Bioengineered 4:2, 59–60; March/April 2013; © 2013 Landes Bioscience

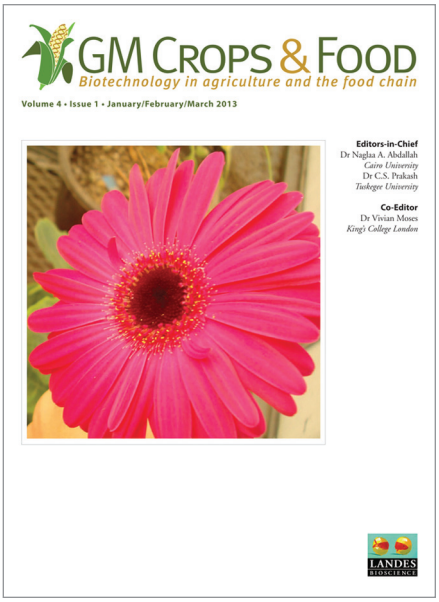
Landes Highlights

Biotech crops to help meet Millenium Development Goals

The Millennium Development Goals (MDGs) were framed at the turn of the 21st century to alleviate poverty, hunger and malnutrition that afflicts more than 1 billion people.

In this review, the authors discuss the neccessity of biotechnologically engineered plants in enabling this process:

According to the authors, biotech crops have already made contributions toward ensuring food and nutrition security by reducing losses and increasing productivity with less pesticide input. These crops could help address some of the major challenges in agriculture-based economies created by climate change. Projections of global climate change expect the concentration of greenhouse gases to increase, aridization of the environment to increase, temperature fluctuations to occur sharply and frequently, and spatial and temporal distribution of rainfall to be disturbed—all of which will increase abiotic stress-related challenges to crops. Countering these challenges and to meet the food requirement of the ever-increasing world population (expected to reach 9 billion by 2030) the authors see urgent need to (1) develop and use biotech crops for mitigating adverse climatic changes; (2) develop biotech crops resilient to adverse environmental conditions; and (3) address the issues raised by NGO's and educate the general population about the benefits of such crops.



Reference

Husaini AM, Tuteja N. Biotech crops: Imperative for achieving the Millenium Development Goals and sustainability of agriculture in the climate change era. GM Crops Food 2013; 4: In press.; http://www.landesbioscience.com/journals/gmcrops/article/22748/; PMID:23333856; http://dx.doi.org/10.4161/gmcr.22748

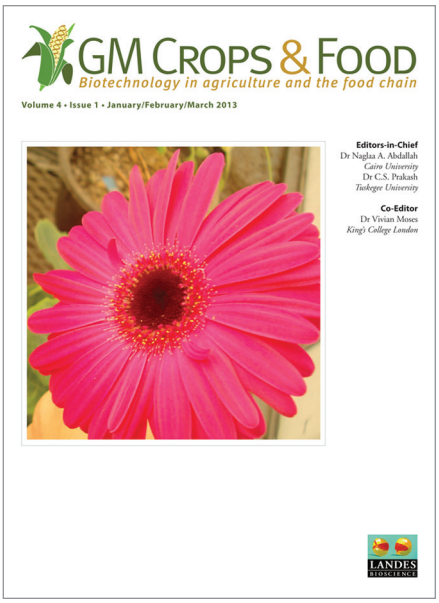
Risk communication on GM crops

Due to an abundance of land and water, albeit unevenly distributed, sub-Saharan Africa (SSA) has a great potential for agricultural growth. In pursuing food security, African agriculture faces considerable challenges, among which are high food prices, climate change, population growth and the human immunodeficiency virus/acquired immuno-deficiency \ syndrome (HIV/AIDS) epidemic.

Policy-makers from developing countries have increasingly considered genetically modified (GM) crops as a potential tool for increasing agricultural productivity. In SSA only two countries have approved the commercial cultivation of GM crops: Burkina Faso and South Africa.

Among new technologies and products, the adoption of GM crops has raised considerable debate, many of which lie well beyond scientific issues. As such, apart from the potential risk to animal and human health (toxicity and allergenicity) and to the environment (effects on non-target organisms, on weediness, etc.), other concerns such as ethical issues, public attitudes, socio-economic factors and intellectual property rights have been raised.

Despite limitations, sub-Saharan African countries have developed a rich experience of risk communication, with cases displaying many similarities but also differences, as demonstrated by the workshop presentations and discussions, as well as the additional information compiled in this article. Common effective risk communication strategies as well as challenges throughout SSA are presented in this review.



Reference

Racovita M, Obonyo DN, Abdallah R, Anguzu R, Bamwenda G, Kiggundu A, et al. Experiences in sub-Saharan Africa with GM crop risk communication: Outcome of a workshop. GM Crops Food 2013; 4: In press.; http://www.landesbioscience.com/journals/gmcrops/article/22488/; PMID:23333856; http://dx.doi.org/10.4161/gmcr.22488

Bacteriophages in plant disease control

The use of bacteriophages as an effective phage therapy strategy faces significant challenges for controlling plant diseases in the phyllosphere. The review by Jone et al., describes current strategies to overcome them: Success requires that high populations of phage exist at critical times in order to ensure interaction with the target bacterium. Given that the single most important physical factor limiting bacteriophage persistence in natural environments is UV, designing strategies for reducing UV exposure is critical to the effective use of phage as biological control agents. Protective formulations have been used to prolong phage activity in the field; however, more work is needed in this area to identify compounds that can extend persistence on leaf surfaces. Another strategy for maintaining high populations of phages has been to use non-pathogenic or attenuated bacterial strains that are sensitive to the phage(s) or a closely related organism that does not cause disease in the plant host. Selecting the correct phages for disease control is critical and improved phage screening stratagies to predict in planta activity is needed. This requires careful monitoring of bacterial strains in the field to minimize development of bacterial strains with resistance to the deployed bacteriophages or the proliferation of wild-type strains that are not sensitive to the bacteriophages used in field applications. Bacteriophages have shown the potential to confer effective disease control as part of an integrated management strategy.

Reference

Jones JB, Vallad GE, Iriarte FB, Obradović A, Wemsing MH, Jackson LE, et al. Considerations for using bacteriophages for plant disease control. Bacteriophage 2012; 2: In press.; http://www.landesbioscience.com/journals/bacteriophage/article/23857