



US009326540B2

**(12) United States Patent**  
**Chalupa et al.****(10) Patent No.:** US 9,326,540 B2  
**(45) Date of Patent:** May 3, 2016**(54) METHOD AND APPARATUS FOR VITAMIN D ENHANCEMENT IN MUSHROOMS****(71) Applicant:** Oakshire Holdings, Inc., Kennett Square, PA (US)**(72) Inventors:** William F. Chalupa, Landenberg, PA (US); Gary M. Schroeder, Landenberg, PA (US)**(73) Assignee:** Oakshire Holdings, Inc., Kennett Square, PA (US)**(\*) Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 889 days.**(21) Appl. No.:** 13/628,194**(22) Filed:** Sep. 27, 2012**(65) Prior Publication Data**

US 2014/0088049 A1 Mar. 27, 2014

**(51) Int. Cl.**  
*A23L 1/28* (2006.01)  
*A23L 1/303* (2006.01)  
*A23L 1/025* (2006.01)**(52) U.S. Cl.**  
CPC ..... *A23L 1/28* (2013.01); *A23L 1/0252* (2013.01); *A23L 1/303* (2013.01)**(58) Field of Classification Search**  
CPC ..... *A23L 1/28*; *A23L 1/303*; *A23L 1/0252*; *A23L 1/0257*

See application file for complete search history.

**(56) References Cited**4,892,821 A 1/1990 Omura et al.  
2003/0082072 A1 5/2003 Koji et al.  
2004/0016887 A1 1/2004 Fink et al.

## U.S. PATENT DOCUMENTS

2004/0115791 A1 6/2004 Sim et al.  
2005/0287255 A1 12/2005 Notermans  
2006/0280753 A1 12/2006 McNary  
2008/0138469 A1 6/2008 Degre et al.  
2009/0269441 A1 10/2009 Beelman et al.  
2009/0274806 A1 11/2009 Schroeder  
2009/0304880 A1 12/2009 Kidder et al.  
2010/0223843 A1 9/2010 Williams

(Continued)

## FOREIGN PATENT DOCUMENTS

CN 101057658 A 10/2007  
CN 101904497 A 12/2010

(Continued)

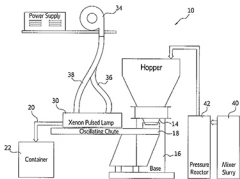
## OTHER PUBLICATIONS

*Pulsed UV... Technology*, 3 pages, Xenon Corporation.

(Continued)

*Primary Examiner*—Steven Leff**(74) Attorney, Agent, or Firm**—Paitech Schwartze Belisario & Nadel LLP**(57)****ABSTRACT**

An apparatus and method for increasing Vitamin D content in mushrooms is disclosed. A mushroom slurry of comminuted or pulverized mushrooms or mushroom parts and liquid, such as water, is passed under a UV light source and subjected to one or more pulses of UV light. The slurry may be conveyed to the UV light source by a vibrating conveyor. After UV light exposure, the treated slurry may be dried and ground into a powder, or the treated slurry may be filtered and the insoluble portion may be dried and ground into a powder. The irradiated mushroom powder has a mass fraction of Vitamin D2 at least 2500 IU/gram of powder, and more preferably at least 20,000 IU/gram of powder. Irradiated mushroom powder may be incorporated into consumable food product for humans or animals, and/or may be incorporated into topical preparations for cosmetic use.

**17 Claims, 4 Drawing Sheets**

僅供線上瀏覽查詢，未經授權，不得轉載