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Title: New Uses of Corn Proteins

Author

• Lawton, John

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Citation: Lawton Jr, J.W. New Uses Of Corn Proteins. International Starch Technology Conference. 2003. Abstract P. 39.

Technical Abstract: Zein is the only corn protein that is commercially isolated from corn. Zein is classified as a proeamine and is located in the endosperm of the corn kernel. Zein has been classified into four types, based on their solubility and structural similarities. The four being a-, B-, Y-, and o-zein. Commercial zein has been available for over 60 years. Currently, zein is produced using a modified Carter and Reck extraction method where the zein is isolated from corn gluten meal (CGM). One of zein's major problems is its cost. Presently, zein costs between \$9 and \$10 per pound. Because of the recovery method, the solvents used, and the use of CGM as the starting material, commercial zein contains mostly a-zein. To lower the cost of zein, new extraction methods have been examined which use ground corn and would be on the front end of a bio-ethanol plant. However, zein isolated from whole corn, which uses different isolation procedures, will likely have slightly different properties. In the past, uses for zein have ranged from adhesives to varnishes and have included binders, coatings, films, and textiles. Sadly, all of these markets have been lost to petroleum based materials except for speciality coatings. Currently, there is renewed interest in zein as a polymeric material, because of the new biobased initiatives. There has been substantial research focused on developing zein-based films for packaging along with solving two of zein's other significant problems; its inherent brittleness and its sensitivity to water. Because of zein's brittleness, plasticizers have to be added to zein for zein films to be flexible at room temperature. The best plasticizers for zein are hygroscopic in nature. These include triethylene glycol and low molecular weight polyethylene glycols. Water, unfortunately, is also a good plasticizer for zein. This is a problem when hygroscopic plasticizers are used. These plasticizers will absorb water from the surrounding air. Under humid conditions, the added

water can change the physical properties of the film greatly and at high humidities make the films too weak for use. Recently, saturated fatty acids have been shown to be a good plasticizer choice for zein because of their low water absorption. Because of the high cost of extracting zein from CGM, research has begun on using CGM to produce injection moldable plastics. Due to good protein balance of corn germ protein, extensive research has been done on using corn germ flour as a high protein food additive. In the last decade, work has been done to show the corn germ proteins have good emulsifying properties and have been used to stabilize and emulsify ground meats.

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Title: Utilization of Proteins from Agricultural Co-Products in Nonfood Applications

Authors

- Willett, Julious - *j. L.*
- Hojillaevangelist, Milagros - *mila*
- Lawton, John
- Sessa, David - *dave*

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Technical Abstract: The U.S. annually produces millions of tons of co-products from the processing of corn and soybeans. These co-products contain significant amounts of proteins, and provide a low cost raw materials for development of new products. Potential applications for soy proteins include foamed plywood adhesives and anti-carcinogenic compounds. Zein is a protein found in corn which has many useful applications, such as films and coatings. Challenges and opportunities in developing new uses for proteins from agricultural co-products will be discussed.


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 John W Lawton
 Plant Polymer Research

 Res Chemst
 lawtonjw@mail.ncaur.usda.gov
 Phone: (309) 681-6419
 Fax: (309) 681-6691
 Room 0230A
 1815 N UNIVERSITY ST
 PEORIA, IL, 61604-3999

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- [Zein: a New Look at An Old Industrial Protein- \(05-May-04\)](#)
- [Native Starch; Uses Of- \(28-Oct-03\)](#)
- [Influence of Aspen Fiber on the Mechanical Properties of Baked Cornstarch Foams- \(06-Jul-03\)](#)
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- [Morphology/property Relationships in Thermoplastic Starch/poly\(hydroxy Ester Ether\)](#)

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- [Biodegradable Laminates and Composites Containing Starch and Poly \(Hydroxyester-Ethers\)- \(07-May-00\)](#)
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- [Morphology and Rheological Behavior of Thermoplastic Starch/poly\(hydroxy Ester Ether\) Biodegradable Blends- \(17-Aug-99\)](#)
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- [Characterization of Zein Modified with a Mild Cross-Linking Agent- \(13-Aug-03\)](#)
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- [Zein Decolorization Methods- \(26-Sep-02\)](#)
- [A New Look at An Old Protein; Alpha-Zeins- \(30-May-02\)](#)
- [Methods for Decolorizing Corn Zein- \(10-Jan-02\)](#)
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- [Synthesis of Zein Derivatives and Their Structure/mechanical Property Relationship- \(01-Jul-03\)](#)
- [Methods for Decolorizing Corn Zein- \(24-Feb-03\)](#)
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