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Springer 2011

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Springer 2005

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Sustainable agriculture is a rapidly growing field aiming at producing food and energy in a sustainable way for humans and their children. Sustainable agriculture is a discipline that addresses current issues such as climate change, increasing food and fuel prices, poor-nation starvation, rich-nation obesity, water pollution, soil erosion, fertility loss, pest control, and biodiversity depletion.

Novel, environmentally-friendly solutions are proposed based on integrated knowledge from sciences as diverse as agronomy, soil science, molecular biology, chemistry, toxicology, ecology, economy, and social sciences. Indeed, sustainable agriculture decipher mechanisms of processes that occur from the molecular level to the farming system to the global level at time scales ranging from seconds to centuries. For that, scientists use the system approach that involves studying components and interactions of a whole system to address scientific, economic and social issues. In that respect, sustainable agriculture is not a classical, narrow science. Instead of solving problems using the classical painkiller approach that treats only negative impacts, sustainable agriculture treats problem sources.

Because most actual society issues are now intertwined, global, and fast-developing, sustainable agriculture will bring solutions to build a safer world. This book series gathers review articles that analyze current agricultural issues and knowledge, then propose alternative solutions. It will therefore help all scientists, decision-makers, professors, farmers and politicians who wish to build a safe agriculture, energy and food system for future generations.

More information about this series at http://www.springer.com/series/8380

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Nanoscience in Food and Agriculture 3

Springer

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We dedicate this book to our parents
– The Editors

Nano-foods: arriving at stores near you
– Shivendu Ranjan and Nandita Dasgupta

Preface

Nanomaterials with unique properties are now being used to improve food and agricultural production. Research on nanomaterials is indeed revealing new applications that were once thought to be imaginary. Specifically, applications lead to higher crop productivity with nanofertilizers, better packaging, longer food shelf life, and better sensing of aromas and contaminants. These applications are needed in particular in poor countries where food is scarce and the water quality bad. Nanotechnology also addresses the age-old issue of water polluted by industrial,

Fig. 1 Nanotechnology for improving quality of water and food. Left: the Roanne river, Saillans area, Vercors, French Alps. Copyright: Alain Beguey/INRA. Right: a malnourished girl of a developing country – Tamil Nadu, India. Copyright: Kamal Dasgupta/Sarojini Nagar/Lucknow/India

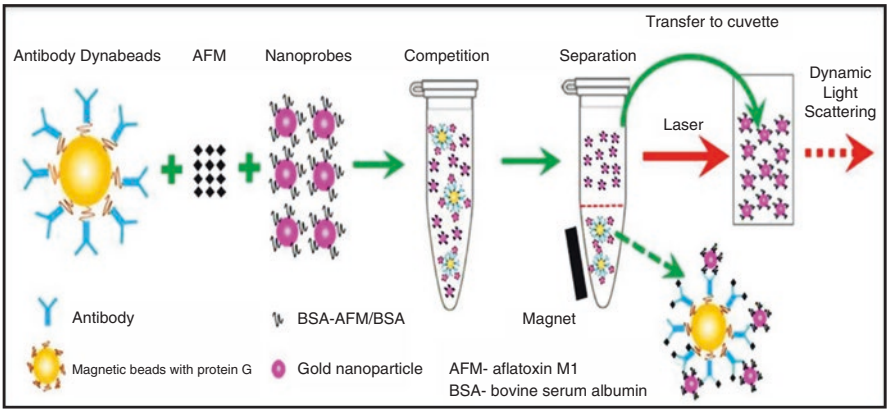

Fig. 2 Dynamic light scattering detection of aflatoxin M1 using gold nanoparticle-based probes. Kumar et al., Chap. 6

urban, and agricultural pollutants. For instance, research produces nanomaterials that clean water more efficiently than classical methods, thus yielding water for drinking and irrigation. However, some nanomaterials have been found to be toxic. Therefore, nanomaterials should be engineered to be safe for the environment. In this book we present ten chapters describing the synthesis and application of nanomaterials for health, food, agriculture, and bioremediation. This book is the third volume on *Nanoscience in Food and Agriculture*, published in the series *Sustainable Agriculture Reviews* (http://www.springer.com/series/8380).

Detailed classifications of nanomaterials are provided by Mageswari et al. in Chap. 2 and by Madhumitha et al. in Chap. 4. The use of copper nanoparticles in agriculture is discussed by Shahmoradi and Byrappa in Chap. 1 and by Kasana et al. in Chap. 5. The transition from nutraceuticals to nanoceuticals is summarized by Kakkar et al. in Chap. 7. Kumar et al. review the applications of nanomaterials to detect food contaminants in Chap. 6 (Fig. 2).

Removal of nitrate, phosphate, and agricultural toxins from water using nanoscale materials is discussed in Chap. 8 by Prashantha Kumar and in Chap. 9 by Leong et al. Pandiarajan et al. discuss the toxicity mechanism of commonly used silver nanoparticles in Chap. 3. Pramanik and Pramanik review the future of nanotechnology for sustainable agriculture in India in Chap. 10.

Thanks for reading.

Vellore, Tamil Nadu, India — Shivendu Ranjan
Vellore, Tamil Nadu, India — Nandita Dasgupta
Aix en Provence, France — Eric Lichtfouse

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Shivendu Ranjan is currently working as DBT Research Fellow, Department of Biotechnology, Ministry of Science and Technology, Govt. of India, at VIT University, Vellore, Tamil Nadu, India. He is also serving for a nongovernment organization as an honorary director, Research Wing, Veer Kunwar Singh Memorial Trust, Chapra, Bihar, India. He is the founder director at Xpert Arena Technological Services Pvt. Ltd., India (www.xpertarena.com); this company is dedicated to serve in online and offline sectors with a vision to simplify education. He has also founded and drafted the concept for the first edition of *VIT Bio Summit* in 2012, and the same has been continued till date by the university.

His area of research is multidisciplinary which is but not limited to nano-food technology, nano-agri-technology, nanobiotechnology, nano-toxicology, natural products technology, natural products chemistry, bio-business, food chemistry, and food engineering. He has published many scientific articles in international peer-reviewed journals and is also serving as editorial board member and referee for reputed international peer-reviewed journals. He has bagged several awards from different organizations, e.g., best poster award, achiever award, research award, young researcher award, etc.

Nandita Dasgupta is currently serving as research associate at VIT University, Vellore, Tamil Nadu, India. She has exposure to research institutes and industries including CSIR (Central Food Technological Research Institute), Mysore, India, and Uttar Pradesh Drugs and Pharmaceutical Co. Ltd., Lucknow, India. Her areas of interest include toxicological analysis, natural products technology, nanobiotechnology, and agri-food technology.

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Eric Lichtfouse, 56, is a soil scientist at the French National Institute for Agricultural Research (INRA). He has invented the ^{13}C-dating method[1] allowing to measure the dynamics of soil organic molecules, thus opening the field of molecular-level investigations of soil carbon sequestration. Chief editor of the awarded journal *Agronomy for Sustainable Development*[3], he has raised the journal rank from 29/53 in 2003, with an impact factor of 0.56, to 2/81 in 2014, with an impact factor of 3.99, in the agronomy category. He is also chief editor and founder of the journal *Environmental Chemistry Letters*[4] and the book series *Sustainable Agriculture Reviews*[5]. He is lecturing scientific writing and communication in universities worldwide[6]. His publication assistance service at the INRA has founded the French-English newsletter Publier La Science[7]. He has published the book

[1] http://dx.doi.org/10.1007/s10311-011-0334-2

[2] http://archive.sciencewatch.com/inter/jou/2010/10novAgrSusDev

[3] http://www.springer.com/journal/13593

[4] http://www.springer.com/journal/10311

[5] http://www.springer.com/series/8380

[6] http://fr.slideshare.net/lichtfouse/scientific-writing-and-communication

[7] https://www.youtube.com/playlist?list=PLKEz5Pbi4p3By53Q0gclKPeSBTK2HJGK_

Scientific Writing for Impact Factor Journal[8]. This textbook describes in particular the micro-article[9], a new tool to identify the novelty of experimental results. Further details are available on SlideShare[10], LinkedIn[11], ResearchGate[12], ResearcherID[13], and ORCID[14].

[8] http://www6.inra.fr/caps-publierlascience

[9] https://www.novapublishers.com/catalog/product_info.php?products_id=42211

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