

Book reviews

A.C. Eliasson, editor. Starch in Food: Structure, Functions and Applications, Woodhead Publishing Ltd, Cambridge, CB1 6AH, UK, 2004 (xiii + 605 pp., £150.00, ISBN 0-85573-731-0)

Starch is the principal energy reserve in plants and is one of the most abundant carbohydrates in the biosphere. Storage starch, which is deposited in storage organs of our main starch crops such as corn, potato, wheat, cassava, etc. serves as the most important energy source for human consumption. On the other hand, they are modified to improve desired functional characteristics and are added in relatively small amounts to foods as food additives. Moreover, being a biodegradable polymer with well defined chemical properties, it has huge potential as a versatile renewable resource for various material applications. Its importance as a foodstuff may be judged by the fact that it accounts for over 30% of the average diet on a dry weight basis and more than 25% on an available energy basis.

In foods, starch is considered as a source for nutrition, an extender thickener, stabilizer, texturizer and/or processing aid. No other single food ingredient compares with starch in terms of sheer versatility of application in the food industry. Second only to cellulose in natural abundance, this polymeric carbohydrate was designed by nature as a plant energy reserve. Starch has become a significant contributor to the commercial food industry. With respect to the type of modification one can differentiate chemical, physical and enzymatic treatments that are used separately or in sequence in producing starch derivatives. Through modifications, numerous highly functional derivatives have enabled the evolution of new processing technologies and market trends. Therefore, understanding the capabilities of starch and how to exploit its potential is of relevance to all stages of a food product's life cycle.

This book provides a throughout overview of role of starch in foods, their structure, function and applications in different food products. The first part of book deals with analyzing and modifying starch which include the topic like plant starch synthesis, analyzing starch structure, starch bioengineering, starch-acting enzymes, understanding starch structure and functionality and measuring starch in food.

Biotechnological strategies are specifically targeted to improve starch yield, structure and functionality. The global abundance, economic and nutritional importance, the simple chemical structure and relatively well

characterized biochemistry of starch deposition in our chief starch crops makes starch the ideal target for biotechnological techniques. The chapter on starch bioengineering highlights promising data in the fields of molecular biology, biochemistry, starch chemistry and modeling and strategies for predictable modification in plants stressing the importance of highly cross-disciplinary approaches.

The utilization of starch and starch derivatives in many industrial processes particularly food processing, has led to the development of numerous methods of starch processing and breakdown. The preparation of modified starch was originally performed by the use of chemical additives. The discovery of amylolytic, synthesizing and debranching enzymes broadened our basis for the development of the fine structure of amylose and amylopectin. In recent years, enzymatic methods have largely replaced the use of chemicals. The chapter on starch-acting enzymes briefly addresses the industrially important starch hydrolyzing enzymes, their use in achieving functional changes in starch and starch based foodstuffs along with the molecular strategies and techniques employed to obtain enzymes with novel starch-modifying activities.

The sources of starch are explained in part II, which covers wheat starch, potato starch, rice starch, new corn starch and other tropical sources of starch. The structure, composition, rheological properties and different strategies on improving the functionality of different starch have been described. The chapter on tropical sources covers the cassava, sweet potato, yam and aroid starches. The applications of starches are covered in subsequent part which addresses the topics like starch as an ingredient, utilization of starch in product development, modified starches, starch lipid interaction and starch based microencapsulating. The applications of starches in thermal processing, frozen foods, instant products, snack foods, dressings, sauces, bakery products, pet products, meat products, cereal, pasta, confectionary, dairy industry, and beverages have been reviewed.

The final part of book reviews topic on starch and health with individual chapters on development of range of industrialized cereal based food stuffs, physical and mental performance, detecting nutritional starch fractions, resistant starch and analyzing starch digestion along with sources of further information and advice.

This book would be useful resource to food scientists and technologists, biochemists, nutritionists, public health professionals as well as entrepreneurs who are designing, processing and marketing specialty foods. It will not only

support research and development, but will also be suitable for academic purposes.

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E. Abdel-Aal and P. Wood, editors. Specialty Grains for Food and Feed, American Association of Cereal Chemists, Inc., Minnesota, USA, 2005 (413 pp., \$109.00, ISBN 1-891127-41-1)

The cereals and cereal like grains have been cultivated since prehistory. Nearly, one-half of the energy and more than two-fifths of the world's protein intake comes from consumption of cereal foods. Out of the total cereal production, 50% is used as for food and 35% in animal feed, with the balance distributed between industrial processing, seeding, other uses and waste. Cereals are a major source of starch and dietary fiber in our diets and they convey health benefits. The availability of a diverse array of grain types and properties of each cereal has allowed the production of a seemingly limitless number of food products. Cereal grains have evolved over the centuries primarily to enhance yield, disease resistance and quality both through traditional breeding programs and more recently through genetic manipulations. With regard to composition and quality, the emphasis has been to improve the key components, protein and starch, however, less attention has been paid to secondary substances such as phenolics and dietary fiber, partly because of lack of knowledge regarding their function in plant protection and in promoting human health. Nevertheless, carbohydrate polymers also play a part here amongst the non-starch components.

Numerous claims have been made over the years for therapeutic properties of ancient grains, and they are used in alternative and folk medicine for the treatment of a wide range of problems. The beneficial health properties of whole grain are accepted widely and recognized. The primary candidate components for the health-promoting and disease-risk-reducing properties of whole grain products are antioxidants and dietary fiber including slowly digested and resistant starch. The term specialty grains is usually applied to grains that exhibit some unique characteristic and are currently produced on a marginal scale for a particular end-use or market.

The size of the specialty grain market is small, but has the potential to grow and this is driven, at least in part, by consumer perception that the products answer the demand for safer and healthier foods. Further expansion of the market depends strongly on availability of product, consistency of quality, and price, since despite specialty appeal, these grains have to compete with mainstream commercial grains.

This book provides a single source of information on numerous specialty grains that have been finding new niche markets in recent years. The grains are described in terms of history, genetic background, agronomic needs, uses, health aspects and marketability. The role of specialty grain production in maintaining agricultural diversity, protecting the environment and contributing to the safety and nutritional value of our food supply are discussed.

The book comprises reviews of wide range of grains that hold promise for specialty food markets, particularly organic, functional foods for health and nutraceuticals, moreover, chapters on more recently developed grains with unique or special properties such as waxy wheat and canary seed are also included. The other specialty grains included are spelt, einkorn, emmer, blue and purple grains, hullless oat, hullless barley, low- and high-viscosity rye, amaranth, buckwheat and organic grains. The special feature of each grain in terms of genetic background, composition and structure are emphasized and discussed in relation to both current and potential uses. Health aspects and market values are also highlighted.

The fact and fiction about cereal grains is discussed in one chapter. The production of many of the specialty grains described in this book is related to the rapidly increasing interest in organically grown produce, which in turn is at least partly associated with public concern. The separate chapter on organic grains and products has been included which addresses the issues of safety, technical quality, nutritional value, consumer interest and perceptions. The health claims of specialty grains are discussed in a concluding chapter.

This book will be particularly useful to cereal and baking industry, as pressures continue to develop to produce food perceived as healthier, safer and more environmentally friendly. This would be useful resource for all the persons involved in the food processing technology particularly grain industry from the farmer to the informed consumer and will contribute significantly to the development of market for specialty grains.

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