ajfand SCHOLARLY, PEER REVIEWED
AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT
Volume 17 No. 3 July 2017
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

BOOK REVIEW

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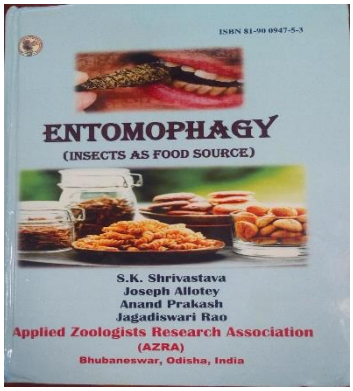

Title: Entomophagy (Insects as Food Source)

Authors: S.K Shrivastava, J. Allotey, A. Prakash, J. Rao

Press: 2017 ©Applied Zoologists Research Association (AZRA).

This is a book that arouses curiosity within the masses as it explores the potential of a non-conventional source of food and nutrition: insects. The book's title is derived from a Greek *entonom* meaning 'insect' and *phagein* 'to eat'. Insects have been recognized as a food source for many years in Africa, Asia and parts of America. The book will interest the common man, as it has simplified findings that instill the idea of insects being used as a source of food. This information is especially intriguing to a layman who does not see insects as a conventional source of food.

The book has been written by four authors who are professionals in the science of zoology and the aspect of insect nutrition and have published over 100 papers including numerous book chapters. Dr. S.K Shrivastava was born in 1952 and has M.Sc. and Ph.D. in Zoology from Pt. Ravishankar Shukla University. He is a founder member of AZRA, India. Currently, Dr. Shrivastava is a professor in Pt. S.K.S college of Agriculture, Rajnandgaon-491441, Chhatisgarh. Prof. Joseph Allotey was born in 1951 has a BSc. and MSc. in Zoology from University of Ghana and a PhD. in applied Entomology from River State University and worked as a Principal lecture for insect ecology in International Center of Insect Physiology and Ecology (ICIPE) Kenya. Similarly, Dr. Annand Prakash born in 1952 also has a MSc. and a PhD. in zoology. He

is a retired head of division of crop Protection. He is the founder and managing director of AZRA as well as the Managing editor. The final author is Dr. Jagadiswari Rao was born in 1948 and completed her MSc. in 1972 and later in 1990 attained her PhD. in the same line of zoology. She is a retired principal scientist from Central Rice Research Institute and continues to serve as the vice president in AZRA since 1998. The authors have made extreme contribution to the field of Entopophagy, making it possible for enthusiasts to understand the intricacies of the science of insects as food in relation to their nutritive value and benefits.

The book's first four chapters introduce the aspect of diversification of food sources by incorporating insects into the human diet as well as the importance of entomophagy to human health and the environment as described by Food Agricultural Organization (FAO). The reader is given a glimpse on the origin of entomophagy and how different cultures view insects as food sources including some myths that surround entomophagy. These chapters also dwell on taxonomic information, detailing the scientific classes of different types of insects that have been incorporated in the human food chain. Further, they provide a history of entomophagy in addition to details on how particular insects were used by different cultures to generate food as well as income from by products that are produced at different growth stages of the insect e.g. silk worm.

Chapter six addresses the nutritive value of insects to the human body and details the nutrition contributions from specific edible insects with reference to RDA. It is worth highlighting that, 100g of dry mopane caterpillar may provide 76% of an average human daily protein requirement and 100% of the daily requirement of vital vitamins and minerals. This is quite comparable to meat and fish in the aspect of protein, vitamins and caloric content. In the book, nutritive contributions of specific edible insects and their comparisons to conventional foods are adequately backed up by research evidence. The data from the experiments support the book's findings on the nutritive content of edible insects.

Industrial aspects of entomophagy are expounded upon in chapter eight of the book. This chapter details the fact that some edible insects are not just collected from nature but reared for human consumption. Cultivated insects provide a missing link in ecology for a circular economy design for countries that are involved in this sector. Thailand and Vietnam, where crickets are reared in sheds and backyards, are highlighted. This chapter informs on how industries process edible insects by drying as well as extracting fat or proteins. It gives detailed step by step information on processing certain insects like mopane worms which are degutted, dried, stored and marketed. A detailed account of insect based-products on or near retail markets in Europe and North America as of 2015 is also provided.

Seeing as to how insects are not regarded as conventional food source by all, the authors have included recipes that are guaranteed to add flavor and transform insects to an appetizing accompaniment, snack or even liquor (Anty gin). They highlight a entrepreneurs who have invented recipes to make snacks. For instance, a start-up company in Iceland that has successfully launched an *"insect powered protein bar"*

named Crowbar, which contains cranberries, a variety of seeds and cricket flour. There are several insect based products that have gained success in different parts of the world, showing that humans are increasingly embracing insects as a source of food.

Safety standards are critical in the food industry. In the case of the utilization of insects as food, it is no different. Codex Alimetarius is the most authoritative set of internationally recognized standards, codes of practice, guidelines, and recommendations relating to foods, food production, and food safety. Chapter nine and ten elaborate on food safety measures required to ensure that the public safely consume insects as food Microbes that are associated with deterioration of insect based foods are intricately assessed in these chapters. Interventions aimed at ensuring that *microflora* that pose a threat to human health are eliminated in insect based foods are highlighted. The book offers data from evidence based experiments and quality control measures that can be put in place to avoid microbial contamination as well as inorganic contaminants from the surrounding environment. The authors have also included a section on how some insect species that are considered toxic can be made edible by following application of certain precautionary measures.

The book has a chapter (11) on research, development and future of entomophagy in different countries as well as perceptions on insects as an alternative food source. This chapter (11) also entails different contributions made by professors towards raising awareness of insects in different universities from around the world. This includes institutions in the Netherlands (Wageningen), Thailand (Khon Kaen), Kenya (Jaramogi Oginga Odinga University of science and technology, ICIPE), United States (Montana state University) among others.

The authors conclude by emphasizing that insects are a valuable food choice more so, due to their nutritional value. This makes them a promising source for curbing impeding food insecurity situation. Insects have been providing buffers against seasonal food shortages for many traditional societies where entomophagy is practices. These societies are likely to maintain direct use of insect as they have realized the value of such insects as source of food and income and have made it part of their local culture. The authors give recommendations on what aspect of edible insects needs further research and contribution.

Aside from a few typos, the book is relatively simple to read and understand. It is reasonably priced at US$40 with exception of shipping/postage costs. I recommend the book to students in addition to scientists and teachers/ professors/ lecturers who are in the field of zoology and entomophagy. It is also a good read for individuals who wish to explore new recipes or be informed on insects as a food source.

Book orders and inquiries can be directed to Dr. Anand Prakash, General Secretary, AZRA, K-9B/285 Bhagabanpur, Patrapada, Bhubaneswar-751 019, Odisha, India.