 min remote plasma treatment. Direct plasma jet treatment did not result in equivalent inactivation levels. However, both plasma applications did not considerable affect the quality parameters. All rights reserved, Elsevier.

Langue: Anglais

Sujet: Additives, spices and condiments -- Spices and essential oils; ANTIBACTERIAL ACTIVITY; BACILLUS; BACILLUS SUBTILIS; BACTERIA; BLACK PEPPER; FOOD SAFETY PLANT FOODS; INHIBITION; MICROORGANISMS; PRESSURE; SALMONELLA; SALMONELLA ENTERICA; SPICES; SPORES

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In-package decontamination of Salmonella montevideo on black pepper using pulsed light

Auteur : Xu, Xinran; Krishnamurthy, Kathiravan; Chen, Xueqing; Oner, M; Anderson, N

Infos sur la publication : Journal of Food Protection 78.Suppl. A: 93. (2015)

Résumé : Introduction. Spices are often contaminated with pathogens and typically used as seasonings without undergoing further cooking. Pulsed light system is a rapid non-thermal inactivation technology for controlling foodborne pathogens such as *Salmonella*. Purpose. In this study, efficacy of pulsed light treatment for inactivation of *Salmonella* Montevideo on black pepper was investigated. Methods. Black peppercorns (20 g) were dip-inoculated with 2 ml of Salmonella Montevideo and air dried for 24 h in a sterile environment. One gram samples of peppercorns were vacuum packaged in polyethylene bags and then pulsed light treated for 10 to 40 s at a distance of 11.5 to 16.6 cm from the lamp at voltages of 3000 to 3800 V. Reduction in microbial population was enumerated by spread plating onto tropic soy agar with yeast extract. Results. Increased treatment time increased microbial reduction. Reductions of 2.48, 3.79 and 5.37 log CFU/g were obtained at 20, 30 and 40 s, respectively, at a voltage of 3800 V and distance of 11.5 cm. Increased voltage also resulted in increased inactivation. Reductions of 0.57, 1.13 and 2.48 log CFU/g were obtained at 3000, 3400 and 3800 V, respectively, at 11.5 cm distance after 20 s treatment. Samples treated closer to the lamp were more readily inactivated. Reductions of 3.95, 2.55 and 0.63 log CFU/g were obtained at 11.5, 14.1 and 16.6 cm, respectively, after a 40 s treatment at 3400 V. The effect of treatment time, voltage, and distance were statistically different ($P < 0.05$). Significance. These results suggest that pulsed light has potential for use for inactivating *Salmonella* on black pepper. Reductions up to 5.60 ± 0.46 log CFU/g were obtained within 40 s indicating that pulsed light can provide rapid decontamination of black peppercorns packaged in the final package.

Langue: Anglais

Sujet: Additives, spices and condiments -- Spices and essential oils; BAGS; BLACK PEPPER; CONFERENCE POSTERS; CONFERENCE PROCEEDINGS; FOOD SAFETY PLANT FOODS; LIGHT; PACKAGING; POLYETHYLENE; POLYETHYLENE BAGS; SALMONELLA; SALMONELLA MONTEVIDEO; SPICES; VACUUM;

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Identification of ethylene oxide in herbs, spices and other dried vegetables imported into Italy

Auteur : Bononi, Monica; Quaglia, G; Tateo, F

Infos sur la publication : Food Additives & Contaminants: Part A 31.2: 271-275. (2014)

Résumé : Gas chromatography-mass spectrometry was used to analyse ethylene oxide (EO) in 63 samples of dried vegetable materials for food use derived from import commodities and subjected to quality control for three food-transformation industries. EO residues were quantified through the determination of ethylene chlorohydrin (ECH). About 29% of the samples analysed contained more than 0.3 mg kg^{-1} of EO. Thus, this specific analytical control limited to 20% of import aromatic matters needs to be increased. This paper demonstrates the importance of this specific control considering the banned use of microbial decontamination EO treatment in the European Union. © 2014 Taylor & Francis.

Langue: Anglais

Sujet: Fruits, vegetables and nuts -- General aspects (vegetables); DRIED FOODS; DRIED VEGETABLES; ETHYLENE OXIDE; FOOD SAFETY PLANT FOODS; FUMIGANTS; GAS CHROMATOGRAPHY; GC-MS; HERBS; MASS SPECTROSCOPY; SPICES; VEGETABLES

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Combined effects of electron-beam irradiation and storage time on the chemical and antioxidant parameters of wild macrolepiota procera dried samples

Auteur : Fernandes, A; Barreira, J C M; Antonio, A L; Oliveira, M. B. P. P.; Martins, A; Ferreira, I. C. F. R.

Infos sur la publication : Food and Bioprocess Technology 7.6: 1606-1617. (2014)

Résumé : Mushrooms are very perishable foods due to their high susceptibility to moisture loss, changes in color and texture, or microbiological spoilage. Drying is considered as the most appropriate method to prevent these alterations, but it has some limitations, such as shrinkage, enzymatic and non-enzymatic browning reactions, and oxidation of lipids and vitamins. According to previous studies, irradiation might effectively attenuate the undesirable changes caused by drying process, ensuring also higher shelf-life of mushrooms and their decontamination. Electron-beam irradiation presents some technological advantages, since it allows higher dose rates and the possibility to be used in most foods/or thin products in a short period. Herein, the combined effects of electron-beam irradiation (0, 0.5, 1 and 6 kGy) and storage time (0, 6 and 12 months) were evaluated by measuring changes in nutritional parameters, namely, free sugars, tocopherols, fatty acids and antioxidant activity. As indicated by linear discriminant analysis, storage time had a higher effect on all the evaluated parameters, except fatty acids, which suffer significant changes with both factors. Overall, the obtained results indicate that electron-beam irradiation might be considered as a suitable technique, allowing long-lasting conservation periods while reducing changes induced by drying treatment. ©Springer Science+Business Media New York 2013.

Langue: Anglais

Sujet: Fruits, vegetables and nuts -- Other vegetables (including macrofungi); ANTIOXIDATIVE ACTIVITY; ELECTRON BEAM IRRADIATION; FATTY ACIDS; FUNGI EDIBLE; IRRADIATION; MUSHROOMS; STORAGE; STORAGE LIFE; SUGARS; TOCOPHEROLS

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Effects of gamma radiation on chemical and antioxidant properties, anti-hepatocellular carcinoma activity and hepatotoxicity of borututu

Auteur : Pereira, C; Calhelha, R C; Antonio, A L; Queiroz, M. J. R. P.; Barros, L; Ferreira, I. C. F. R.

Infos sur la publication : Innovative Food Science and Emerging Technologies 26 : 271-277. (2014)

Résumé : Borututu is a well-known medicinal plant in Angola for the treatment of liver diseases and for the prophylaxis of malaria. Our research group reported, in a recent study, that its infusion, pills and syrups display significant antioxidant and anti-hepatocellular carcinoma activities. However, during the processing and storage, it can be easily exposed to contamination that can lead to a microbial deterioration or insect infestation compromising its quality, shelf life, and efficiency. Herein, we investigated the effect of gamma irradiation, one of the most promising decontamination methods for many foodstuffs and plant materials, at different doses (1 and 10 kGy) on borututu regarding its nutritional value, lipophilic (fatty acids and tocopherols) and hydrophilic (free sugars and

organic acids) compounds, antioxidant and anti-hepatocellular carcinoma activities. In general, the irradiation treatment did not appreciably affect the nutritional value of the studied plant, but the highest energetic contribution (383.83 kcal/100 g), total sugars (8.63 g/100 g), organic acids (3.31 g/100 g dw), total tocopherols (336.72 mg/100 g dw), and PUFA (32.75%) contents were found in the sample irradiated at 10 kGy. Furthermore, this sample presented also the highest levels of total phenolics and flavonoids and, in general, the highest antioxidant activity (EC_{50} values of 0.04 to 0.24 mg/mL for the methanolic extract and 0.03 to 1.34 mg/mL for the infusion). Irradiated samples kept the anti-hepatocellular carcinoma activity, but a decrease was observed in the methanolic extract prepared from sample irradiated at 10 kGy (GI_{50} = 188.97 µg/mL). Overall, gamma irradiation proved to be a suitable technique of preservation of dried herbs without affecting the bioactive compounds. Industrial relevance. During processing and storage, plants can be easily exposed to contamination that can lead to a microbial deterioration or insect infestation compromising its quality, shelf life, and efficiency. This article highlights gamma irradiation as a suitable technique of preservation of borututu (a widely used dried plant) without significant changes in its bioactive effects. All rights reserved, Elsevier.

Langue: Anglais

Sujet: Catering, speciality and multi-component foods -- Prepared foods; ANTICARCINOGENICITY; ANTIOXIDATIVE ACTIVITY; BIOACTIVE COMPOUNDS; GAMMA IRRADIATION; HEALTH; IRRADIATION; MEDICINAL PLANTS; NUTRITIONAL VALUES; PLANTS

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Decontamination of Salmonella, Shigella, and Escherichia coli O157:H7 from leafy green vegetables using edible plant extracts

Auteur : Orue, N; Garcia, S; Feng, P; Heredia, N

Infos sur la publication : Journal of Food Science 78.2: M290-M296. (2013)

Résumé : Fresh cilantro, parsley, and spinach are products that are regularly consumed fresh, but are difficult to decontaminate, as a result, they are common vehicles of transmission of enteropathogenic bacteria. In this study, the efficacy of plant extracts as alternatives for disinfection of cilantro, parsley, and spinach that were artificially contaminated with *Salmonella*, *Escherichia coli*O157:H7, and *Shigella sonnei* was determined. Edible plant extracts obtained using ethanol as the extraction solvent were tested to determine the minimum bactericidal concentration (MBC) and those that exhibited the lowest MBC were selected for further studies. Leaves of fresh greens were washed with sterile water and dried. For seeding, leaves were submerged in suspensions of 2 different concentrations of bacteria (1.5×10^8 and 1×10^5), dried, and then stored at 4°C until use. To determine the effects of the extracts, inoculated leafy greens were submerged in a container and subjected to treatments with chlorine, Citrol®, or selected plant extracts. Each treatment type was stored at 4°C for 0, 1, 5, and 7 d, and the bacterial counts were determined. From the 41 plant extracts tested, the extracts from oregano leaves and from the peel and pulp of limes were found to be as effective as chlorine or Citrol® in reducing by >2 logs, the population of pathogenic bacteria on leafy greens and therefore, may be a natural and edible alternative to chemicals to reduce the risk of *Salmonella*, *E. coli* O157:H7 and *S. sonnei* contamination on leafy vegetables. Practical Application: The antimicrobial efficacy of the extracts of Mexican lime and oregano was clearly demonstrated on cilantro, parsley, and spinach. The extracts of Mexican lime and oregano provide alternatives to chlorine to significantly reduce bacterial pathogens that have been associated with outbreaks from contaminated leafy green vegetables. A simple, low cost, and labor-saving extraction system for production of the extracts was used. © 2013 Institute of Food Technologists®.

Langue: Anglais

Sujet: Additives, spices and condiments -- Spices and essential oils; ANTIBACTERIAL ACTIVITY; BACTERIA; CORIANDER; ESCHERICHIA; ESCHERICHIA COLI; FOOD SAFETY PLANT FOODS; HERBS; INHIBITION; MICROORGANISMS; PARSLEY; PLANT EXTRACTS; PLANTS; SALMONELLA; SHIGELLA; SPICES; SPINACH

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Continuous system for elimination of bacteria from comminuted solids, especially food products

Infos sur la publication : French Patent Application (2012)

Résumé : Equipment for elimination of bacteria from finely-divided foods such as herbs, spices or powders by heat treatment includes a fluidized bed section, a system for treatment with steam or other decontaminating gas, a cooling and drying section and a packaging section.

Informations sur le brevet: FR 2967554; A1; FCD sarl; FR; FR; FR 1059627; 23 novembre 2010 (20101123); Cheinet, F

Langue: Français

Sujet: Additives, spices and condiments -- Patents; EQUIPMENT; FLUIDIZATION; FLUIDIZED BEDS; HEATING; HERBS; PATENTS; SPICES; STERILIZATION

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Progress in food preservation

Infos sur la publication : 2012.

Résumé : This book provides information regarding novel and emerging food preservation techniques. It is aimed at food scientists and engineers in the food manufacturing and research sectors. The book contains 28 chapters under the following headings: Selected techniques to decontaminate minimally processed vegetables (pp. 1–21, many ref.); Active and intelligent packaging of food (pp. 23–48, many ref.); Modified-atmosphere storage of foods (pp. 49–66; many ref.); Effects of combined treatments with modified-atmosphere packaging on shelf-life improvement of food products (pp. 67–109; many ref.); Coating technology for food preservation (pp. 111–127; many ref.); Biological materials and food-drying innovations (pp. 129-142; many ref.); Atmospheric freeze drying (pp. 143–160; 37 ref.); Osmotic dehydration: theory, methodologies, and applications in fish, seafood, and meat products (pp. 161–189; 36 ref.); Dehydration of fruit and vegetables in tropical regions (pp. 191–209; 23 ref.); Developments in the thermal processing of food (pp. 211–230; many ref.); Ozone in food preservation (pp. 231–245; many ref.); Application of high hydrostatic pressure technology for processing and preservation of foods (pp. 247–276; many ref.); Pulsed electric fields for food preservation – an update on technological progress (pp. 277–295; many ref.); Salting technology in fish processing (pp. 297–313; 22 ref.); Hypoxanthine levels, chemical studies and bacterial flora of alternate frozen/thawed market-simulated marine fish species (pp. 315–329; 32 ref.); Preservation of cassava (*Manihot esculenta* Crantz) – a major crop to nourish people worldwide (pp. 331–342; many ref.); Use of electron beams in food preservation (pp. 343–372; many ref.); Treatment of foods using high hydrostatic pressure (pp. 373–388; many ref.); Role of predictive microbiology in food preservation (pp. 389–404; many ref.); Factors affecting the growth of microorganisms in food (pp. 405–427; 38 ref.); A whole-chain approach to food safety management and quality assurance of fresh produce (pp. 429–449; many ref.); Food bioprotection – lactic acid bacteria as natural preservatives (pp. 451–483; many ref.); Bacteriocins – recent advances and opportunities (pp. 485–511; many ref.); Application of botanicals as natural preservatives in food (pp. 513–530; many ref.); Tropical medicinal plants in food processing and preservation – potentials and challenges (pp. 531–538; many ref.); Essential oils and other plant extracts as food preservatives (pp. 539–579; many ref.); Plant-based products as control agents of stored-product insect pests in the tropics (pp. 581–601; many ref.); and Preservation of plant and animal foods – an overview (pp 603–611; many ref.).

Langue: Anglais

Sujet: Hygiene and toxicology -- Public health; BOOKS; FOOD SAFETY; FOODS; INTELLIGENT PACKAGING; PACKAGING; PRESERVATION; WORLD

Éditeur: Bhat, Rajeev; Karim Alias, A; Paliyath, Gopinadham

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Study of instant controlled pressure drop DIC treatment in manufacturing snack and expanded granule powder of apple and onion

Auteur : Mounir, S; Besombes, C; Al-Bitar, N; Allaf, K

Infos sur la publication : Drying Technology 29.3: 331-341. (2011)

Résumé : While the use of "puffing" process is mainly limited to products like cereals or carrot, the instant controlled pressure drop (DIC) can treat and expand the large domain of heat sensitive food products. In the present article, this operation is applied on partially dried apple and onion, to produce snack or, by shadow grinding, expanded granule powder. DIC is a high-steam pressure treatment (up to 0.6 MPa in this article), where steam is applied constantly during a short treatment time t (5–55 s) and instantaneously dropping the pressure toward vacuum 5 kPa with a rate higher than 0.5 MPa s^{-1}. The expanded structure allows the product to achieve better functional properties linked with a greater specific surface area. Thus, the time of final hot air drying (with air flow at 40°C, 1 m s^{-1}, and 267 Pa partially pressure humidity) is reduced by about 55% through greater effective diffusivity and initial starting accessibility. The product's nutritional value is partially preserved (vitamins) or even improved through more available flavonoids. DIC can perfectly decontaminate the products, and end quality attributes are higher than normally dried or as good as freeze-dried fruits. © Taylor and Francis Group, LLC.

Langue: Anglais

Sujet: Fruits, vegetables and nuts -- General aspects (fruits and vegetables); APPLES; DRIED FOODS; DRIED FRUITS; DRIED VEGETABLES; FRUITS DRIED; GRANULES; INSTANT FOODS; KINETICS; ONIONS; POWDERS; PUFFING; SNACK FOODS; VEGETABLES

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Natural pasteurisation process cuts contamination risk for raw snacks

Auteur : Ivarrson, C

Infos sur la publication : eFood (European Food Scientist) May: 20-22. (2009)

Résumé : The importance of pasteurization for ensuring good microbiological quality and safety of nuts, seeds and dried fruits as well as herbs and spices is discussed.

Langue: Anglais

Sujet: Fruits, vegetables and nuts -- General aspects (fruits and vegetables); CONTAMINATION; DECONTAMINATION; DRIED FRUITS; FOOD SAFETY PLANT FOODS; FRUITS DRIED; MICROBIOLOGICAL QUALITY; NUTS; PASTEURIZATION; SEEDS; SPICES

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Assessment of the microbiological safety of dried spices and herbs from production and retail premises in the United Kingdom

Auteur : Sagoo, S K; Little, C L; Greenwood, M; Mithani, V; Grant, K A; McLauchlin, J; Pinna, E de; Threlfall, E J

Infos sur la publication : Food Microbiology 26.1: 39-43. (2009)

Résumé : A study of dried spices and herbs from retail and production premises to determine the microbiological status of such products was undertaken in the UK during 2004. According to EC Recommendation 2004/24/EC and European Spice Association specifications, 96% of 2833 retail samples and 92% of 132 production batches were of satisfactory/acceptable quality. *Salmonella* spp. were detected in 1.5% and 1.1% of dried spices and herbs sampled at production and retail, respectively. Overall, 3.0% of herbs and spices contained high counts of *Bacillus cereus* (1%, $\geq 10^5$ cfu g^{-1}), *Clostridium perfringens* (0.4%, $\geq 10^3$ cfu g^{-1}) and/or *Escherichia coli* (2.1%, $\geq 10^2$ cfu g^{-1}). Ninety percent of samples examined were recorded as being 'ready-to-use', 96% of which were of satisfactory/acceptable quality. The potential public health risk of using spices and herbs as an addition to ready-to-eat foods that potentially undergo no further processing is therefore highlighted in this study. Prevention of microbial contamination in dried herbs and spices lies in the application of good hygiene practices during growing, harvesting and processing from farm to fork, and effective decontamination. In addition, the importance of correct food handling practices and usage of herbs and spices by end users cannot be overemphasised.

Langue: Anglais

Sujet: Additives, spices and condiments -- Spices and essential oils; FOOD SAFETY ADDITIVES; HERBS; MICROBIOLOGICAL QUALITY; PATHOGENS; SPICES

Document 50 sur 57

Conventional and alternative processes for spice production – a review

Auteur : Schweiggert, U; Carle, R; Schieber, A

Infos sur la publication : Trends in Food Science & Technology 18.5: 260-268. (2007)

Résumé : Disadvantages of processing operations used currently for manufacture of spices and recently developed, more suitable, alternative methods are reviewed. Aspects considered include: conventional spice manufacture (harvest and post-harvest treatments, drying, grinding, packaging and storage); microbial decontamination methods employed (fumigation with ethylene oxide, irradiation, steaming, high pressure processing); problems associated with manufacture of spices (high microbial loads and aflatoxin contamination, loss of valuable components via degradation with endogenous enzymes or conventional processing and storage conditions); innovative spice processing (development of free and microencapsulated spice essential oils and oleoresins, inclusion of a thermal processing step immediately prior to grinding); and recommendations for future research into the potential of extrusion or enzyme-assisted liquefaction for processing of spices and the optimization of the improved method which includes thermal processing prior to grinding.

Langue: Anglais

Sujet: Additives, spices and condiments -- Spices and essential oils; COMPOSITION; MICROBIOLOGICAL QUALITY; PROCESSING; SPICES

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Gamma irradiation improved the quality of onion flakes used by Argentine consumers

Auteur : Pezzutti, A; Matzkin, M R; Croci, C A

Infos sur la publication : Journal of Food Processing and Preservation 29.2: 120-131. (2005)

Résumé : The microbiological quality of local and imported packaged onion flakes available at retail markets in Argentina was investigated. A_w, water content, optical index and pungency (determined by enzymic pyruvic acid content) were monitored following ionizing radiation to ascertain the microbiological status and determine the effectiveness of selected doses of gamma rays to decontaminate the onion flakes, and their subsequent effect on selected sensory properties. Untreated onion flakes were found to be contaminated with a high percentage of spore-forming microorganisms. The onion flakes were irradiated at doses of 7–23 kGy, and stored at temp. between 20 and 25°C, and RH ranging from 50 to 80%. Irradiation doses between 7 and 11 kGy reduced aerobic plate counts by 3 log cycles. Doses between 7 and 15 kGy reduced yeast and fungal counts by 2 log cycles. A dose of 7 kGy was sufficient to reduce sulfite-reducing *Clostridia* counts to undetectable levels. No variation in water content or a_w was attributed to the selected irradiation doses. Irradiation in the 7–11 kGy range markedly increased the saline extract optical index of the onion flakes. Gamma irradiation did not significantly affect the flavor intensity. It is suggested that a dose of ≥7 kGy is necessary to decontaminate imported dry onions marketed in Argentina.

Langue: Anglais

Sujet: Fruits, vegetables and nuts -- Other vegetables (including macrofungi); ARGENTINA; DRIED FOODS; DRIED VEGETABLES; FLAVOUR; GAMMA IRRADIATION; IRRADIATION; MICROBIOLOGICAL QUALITY; ONIONS; VEGETABLES

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Efficacy of chlorine dioxide, ozone, and thyme essential oil or a sequential washing in killing Escherichiacoli O157:H7 on lettuce and baby carrots

Auteur : Singh, N; Singh, R K; Bhunia, A K; Stroshine, R L

Infos sur la publication : Lebensmittel-Wissenschaft und -Technologie 35.8: 720-729. (2002)

Résumé : Efficacy of aqueous and gaseous forms of chlorine dioxide (CD) and ozone, as well as thyme essential oil (TEO), as antibacterial surface treatments for elimination of *Escherichiacoli* O157:H7 inoculated onto shredded Romaine lettuce and baby carrots was evaluated. Efficacy of treatments applied singly and sequentially was examined. A 3-strain cocktail of *E.coli* O157:H7 (C7927, EDL933 and 204P) inoculated at 10^8 cfu/g was used in tests. To permit attachment of pathogen, inoculated samples were air dried for 1 h at 22°C then refrigerated at 4°C for 24 h before exposure to sanitizers. Neither water washing nor use of individual sanitizers was effective in eliminating the pathogen from either food sample. Sequential washing may, therefore, be an important part of decontamination of fresh-cut vegetables. Gaseous exposures caused considerable reductions in pathogen numbers, but also decolorized lettuce. Sequential washing in TEO followed by aqueous CD and ozonated water was very effective in killing the pathogen (3–4 log reduction of initial load), but may have adverse effects on sensory properties of the product.

Langue: Anglais

Sujet: Fruits, vegetables and nuts -- General aspects (vegetables); CARROTS; CHLORINE DIOXIDE; CLEANING; CONTAMINATION; DISINFECTION; ESCHERICHIA; ESCHERICHIA COLI; ESSENTIAL OILS; FOOD SAFETY PLANT FOODS; GASES; LETTUCES; OXIDIZING AGENTS; OZONE; SANITIZERS; THYME; WASHING

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Decontamination of dry food ingredients with "soft-electrons" (low-energy electrons)

Auteur : Hayashi, T

Infos sur la publication : JARQ Japan Agricultural Research Quarterly 32.4: 293-299. (1998)

Résumé : Use of low energy electrons (i.e. ≤300 keV, defined as soft electrons) for surface decontamination of dry foods was investigated in studies on cereals (wheat, rice) and other foods (driedvegetables, spices, pulses). Results showed that low-energy electrons eradicated microorganisms on the surface of cereal grain and did not significantly degrade starch molecules within the grain. Use of electrons with a

higher energy and higher penetration capacity resulted in a higher TBA value for brown rice. Milling of electron-treated brown rice (65 keV) resulted in a TBA value similar to that of untreated rice, indicating that the milling process removed the portion of brown rice exposed to the electrons. Low energy electrons were also successfully used to reduce microbial counts on shredded dried vegetables, spices and pulses. It is concluded that low-energy electron treatment can be used to decontaminate dry foods with few adverse effects on quality. [From En summ.]

Langue: Anglais

Sujet: Cereals and bakery products -- General aspects; CEREALS; DRIED FOODS; DRIED VEGETABLES; FOOD SAFETY PLANT FOODS; SPICES; STERILIZATION; VEGETABLES

Document 54 sur 57

Comparing effects of washing, thermal treatments and gamma irradiation on quality of spices

Auteur : Farag Zaied, S. E. A.; Aziz, N H; Ali, A M

Infos sur la publication : Nahrung 40.1: 32-36. (1996)

Résumé : Samples of black pepper, fennel, coriander, anise and turmeric were treated by: washing in tap water then drying at room temp; heat treatment at 70°C for 15 min; or γ-irradiation at 5 or 10 kGy. Effects of the different treatments on microbiological and flavour quality were determined. Initial untreated spices were highly contaminated with pathogenic and toxigenic microorganisms. Irradiation was an effective means of decontamination, especially at 10 kGy, but resulted in losses in major flavour components including anethole, anisaldehyde and chavicol in anise and β-pinene and cineol in black pepper. Irradiation also resulted in conversion of monoterpene hydrocarbons to terpenes in black pepper. Heat treatment gave a similar level of microbial reduction as irradiation with 5 kGy and had a beneficial effect on flavour components such as anisaldehyde in fennel, anethole in anise and β-pinene in black pepper. Washing spices resulted in a low level of microbial removal and little change in flavour except for anise. It is concluded that heat and washing treatments can be recommended as alternatives to irradiation for producing spices with good flavour and good hygienic quality. [From En summ.]

Langue: Anglais

Sujet: Additives, spices and condiments; FLAVOUR; FLAVOURINGS; FOOD SAFETY; FOOD SAFETY PLANT FOODS; MICROBIOLOGICAL QUALITY; PROCESSING; SENSORY PROPERTIES; SPICES

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Decontamination of irradiated mushrooms by cooking and soaking

Auteur : Antonowa, V A

Infos sur la publication : Industrielle Obst- und Gemueseverwertung 79.5: 176-177. (1994)

Résumé : Various types of dried mushrooms which had been subjected to Cs irradiation under natural conditions were cooked in water, with and without added salt at 20 g/l, for 30 min and 1 h. The ^{137}Cs content dropped by 70-80%, with little difference attributable to cooking time. Steeping of the mushrooms in the water proved a more effective means of decontamination, their ^{137}Cs content declining by 86-92%, again with little difference due to the added salt. Steeping of the samples, plus repeated washing in mains water prior to cooking, led to virtually 100% transfer of the ^{137}Cs to the water.

Langue: Allemand

Sujet: Fruits, vegetables and nuts; CS; DRIED FOODS; FUNGI EDIBLE; MINERALS; MUSHROOMS; PROCESSED FOODS; PROCESSING; RADIOELEMENTS; RESIDUES; VEGETABLES SPECIFIC

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Herbs and spices. Dispensing methods

Auteur : Cohen Maurel, E

Infos sur la publication : Process No. 1094: 50-51. (1994)

Résumé : Problems associated with the use of aromatic herbs and spices, both in the natural state and in the form of extracts or aroma compounds, in foods are discussed. Aspects considered include: microbiological quality; dispersion and homogeneity; strength uniformity between samples; treatment of aromatic herbs to reduce contamination (drying, freezing, lyophilization); contaminants in driedspices; decontamination of spices (γ irradiation, MicroControl vapours, ozone, microwave treatments); maintaining colour of herbs during processing; properties of essential oils and oleoresins; and further processed extracts.

Langue: Français

Sujet: Additives, spices and condiments; FLAVOURINGS; HERBS; SPICES

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Radiation decontamination of dry chamomile flowers and chamomile extract

Auteur : Katusin-Razem, B; Razem, D; Dvornik, I; Matic, S; Mihokovic, V

Infos sur la publication : In 'Food irradiation processing' [see FSTA (1986) 18 9G1] : . 69-77. (1985)

Résumé : Chamomile flowers (used in herbal tea infusions) show very high microbial counts (up to 10^8/g). About 2% of these survived into chamomile tea (made by soaking dry flowers in hot water for 10 min) and about 3% (sporogenic bacteria) survived extraction with aqueous ethanol. Commercial conc. chamomile extracts also contain a high level of microbial contamination (10^6/g) which persists for a long time. The presence of microorganisms in herbs and extracts presents health and food spoilage problems. For radiation decontamination of conc. chamomile extracts, higher doses are required than for dry flowers. Essential oil and hydrophilic components obtained from irradiated dry flowers did not change on irradiation up to 10 kGy. No immediate radiation-induced change of the components obtained from conc. extract was observed at 15 kGy, except for a 17% decrease of herniarin (a coumarin). However, for commercial sterility, lower doses would be adequate. The content of en-in-dicyclo-ether decreased only on extended storage. Radiation is an efficient and convenient method for decontamination of dry plants and the only choice for decontamination of heat sensitive extracts and concentrates.

Langue: Anglais

Sujet: Alcoholic and non-alcoholic beverages; CHAMOMILE; CROPS; EXTRACTS; MICROBIAL COUNTS; MICROBIOLOGICAL TECHNIQUES; MICROORGANISMS; PLANT FOODS; SPICES; TEA; TEAS

ANNEXE 4

Décontamination – Base CTCPA

950154

TF : Procédé pour la décontamination microbiologique des bulbes comestibles, notamment d'ail et d'oignon.
AU : GILBERT, O./MASTORINO, E.
SO : BREVET EUROPEEN n° 0 634 104, 7 p., 12.07.1994,7 p., LANGUE»
KW : DESHYDRATATION/CONDIMENT/AIL/OIGNON/LEGUME/MICROBIOLOGIE/DESINFECTION/TRAITEMENT-THERMIQUE/STERILISATION/BREVET

890613

TF : Désinfection par ionisation et qualités biochimiques des noix sèches.
TI : (Irradiation disinfestation and biochemical quality of dry nuts).
AU : SATTAR, A. / JAN, M. / AHMAD, A.
SO : ACTA ALIMENTARIA 18, 1, 45-52, 01.03.1989,, LANGUE»
KW : DESINFECTION/HYGIENE / DESHYDRATATION/TECHNOLOGIE / NOIX/FRUIT-SEC/FRUIT/PRODUIT-VEGETAL / DESINSECTISATION / QUALITE

870789

TF : Décontamination et élimination des parasites par ionisation dans les produits alimentaires déshydratés, réfrigérés et congelés.
TI : (Decontamination, including parasite control of dried, chilled and frozen foods by irradiation).
AU : FARKAS, J.
SO : ACTA ALIMENTARIA 16, 4, 351-384, 01.12.1987,, LANGUE»
KW : HYGIENE / CONTROLE-QUALITE / DESHYDRATATION/TECHNOLOGIE / REFRIGERATION/TRAITEMENT-THERMIQUE / CONGELATION / IONISATION/STERILISATION / DESINFECTION

970289

TF : Traitement vapeur flash-pasteurisation et désinfection sur produits secs (9 à 11% d'humidité).
AU : VAROQUAUX, P.
SO : CT-INFOS (CTCPA) n° 19, pp. 6-8, 01.04.1997,3 p., LANGUE»
KW : PASTEURISATION/TRAITEMENT-THERMIQUE / VAPEUR/FLUIDE / DESINFECTION/HYGIENE / DESHYDRATATION/TECHNOLOGIE

020211

TF : Décontamination des produits secs.
AU : VASSEUR, P.
SO : CT-INFOS (CTCPA) n°39-02/1, pp. 15-19, 01.03.2002,5 p., LANGUE»
AB : Pour remplacer l'ionisation : techniques chimiques ou physiques, utilisant la conduction ou la convection, tandis que d'autres agissent par rayonnement.
KW : DESHYDRATATION / TECHNOLOGIE / DESINFECTION / HYGIENE / CONDUCTION / PROPRIETE-PHYSIQUE / TRANSFERT-DE-CHALEUR / CONVECTION

020236

TF : Revue des pratiques courantes de nettoyage et des contrôles de contamination dans les industries de produits déshydratés.
TI : (Review of current cleaning practices and contamination controls in the dry goods industries).
AU : MIDDLETON, K.E. / CAMPDEN & CHORLEYWOOD FOOD RESEARCH ASSOCIATION
SO : pp. 1-31, 01.01.2002,31 p., LANGUE»
AB : Revues des procédures séches et humides de nettoyage et des analyses microbiologiques correspondantes de contrôle.
KW : NETTOYAGE / DESINFECTION / HYGIENE / CONTAMINATION / DESHYDRATATION / TECHNOLOGIE

040018

TF : Décontamination des poudres alimentaires : revue bibliographique et nouvelles perspectives.
AU : FINE, F. / GERVAIS, P.
SO : SCIENCES DES ALIMENTS 23, n°3, pp. 367-394, 01.07.2003,28 p., LANGUE»
AB : Les produits pulvérulents sont largement représentés dans les différentes filières alimentaires et leur qualités microbiologiques et organoleptiques font l'objet de la plus grande attention de la part des industriels. La faible activité de l'eau des poudres alimentaires contribue à sélectionner une flore résistante et notamment une majorité de formes sporulées. La décontamination par ionisation ayant été abandonnée pour des raisons

d'image de marque , de nombreux traitements thermiques et athermiques ont été développés. L'efficacité décontaminante de ces traitements se faisant le plus souvent au détriment de la qualité du produit, de nouveaux procédés innovants (lumière pulsée, traitements thermiques de type HTST...) ont vu le jour et devraient prochainement être utilisés industriellement.
KW : DESHYDRATATION / TECHNOLOGIE / DESINFECTION / HYGIENE / LUMIERE-PULSEE / LUMIERE / PULSE / TRAITEMENT-ATHERMIQUE / ENERGIE

040132

TF : Efficacité antimicrobienne d'huiles essentielles d'épices finlandaises contre les microorganismes pathogènes et d'altération.
TI : (Antibacterial efficiency of Finnish spice essential oils against pathogenic and spoilage bacteria).
AU : NEVAS, M.
SO : JOURNAL OF FOOD PROTECTION 67, n°1, pp. 199-202, 01.01.2004,4 p., LANGUE»
AB : L'origan, le thym et la sarriette ont les spectres antimicrobiens les plus larges.
KW : EPICE / PRODUIT-VEGETAL / MICROBIOLOGIE / DESINFECTION / HYGIENE

040233

TF : Efficacité de la lumière UV pulsée pour la décontamination microbienne des poudres alimentaires.
TI : (Efficiency of pulsed UV light for microbial decontamination of food powders).
AU : FINE, F. / GERVAIS, P.
SO : JOURNAL OF FOOD PROTECTION 67, n°4, pp. 787-792, 01.04.2004,6 p., LANGUE»
AB : Fluidisation efficace des poudres.
KW : LUMIERE-PULSEE / LUMIERE / PULSE / TRAITEMENT-ATHERMIQUE / ENERGIE / ULTRA-VIOLET / STERILISATION / DESHYDRATATION / TECHNOLOGIE / DESINFECTION / HYGIENE

050065

TF : Abcar-Dic stérilise sans altérer le goût, la couleur ni l'aspect.
AU : LEBOULENGER, S.
SO : L'USINE NOUVELLE N°2946, p. 54, 27.01.2005,1 p., LANGUE»
AB : Soumettre pendant quelques secondes les produits (épices, fruits, légumes) à une température comprise entre 80 et 180°C, sous 15 à 20 bars maximum.
KW : DESHYDRATATION / TECHNOLOGIE / DECONTAMINATION / EPICE / PRODUIT-VEGETAL / FRUIT / LEGUME

050408

TF : Décontaminer les pulvérulents
AU : CHRISTEN, P.
SO : PROCESS n°1218, pp 84-86, 01.09.2005,3 p, LANGUE»
AB : Outre l'ionisation, les microondes monomodes et la pasteurisation sous vide, sont présentés les procédés de décontamination des poudres par vapeur saturée (Hosokawa micron), par vapeur + dioxyde de carbone (CTCPA), par procédé HTST, par détente instantanée contrôlée et par tube à passage de courant (chauffage par effet Joule).
KW : DECONTAMINATION / FLUIDE / IONISATION / MICROONDE / POUDRE / STERILISATION / TECHNOLOGIE / TRAITEMENT-ATHERMIQUE / TRAITEMENT-THERMIQUE / VAPEUR

070146

TF : Activité antimicrobienne de plusieurs extraits d'herbes et d'épices dans les milieux de culture et dans du porc emballé sous vide.
TI : (Antimicrobial activity of several herb and spice extracts in culture medium and in vacuum-packaged
AU : KONG, B./WANG, J./XIONG, Y.L.
SO : JOURNAL OF FOOD PROTECTION vol.70, n° 3, pp. 641-647, 01.03.2007,7 p., LANGUE»
AB : Des extraits d'herbes et d'épices (chèvrefeuille, Scutellaria, Forsythia suspensa, canelle, romarin) dilués dans l'éthanol et de l'essence de girofle sont ajoutés au milieu de croissance d'Escherichia coli, Pseudomonas fluorescens et Lactobacillus plantarum. Tous ont un effet sur la croissance des bactéries. Détermination du mélange le plus efficace sur du porc frais emballé sous vide : on obtient une réduction de 1,81 à 2,32 log CFU/g comparé à un témoin au bout de 28 jours de stockage.
KW : AROMATE / DECONTAMINATION / EMBALLAGE / EPICE / HERBE / PORC / VIDE

070184

TF : Décontamination microbienne de poivre noir (Piper nigrum L.) en poudre en utilisant les microondes.

TI : (Microbial decontamination of powdered black pepper (Piper nigrum L.) by using microwave)

AU : AYDIN, A./BOSTAN, K.

SO : JOURNAL OF FOOD SCIENCE AND TECHNOLOGY vol. 43, n° 6, pp. 575-578, 01.11.2006,4 p., LANGUE»

AB : Avant d'être utilisés, les épices doivent être décontaminés. On étudie les effets d'un traitement par microondes sur la charge en microorganismes d'échantillons de poivre noir en poudre, à différentes teneur en humidité. Des poudres de poivre noir, dont on a ajusté le taux d'humidité (normal, 15 et 17,5 %) en pulvérisant de l'eau, sont soumises à un traitement par microondes (2450 Mhz, 450 W) pendant 50 et 150 s en continu, ou de façon intermittente par tranches de 10 s. Au terme du traitement, on analyse les réductions de la flore aérobie mésophile, des Enterobacteriaceae, des levures et des moisissures. On évalue également le taux d'humidité et les pertes en composés volatiles. Les microondes réduisent les charges microbiennes initiales (respectivement 6,3, 4,4 et 3,9 log CFU/g) pour les différentes familles de microorganisme de 49 à 87% pour la flore aérobie mésophiles, de 7,5 à 94,9 % pour les Enterobacteriaceae et de 33,9 à 90,7 % pour les levures et les moisissures. La réduction la plus importante est obtenue avec le traitement continu de 150 s. L'augmentation de la teneur en humidité augmente l'efficacité du traitement. Les teneurs en composés volatiles baissent de 3,9 à 18,7% quand le temps de traitement augmente. Cette perte reste à un niveau acceptable et semble moins marquée quand on appplique un traitement intermittent.

KW : DECONTAMINATION / EPICE / HUMIDITE / MICROONDE / POIVRE

070451

TF : Efficacité de sachets de dioxide de chlore gazeux pour améliorer la qualité microbiologique et la sécurité sanitaire des myrtilles

TI : (Efficacy of chlorine dioxide gas sachets for enhancing the microbiological quality and safety of blueberries)

AU : POPA, I./HANSON, E.J./TODD, E.C.D./SCHILDER, A.C./RYSER, E.T.

SO : JOURNAL OF FOOD PROTECTION vol. 70, n°9, pp.2084-2088, 01.09.2007,5 p., LANGUE»

AB : Des lots de myrtilles sont inoculés avec des mélanges de microorganismes (Escherichia coli, Listeria monocytogenes, Salmonella, levures et moisissures) puis placés dans des containers scellés et exposés au dioxyde de chlore gazeux (4 mg/). On obtient des réductions respectives de 3,94, 3,62, 4,25, 3,10 et 3,17 log CFU/g pour Listeria, Salmonella, E.coli, les levures et les moisissures. Des lots non inoculés sont également exposés au gaz (18 mg/l). On obtient des réductions respectives de 2,33, 1,47, 0,52, 1,63 et 0,48 log CFU/g pour les flores aérobies mésophiles, les coliformes, E. coli, les levures et les moisissures. Les sachets de ClO2 pourraient être un moyen pour améliorer la qualité des myrtilles.

KW : BAIE / CHLORE / CONTENEUR / DECONTAMINATION / FRUIT / GAZ / MICROORGANISME / MYRTILLE / POUDRE / SACHET

080077

TF : Huiles essentielles : agents aromatisants aux propriétés anti-microbiennes

AU : JELTSCH, P./THOUVENOT, D.

SO : INDUSTRIES ALIMENTAIRES ET AGRICOLES vol. 124, nov-dec, pp. 11-22, 01.12.2007,12 p., LANGUE»

AB : Les huiles essentielles sont principalement utilisées comme agents aromatiques, mais certains de leurs composés actifs ont un effet antimicrobien contre les flores pathogènes ou d'altération. Le thymol, le carvacrol, l'eugénol, le géraniol, le cinnamaldéhyde et l'acide cinnamique sont actifs contre un spectre large de bactéries. En raison d'effets gustatifs indésirables aux doses efficaces, l'action des huiles essentielles n'est envisageable que combinée aux agents et procédés de conservation.

KW : ADDITIF-ALIMENTAIRE / AGENT-CONSERVATION / ALLERGENE / AROMATE / CORPS-GRAS / DECONTAMINATION / FLAVEUR / HUILE / MICROORGANISME / PROPRIETE-ORGANOLEPTIQUE / THYM

080184

TF : Décontamination d'épices par combinaison d'effets mécanique et thermique - une approche alternative pour le maintien de la qualité

TI : Decontamination of spices by combining mechanical and thermal effets - an alternative approach for quality retention

AU : LILIE, M./HEIN, S./WILHELM, P./MUELLER, U.

SO : INTERNATIONAL JOURNAL OF FOOD SCIENCE AND TECHNOLOGY vol. 42, n°1, pp. 190-193, 01.01.2007,4 p., LANGUE»

AB : Evaluation avec du poivre noir contaminé d'une modification du traitement des épices par vide-vapeur-vide par l'introduction d'une évacuation rapide après un traitement court à la vapeur (100 -130 °C).

KW : DECONTAMINATION / EPICE / FLUIDE / HUMIDITE / MICROORGANISME / POIVRE / PRODUIT-VEGETAL / VAPEUR / VIDE

080236

TF : Activité bactéricide de l'ozone contre Escherichia coli sur les poivres noirs entiers et moulus
TI : (Bactericidal activity of ozone against Escherichia coli in whole and ground black peppers
AU : EMER, Z./AKBAS, M.Y./OZDEMIR, M.
SO : JOURNAL OF FOOD PROTECTION vol. 71, n°5, pp. 914-917, 01.05.2008,4 p., LANGUE»
AB : Etude des effets de différentes concentrations d'ozone (0,1 ; 0,5 et 1 ppm) et temps de traitement (0 à 360 min) sur l'inactivation d'E. coli et les propriétés organoleptiques du poivre. Un traitement à 0,1 ppm d'ozone pendant 360 min permet d'inactiver E. coli sur les poivres entiers et moulus tout en conservant les qualités sensorielles (odeur, couleur, amertume, ...).
KW : DECONTAMINATION / ENTEROBACTERIE / EPICE / ESCHERICHIA-COLI / GAZ / MICROORGANISME / OZONE / POIVRE / POUDRE / PRODUIT-VEGETAL / PROPRIETE-ORGANOLEPTIQUE

080340

TF : Efficacité des huiles essentielles de plantes contre les pathogènes alimentaires et les bactéries d'altération associés aux légumes prêts à consommer : examen des propriétés antimicrobiennes et sensorielles
TI : (Efficacity of plant essential oils against foodborne pathogens and spoilage bacteria associated with ready-to-eat vegetables :antimicrobial and sensory screening)
AU : GUTIERREZ, J./RODRIGUEZ, G./BARRY-RYAN, C./BOURSE, P.
SO : JOURNAL OF FOOD PROTECTION vol. 71, n°9, pp. 1846-1854, 01.09.2007,9 p., LANGUE»
AB : Etude des propriétés antimicrobiennes d'huiles essentielles de plantes (basilic, thym, sauge, persil, carvi, fenouil, noix de muscade, mélisse, romarin, origan) sur les pathogènes et les bactéries d'altération des légumes prêts à consommer faiblement transformés (carotte, laitue iceberg), et étude du seuil d'acceptabilité sensorielle. Les bactéries gram-positives sont plus sensibles que les bactéries gram-négatives. Les souches de Listeria monocytogenes sont les plus sensibles et celles de Pseudomonas, les plus résistantes.
KW : AROMATE / CAROTTE / DECONTAMINATION / EXTRAIT / HUILE / LAITUE / LEGUME / MICROORGANISME / PRODUIT-VEGETAL / PROPRIETE-ORGANOLEPTIQUE / SALADE

090021

TF : Efficacité du dioxyde de chlore gazeux comme désinfectant contre Cryptosporidium parvum, Cyclospora cayetanensis, et Encephalitozoon intestinalis sur les végétaux frais
TI : (Efficacity of gaseous chlorine dioxide as sanitizer against Cryptosporidium parvum, Cyclospora cayetanensis, and Encephalitozoon intestinalis on produce)
AU : ORTEGA, Y.R./MANN, A./TORRES, M.P./CAMA, V.
SO : JOURNAL OF FOOD PROTECTION vol. 71, n°12, pp. 2410-2414, 01.12.2008,5 p., LANGUE»
AB : Des oocytes des parasites Cryptosporidium parvum et Cyclospora cayetanensis, des spores de Encephalitozoon intestinalis et deux isolats d'Escherichia coli O157:H7 sont inoculés à des feuilles de basilic et de laitue. Les échantillons sont traités 20 min avec du dioxyde de chlore gazeux (4,1 mg/l). Les réductions obtenues sur le basilic et la laitue sont respectivement de 2,6 et 3,31 log pour Cryptosporidium parvum, 3,58 et 4,58 CFU/g pour Encephalitozoon intestinalis et 2,45 et 9,97 log pour E. coli. La sporulation de Cyclospora cayetanensis n'est pas modifiée par le traitement. L'étude montre que l'apparence des feuillles de laitues et de basilic est modifiée.
KW : AROMATE / CHLORE / DECONTAMINATION / DESINFECTION / ELEMENT-CHIMIQUE / ENTEROBACTERIE / ESCHERICHIA-COLI / GAZ / HYGIENE / LAITUE / LEGUME / MICROORGANISME / PRODUIT-VEGETAL / SALADE / SPORE

090136

TF : Effets des radiations ionisantes sur la décontamination microbienne, la teneur en composés phénoliques et les propriétés antioxydantes du triphala
TI : Effects of ionizingradiation on microbial decontamination, phenolic contents, and antioxidant properties of triphala
AU : KUMARI, N./KUMAR, P./MITRA, D./PRASAD, B./TIWARY, B.T./VARSHNEY, L.
SO : JOURNAL OF FOOD SCIENCE vol. 74, n°3, pp. M109-M113, 01.03.2009,15 p., LANGUE»
AB : Le triphala, un mélange de Emblica officinalis, Terminalia chebula, et Terminalia bellirica, contient des ingrédients végétaux sujets à la contamination. Après un traitement par ionisation gamma, on observe une diminution de la contamination de façon proportionnelle à la dose appliquée. On obtient une décontamination complète à 5 kGy. La valeur D10 pour la flore aérobie et les moisissures sont respectivement de 0,55 kGy et 0,94 kGy, respectivelment On constate une augmentation des concentrations en principes actifs et des

propriétés oxydantes jusqu'à 25 kGy. L'aflatoxine B1 et l'ochratoxine ne sont plus détectées dans les échantillons traités.
KW : AROMATE / COMPOSITION / DECONTAMINATION / HERBE / INGREDIENT / IONISATION / MYCOTOXINE / TECHNOLOGIE / TOXICOLOGIE / TOXINE / TRAITEMENT-ATHERMIQUE

090272

TF : Test Croissance - Non croissance de Colletotrichum gloeosporioides après une sélection de traitements par microondes
TI : Colletotrichum gloeosporioides growth-no-growth interface after selected microwave treatments
AU : SOSA-MORALES, M.E./GARCIA, H.S./LOPEZ-MALO, A.
SO : JOURNAL OF FOOD PROTECTION vol. 72, n°7, pp. 1427-1433, 01.07.2009,7 p., LANGUE»
AB : Etude de l'application des microondes pour lutter contre la moisissure Colleotrichum gloeosporoides. Des microondes sont appliquées sur des spores séchées ou en milieu humide en faisant varier le niveau de puissance (77,2 à 435, 6 W) , le temps d'exposition (1, 2, 3 ou 4 min en milieu sec, et 3, 6, 9 s sur milieu humide) et le temps d'incubation (4 et 10 jours) et on comptabilise les croissances. Les conditions les plus fortes provoquent l'ihnibition complète de la moisissure. La chaleur des microondes provoque la destruction des cellules.
KW : DECONTAMINATION / DESHYDRATATION / HUMIDITE / MICROONDE / MICROORGANISME / MODELISATION / MOISISSURE / PHYSIOLOGIE / TECHNOLOGIE / TRAITEMENT-THERMIQUE

120208

TF : Stéripure décontamine les produits secs
AU : BENARD, L.
SO : RIA - REVUE DE L'INDUSTRIE AGROALIMENTAIRE n°735, pp. 67, 01.06.2012,1 p., LANGUE»
AB : Stéripure lanche une activité de décontaminaiton de produts secs et de pasteurisation d'herbes, d'épice de plantes séchéessn de fuits secs et de graines comestibles par injection de vapeur saturée dans une enceinte sous vide (équipement Napasol). Cette technologie permet d'ayyeindre des réduction de 5 à 6 log de la charge microbienne.
KW : AROMATE / DECONTAMINATION / DESHYDRATATION / EPICE / FLUIDE / FRUIT / FRUIT-SEC / HERBE / MATERIEL / PASTEURISATION / PRODUIT-VEGETAL / TECHNOLOGIE / TRAITEMENT-THERMIQUE / VAPEUR

130048

TF : Traitement en continu des grains et épices par la vapeur
AU : DULAU, I.
SO : RIA - REVUE DE L'INDUSTRIE AGROALIMENTAIRE n°742, pp. 51, 01.02.2013,1 p., LANGUE»
AB : La société FCD System propose une technologie qui permet de traiter fruits secs, épices et grains, tout en respectant les qualités aromatiques et l'intégrité de ces produits. Stéristep est une table vibrante à 12 niveaux, chauffée avec des résistances électriques et de la vapeur surchauffée (100 - 120 °C) pour décontaminer les produits. Ils sont pasteurisés entre 2 et 4 min ou stérilisés entre 4 et 7 min.
KW : AROMATE / DECONTAMINATION / EPICE / FLUIDE / HERBE / MATERIEL / NETTOYAGE / PASTEURISATION / PRODUIT-VEGETAL / TRAITEMENT-THERMIQUE / VAPEUR

130141

TF : Une petite soupe assaisonnée au cobalt 60 ?
AU : MAUGAIN, L.
SO : SOIXANTE MILLIONS DE CONSOMMATEURS n° 483, juin 2013, pp. 22-24, 01.06.2013,3 p., LANGUE»
AB : En France, la stérilisation par irradiation est limitée à quelques produits et doit être indiquée par un marquage spécifique. Ce n'est pas le cas dans certains pays tiers qui pratiquent plus largement ces traitements. La France contrôle moins les produits importés que les autres pays européens : elle cible quelques produits comme les nouilles, soupes et sauces déshydratées en provenance d'Asie. L'irradiation ou ionisation n'est pas reconnue comme toxique, bien que des débats sur cette question soient toujours en cours, en particulier sur l'oxydation et l'hydrogénation des lipides.
KW : DECONTAMINATION / DESHYDRATATION / IONISATION / POTAGE / STERILISATION / TECHNOLOGIE / TRAITEMENT-ATHERMIQUE

130215

TF : Plasma atmosphérique froid - un nouvel outil pour les producteurs alimentaires
TI : Cold atmospheric plasma - a new tool for food manufacturers
AU : BAYLISS, D.
SO : NEW FOOD Vol. 16, n°3, pp. 34-36, 01.06.2013,3 p., LANGUE»

AB : La production alimentaire doit assurer la décontamination des produits, ou la désinfection de son environnement (matériels, surfaces, ..) pour limiter les contaminations croisées. L'utilisation d'un plasma froid peut répondre à ces besoins. Le plasma froid, obtenu en appliquant une énegie électrique à un gaz, présente des propriétés antibactériennes et peut s'appliquer à la désinfection des surfaces, des équipements, des emballages, à des températures basses. il peut en particulier s'apliquer aux produits secs et frais, et au traitement des eaux usées.
KW : DECONTAMINATION / DESHYDRATATION / DESINFECTION / ELECTRICITE / EMBALLAGE / ENERGIE / GAZ / HYGIENE / MATERIAU-AU-CONTACT / MATERIEL / QUATRIEME-GAMME / TECHNOLOGIE

150081

TF : Procédés alimentaires infrarouge innovants
TI : Innovative infrared food processing
AU : MCHUGH, T./PAN, Z.
SO : FOOD TECHNOLOGY Vol. 69, n°2, pp. 79-81, 01.02.2015,3 p., LANGUE»
AB : Présentation des principes, des équipements et des applications des ultrasons dans le traitement des produits alimentaires. Les ultrasons sont utilisés pour inactiver les microorganismes et les enzymes, pour améliorer la conservation des aliments. Ils sont aussi appliqués dans des activités de découpe, de déshydratation, avec la surgélation, l'homogénéisation,...
KW : BLANCHIMENT / DECONTAMINATION / DESHYDRATATION / INFRAROUGE / PELAGE / TECHNOLOGIE / TRAITEMENT-THERMIQUE

150130

TF : Microbial decontamination of red pepper powder by cold plasma
TI : Microbial decontamination of red pepper powder by cold plasma
AU : KIM, J.E./LEE, S.U./MIN, S.C.
SO : FOOD MICROBIOLOGY Vol. 38, pp. 128-136, 01.12.2014,9 p., LANGUE»
AB : L'effet de traitements à plasma froid renforcés par microondes sur l'inhibition de microorganismes (microflore aérobie naturelle, et spores d'Aspergillus flavus et de Bacillus cereus inoculés) dans la poudre de piment rouge (Capsicum annuum L.) est évalué et les conditions de traitement pour l'inhibition d'A. flavus sont optimisées. Globalement, ces traitements de plasma froid renforcés par microondes sont potentiellement utilisables pour décontaminer les poudres alimentaires. Un traitement avec de l'azote, à 900 W et 667 Pa pendant 20 min inhibe les bactéries aérobies totales d'environ 1 log UFC/g de poudre de piment rouge et les spores d'A. flavurs de 2,5 log spores/g. Les modèles de Fermi's et de Weibull décrivent bien l'inhibition d'A. flavus. En revanche, pour les spores de B. cereus, l'association du traitement par plasma froid (avec un mélange hélium-oxygène) avec un traitement thermique (90°C pendant 30 min) s'avère nécessaire pour une inhibition suffisante (3,4 log spores/g).
KW : CONDIMENT / DECONTAMINATION / MICROBIOLOGIE / PIMENT / POUDRE

160423

TF : La décontamination des produits secs avec la vapeur
TI : The decontamination of dried products with full steam
AU : KHINOUCHE, K-F.
SO : INTERNATIONAL FOOD HYGIENE VoL; 27, n°2, pp. 9-10, 01.03.2016,2 p., LANGUE»
AB : Les aliments séchés (herbes, épices, fruits déshydratés, céréales….) peuvent être contaminés par des micro-organismes, y compris des pathogènes. Pour ces produits, des procédés de pasteurisation ou de stérilisation existent pour détruire les agents pathogènes : la vapeur restant le moyen le plus efficace. Cependant, la vapeur a aussi des inconvénients. La condensation provoque une augmentation de l'humidité du produit, et donc du risque de développement de germes. Une étape de séchage est alors souvent nécessaire. Parmi les derniers équipements certains combinent vide et chaleur permettant ainsi le séchage. Plusieurs matériels et procédés sont décrits, tel le Spirajoule ou un système de fluidisation à haute température.
KW : DECONTAMINATION / DESHYDRATATION / FLUIDE / TECHNOLOGIE / VAPEUR

170228

TF : Qualité : Supratec nettoie en profondeur
AU : LEMOINE, D.
SO : RIA REVUE DE L'INDUSTRIE AGROALIMENTAIRE n°790, p. 65, 01.06.2017,1 p., LANGUE»
AB : La société Supratec a développé un équipement de nettoyage des bandes de convoyage en atelier sec (poudres,granulés, biscuits) qui permet l'élimination des souillures et la désinfection. Suprastream consomme uniquement de l'eau (10 litres par heure) sous forme vapeur, qui est aspirée avec les matières. L'eau est portée à 180 degrés sous 10 bars de pression. Suprastream s'utilise sur des convoyeurs à bande de 600 à 800 mm. Le portoir est démontable de façon à pouvoir l'employer sur différents convoyeurs.

KW : DECONTAMINATION / MACHINE / MATERIEL / NETTOYAGE / POUDRE / TRANSPORT

170241

TF : Décontamination microbienne de la poudre d'oignon au moyen de traitements au plasma à froid au micro-ondes

TI : Microbial decontamination of onion powder using microwave-powered cold plasma treatments

AU : KIM, J.E /OH, Y.J /WON, M.Y /LEE, K.S. /MIN, S.C.

SO : FOOD MICROBIOLOGY Vol. 62, pp.112-123, 01.04.2017,12 p., LANGUE»

AB : Les effets des traitements par plasma froid (CP) généré par micro-ondes contre les spores de Bacillus cereus, Aspergillus brasiliensis et Escherichia coli O157: H7 sur de la poudre d'oignon ont été étudiés. La croissance de B. cereus, A. brasiliensis et E. coli O157: H7 dans la poudre d'oignon traitée a été mesurée durant un stockage à 4 et 25 °C. Les propriétés physico-chimiques et sensorielles de la poudre ont également été analysées. Le traitement a réduit la charge des spores de B. cereus et A. brasiliensis et des cellules E. coli 0157: H7 et a inhibé leur croissance, à des puissances différentes selon le pathogène. Le traitement par CP à une faible puissance des micro-ondes, suivi d'un séchage sous vide, permettrait de décontaminer la poudre d'oignon avec une perte minimale en composés volatils. Ainsi, le traitement par plasma froid a un potentiel de décontamination de la poudre d'oignons sans exercer d'effet néfaste sur ses propriétés physico-chimiques et aromatiques.

KW : CONDIMENT / DECONTAMINATION / LEGUME / MICROONDE / MICROORGANISME / OIGNON / POUDRE / PRODUIT-VEGETAL / TRAITEMENT-THERMIQUE

ANNEXE 5

Décontamination - Autres sources

Microbial decontamination of onion powder using microwave-powered cold plasma treatments

Food Microbiology
Volume 62, April 2017, Pages 112-123
http://www.sciencedirect.com/science/article/pii/S0740002015301908

The effects of microwave-integrated cold plasma (CP) treatments against spores of Bacillus *cereus* and *Aspergillus brasiliensis* and *Escherichia coli*O157:H7 on onion powder were investigated. The growth of *B.* cereus, *A. brasiliensis*, and *E. coli* O157:H7 in the treated onion powder was assessed during storage at 4 and 25 °C, along with the physicochemical and sensory properties of the powder. Onion powder inoculated with *B. cereus* was treated with CP using helium as a plasma-forming gas, with simultaneous exposure to low microwave density at 170 mW m^{-2} or high microwave density at 250 mW m^{-2}. High microwave density-CP treatment (HMCPT) was more effective than low microwave density-CP treatment (LMCPT) in inhibiting *B. cereus* spores, but induced the changes in the volatile profile of powder. Increase in treatment time in HMCPT yielded greater inhibition of *B. cereus*spores. Vacuum drying led to greater inhibition of spores of *B. cereus* and *A. brasiliensis* than hot-air drying. HMCPT at 400 W for 40 min, determined as the optimum conditions for *B. cereus* spore inhibition, initially reduced the numbers of *B. cereus*, *A. brasiliensis*, and *E. coli* O157:H7 by 2.1 log spores/cm^2, 1.6 log spores/cm^2, and 1.9 CFU/cm^2, respectively. The reduced number of *B. cereus* spores remained constant, while the number of *A. brasiliensis* spores in the treated powder increased gradually during storage at 4 and 25 °C and was not different from the number of spores in untreated samples by the end of storage at 4 °C. The *E. coli* counts in the treated powder fell below the level of detection after day 21 at both temperatures. HMCPT did not affect the color, antioxidant activity, or quercetin concentration of the powder during storage at both temperatures. The microwave-integrated CPTs showed potential for nonthermal decontamination of onion powder.

Alimentation et industries alimentaires (ALIA) 2008
Projet ***SPICECLEAN***

Evaluation de l'efficacité microbicide et du bénéfice organoleptique de traitements athermiques innovants de décontamination appliqués à des épices et des herbes aromatiques séchées

Les épices et herbes aromatiques séchées sont utilisées i) dans l'industrie agro-alimentaire, comme ingrédients ajoutés dans des produits élaborés (plats traiteurs congelés, produits de la mer marinés, sauces, soupes, produits sucrés…) ; ii) directement pas le consommateur, pour assaisonner les préparations culinaires cuisinées au domicile. Ces graines et plantes sont produites principalement dans les pays en voie de développement au climat tropical des continents Africain, Sud-Américain et Asiatique. Le mode de production de ces matières premières est souvent traditionnel, et ces produits sont soumis à de multiples voies de contamination potentielles : irrigation avec de l'eau de mauvaise qualité sanitaire, contact avec le sol ou avec des amendements biologiques non traités, manipulation par des cultivateurs susceptibles d'être des vecteurs ou des sources de contamination...

L'analyse des données bibliographiques disponibles relatives à la qualité sanitaire de ces produits (avant traitement) met en évidence la présence d'un nombre important (> 10 000 unités formant colonies / gramme de produit) et extrêmement diversifié de bactéries, levures et moisissures (formes végétatives et sporulées). L'origine fécale d'un certain nombre de ces contaminants suggère une présence potentielle de virus entériques, germes pour lesquels aucune donnée d'occurrence sur ce type de matrices n'est disponible à l'heure actuelle. Ces matières premières sont généralement soumises à des traitements de décontamination lorsqu'elles sont utilisées comme ingrédients pour la fabrication de produits élaborés industriels. Ces traitements sont beaucoup moins systématiques pour les épices et herbes aromatiques destinés à une utilisation ménagère directe par le consommateur.

L'ionisation est un traitement autorisé mais peu ou pas pratiqué du fait des contraintes techniques et réglementaires associées à son utilisation (étiquetage, autorisation d'importation pour la Communauté Européenne, mauvaise perception par le consommateur). Les traitements classiquement utilisés en Europe à l'heure actuelle sont quasi-exclusivement des traitements thermiques (vapeur). Leur efficacité microbicide sur des produits secs comme les épices et herbes aromatiques reste néanmoins relativement limitée, notamment sur les formes sporulées de résistance bactériennes et fongiques, et ils ont pour inconvénients de réduire significativement la qualité organoleptique et les propriétés fonctionnelles des produits traités.

La présence résiduelle de contaminants microbiens (bactéries, moisissures, virus entériques) sur des épices et herbes aromatiques séchées utilisés comme ingrédients dans des produits élaborés, dont certains ne subissent pas ou peu de traitement technologique ou ménager germicide post-incorporation, peut être à l'origine de toxi-infections alimentaires et/ou de dégradation du produit. Dans ce contexte général, les objectifs de ce projet sont d'évaluer l'intérêt d'une utilisation industrielle de la lumière pulsée et des hautes pressions barométriques, alternatives athermiques et innovantes aux traitements actuels, pour la décontamination des épices et herbes aromatiques. Outre la détermination de l'efficacité décontaminante, ce projet intègrera les aspects de préservation de la qualité organoleptique et des propriétés fonctionnelles des produits traités.

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http://www.agence-nationale-recherche.fr/Projet-ANR-08-ALIA-0016

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