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| U.S. Department of Agriculture Accomplishments Report AD-421 U.S. Dept. of Agriculture, State Agricultural Experiment Stations and Other Institutions | | | Date (Month, Day, Year) 03/22/2012 |
| 1. Accession 0214137 | Agency Identification No. 2. CSREES 3. LA.B | 5. Work Unit/Project No. LAB93914 | 6. Status Annual Report |
| 7. Title Conversion of Crawfish and Shrimp Processing Byproducts into Value Added Functional and Food Ingredients | | | |
| 12. Investigator Name(s) (Last Name and Initials) Sathivel, S. | | | |
| 20. Termination Date 06/30/2013 | | 40. Period Covered (mo/da/year): 01/01/2011 TO 12/31/2011 | |
| Outputs: Six refereed articles and ten abstracts were published in this time frame from the PI's research lab. In addition, many of the findings from LAB93914 have been presented at national and international meetings. For example, ten papers were presented at the 2011 Institute of Food Technology annual meeting (IFT), New Orleans, LA from the PI's research lab. Thus, clearly the results of work conducted under LAES LAB 93914 are being broadly disseminated amongst both scientific and food industry communities. Several students from the PI's research lab won awards for presenting papers and posters at national and local scientific meetings. Indeed, one of his students was the recipient of the highly prestigious 2011 American Oil Chemists' Society (AOCS) Honored Student Award. As a result of the PI's Ph.D. student's dissertation, the PI has developed "A novel method for producing purified fish oils enriched with EPA and DHA." The technology that PI and PI's student developed is currently under License negotiations with one of the fish oil producing companies and provisional patent application was submitted to the U.S. Patent Office, September 22, 2011. Students' Accomplishments: Ms. Huaixia Yin - 2011 American Oil Chemist Society Honored Student Award, to attend the 2011 Annual Meeting & Expo in Cincinnati, Ohio. Mr. Luis Espinoza - first place, 2011 IFT-Refrigerated and Frozen Foods division graduate student paper competition. Presentation entitled "Effect of cryogenic and air blast freezing on pathogenic bacteria load associated with oysters and the quality of oyster meat." Mr. Luis Espinoza - awarded 2011 Louisiana Gulf Coast Section of the IFT section scholarship (\$300). Presentation entitled "Effect of cryogenic and air blast freezing on pathogenic bacteria load associated with oysters and the quality of oyster meat." Ms. Fathima Mohideen - second place, 2011 IFT-Aquatic Food Products division graduate student paper competition. Presentation entitled "Effects of blueberry (Vaccinium corymbosum) extract on lipid oxidation during spray drying of microencapsulated salmon oil." Mr. Jose Espinoza - fourth place, 2011 IFT- Dairy Foods division graduate student paper competition. Presentation entitled "Developing a plain stirred yogurt fortified with fish oil and vitamin E." The PI solved a Louisiana shrimp processing company's issues related to lipid oxidation and freezer burn by using a cost effective technology, which not only saved thousands of dollars, but also helped the company to stay competitive and enhanced their position in the frozen shrimp market. | | | |
| Outcomes/Impacts: We produced microencapsulated flaxseed oil powders containing shrimp and crawfish astaxanthin by spray drying and evaluated their oxidative stability and estimated the microencapsulated powder production efficiency and the energy required to produce the powder. Our study demonstrated that astaxanthin reduced lipid oxidation in flex seed oil containing astaxanthin (FOA) during heating. The rates of oxidation in FOA and astaxanthin degradation in FOA were significantly influenced by temperature. In addition, the extracted astaxanthin from shrimp and crawfish effectively delayed the oxidation process of microencapsulated flaxseed oil over the storage period. Data obtained for production rate and evaporation rate for spray drying the emulsion containing astaxanthin can be useful to scale up the process. Opportunities were identified for development of value-added products from the shrimp byproducts. | | | |
| Publications: Sundararajan, S., A. Prudente, D. J. Bankston, J. M. King, P. Wilson, and S. Sathivel. 2011. Evaluation of green tea extract as a glazing material for shrimp frozen by cryogenic freezing. J. Food Sci. 76: E511-E518. Wan, Y., J. D. Bankston., P. J. Bechtel, and S. Sathivel. 2011. Microencapsulation of menhaden fish oil containing soluble rice bran fiber using spray drying technology. J. Food Sci. 76 (4): E348-E356. Pu, J., J. D. Bankston, and S. Sathivel. 2011. Production of microencapsulated crawfish (Procambarus clarkii) astaxanthin in | | | |

oil by spray drying technology. *Drying Technol.* 29: 1150-1160.

Pu, J. and S. Sathivel. 2011. Kinetics of lipid oxidation and degradation of flaxseed oil containing crawfish (*Procambarus clarkii*) astaxanthin. *J. Am. Oil Chem. Soc.* 88: 595-601.

Yin, H., K.M. Solval, J. Huang, P. J. Bechtel, and S. Sathivel. 2011. Effects of oil extraction methods on physical and chemical properties of red salmon Oils (*Oncorhynchus nerka*). *J. Am. Oil Chem. Soc.* 88: 1641-1648.

Yin, H., Y. Wan, J. Pu, P. J. Bechtel, and S. Sathivel. 2011. Functional and rheological properties of protein fractions of channel catfish (*Ictalurus punctatus*) and their effects in an emulsion system. *J. Food Sci.* 76: E283-E290.

Alfaro, S. L., S. Sathivel., J. King, and Z. Xu. 2011. Development of sonication-assisted extraction method to extract rice bran oil. *Ann. Mtg. of the Institute of Food Technologists, New Orleans, LA.* abstract no. 293-13, p 248.

Espiniza, L., M. Janes, M. Gutierrez, R. Jadeja, D. J. Bankston, and S. Sathivel. 2011. Effect of cryogenic and air blast freezing on pathogenic bacteria load associated with oysters and the quality of oyster meat. *Ann. Mtg. of the Institute of Food Technologists, New Orleans, LA.* abstract no. 294-02, p248.

Estrada, J., S. Sathivel, P. J. Bechtel, J. Stine, Z. Xu, J. M. King, C. Boeneke, and P. Wilson. 2011. Developing a plain stirred yogurt fortified with fish oil and vitamin E. *Ann. Mtg. of the Institute of Food Technologists, New Orleans, LA.* abstract no. 048-05, p34.

Kosal Ram, A. and S. Sathivel. 2011. Development of a microencapsulated honey powder with retrograded starch as a drying agent. *Ann. Mtg. of the Institute of Food Technologists, New Orleans, LA.* abstract no. 047-04, p32.

Li J. and S. Sathivel. 2011. Effect of soluble blueberry fiber on the microencapsulated polyunsaturated fish oil. *Ann. Mtg. of the Institute of Food Technologists, New Orleans, LA.* abstract no. 097-37, p93.

Mis Solval, K., J. Bankston, and S. Sathivel. 2011. Developing microencapsulated omega-3 fish oil fortified egg white powder for athletes. *Ann. Mtg. of the Institute of Food Technologists, New Orleans, LA.* abstract no. 284-05, p222.

Mohideen, W. F., J. Estrada, and S. Sathivel. 2011. Effect of thermal pasteurization and ultrasonication on physicochemical properties and microbial counts of blueberry (*Vaccinium corymbosum*) juice. *Ann. Mtg. of the Institute of Food Technologists, New Orleans, LA.* abstract no. 041-01, p27.

Mohideen, W. F. and S. Sathivel. 2011. Effects of blueberry (*Vaccinium corymbosum*) extract on lipid oxidation during spray drying of microencapsulated salmon oil. *Ann. Mtg. of the Institute of Food Technologists, New Orleans, LA.* abstract no. 147-10, p118.

Yin, H., P. J. Bechtel, and S. Sathivel. 2011. Purification of salmon fish oil using a pilot scale adsorption column. *Ann. Mtg. of the Institute of Food Technologists, New Orleans, LA.* abstract no. 284-06, p 222.

Zhang J. and S. Sathivel. 2011. Development of sonication-assisted fish oil extraction method with application to fish processing byproducts. *Ann. Mtg. of the Institute Food Technologists, New Orleans, LA.* abstract no. 096-18, p 79.

Participants:


S. Sathivel (PI), LSU AgCenter.

Target Audiences:

Students, Food Industry, and Faculty as well as governmental officials, industry representatives, and international experts.

Project Modifications:

Nothing significant to report during this reporting period.

| Approved (Signature) | Title | Date |
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|  | | 3-23-12 |