

Evaluating Efforts and Assessing Impact

Did we meet our objectives? Did our activities attain our objectives? Did we make an impact with our communication efforts?

Evaluation of communication strategies is often a neglected but equally important task. It should be a continuous feedback mechanism at different stages of the communication process – evaluation can be done prior to, during, and after a communication strategy is implemented. Evaluation enables necessary adjustments to be made so as to avoid costly mistakes, duplication of efforts, and inability to meet objectives.

The evaluation scheme should allow both quantitative and qualitative information. Numbers such as visitors to a website, readership impressions, and articles published on crop biotechnology for example, are indicators. Other important measures can provide glimpses into trends and help gauge the use of various approaches.

Project Monitoring and Impact Evaluation. Progress of communication activities as it relates to the overall implementation plan must be continually monitored. Feedback about project implementation can then be fed back to the system to improve the process. Questions to be answered during monitoring include: Are we reaching intended stakeholders? Are they receiving the messages we identified? Are we on the right track? Answers to these questions can help determine alternative courses of action.

The workplan should have a list of expected activities and outputs or deliverables so that these can be assessed at various stages of the communication process.

An impact evaluation determines the overall effect of interventions to determine the degree of success or failure. It entails measuring the level of intended change in knowledge, attitudes, and skills.

An assessment of public perceptions provides a benchmark against which to measure the impact of a communication initiative. A sample of stakeholders who have been identified as 'key' audiences can be surveyed to determine conceptual



and behavioral changes (See previous discussion on surveys).

Communication Strategies. Different approaches and strategies used in communicating biotechnology can be evaluated to determine their impact and if the set objectives were attained.

Training and workshops. The effectiveness of a training or workshop and how it was implemented can be evaluated. Participants to workshops, training programs, and other group meetings are asked to fill out a questionnaire to determine their rating of various aspects such as workshop in general (relevance, organization, and effectiveness), group exercises, open fora, field visit, resource persons, workshop venue, hotel rooms, food, and management of the workshop. A rating scale of 1-5 where 5 is the highest and 1 is the lowest can be used as measure. Specific comments and recommendations are also asked. The data is processed and incorporated into the workshop proceedings and is used to improve future activities.

A post-workshop evaluation can also be done to see how knowledge and skills acquired during the workshop were used after a specified period of time. Six months after a risk communication workshop, participants were asked how the skills they learned helped them when they returned to their work. They gave specific skills such as being more confident during a television interview, being able to write a reply to a negative article on biotech crops in a newspaper, and answering queries from media.

Website. Measuring a website's usage is necessary to have a basis for determining how the site is perceived as useful by visitors. The Global Knowledge Center on Crop Biotechnology (KC) uses a software called AWStats to monitor and track website usage on a daily or monthly basis. Data generated include unique visitors, number of visits, pages viewed, hits, top countries viewing the site, visit duration, and top file downloads. An analysis can be made to determine the total number of people who visit the site at a particular period,

the session of activity that a visitor does on the site, what materials he/she spends time on or downloads, and other related information. Google offers a free service called Google Analytics that generates detailed statistics about the visitors to a website (<http://www.google.com/analytics>).

Usability and usefulness are also measured using user polls and surveys, either through questionnaires on the website or through email (Haight, 2007). Possible questions on usefulness include: How do you rate the usefulness of this website? Does the website provide you with the information you need? If not, what information would you like to see? What content or features do you find important? How do you rate the design of the website? How satisfied are you about the website?

Every year, subscribers to the Crop Biotech Update are asked to fill out a short questionnaire about the e-publication through email. The responses enable the KC to profile its subscribers, and gather feedback. The profile of respondents gives some background information such as organization, country, and designation, hence an idea of who the readers are. Feedback such as categorization of news, font size of the newsletter, and general layout, give ideas on how to further improve the CBU.

Video. Pre-testing of videos can be done through focus group discussion. This involves inviting a mixed group of stakeholders, i.e. student, housewife, and researcher, to view the video and then asking them to react based on these variables: overall video presentation, clarity of message, visuals, audio, and voice over. Another approach is to test the video on workshop participants and then have them fill out a questionnaire, rating the variables on a scale of 1 (very poor) to 5 (excellent). The group's interest during the workshop is, in itself, a good gauge of the video's production quality and effectiveness as a communication medium.

Print/publications. Publications can be pre-tested with various

sample audiences to determine understandability of content, readability, design and layout, as well as overall impact. A rating scale of 1 (very poor) to 5 (excellent) is used. Respondents who represent the identified target of the publication are shown prototype materials in a near-final stage and then asked to fill out a simple questionnaire measuring these variables. Answers are processed and comments where feasible are added in the revised version.

Institutional/Internal Capability. A SWOT Analysis is a strategic planning tool to determine how an organization, say the BIC, is performing or will be able to respond to the needs of its stakeholders. A critical self-analysis of the organization is important to determine one's strengths (S), weaknesses (W), opportunities (O), and threats (T) from the environment. By analyzing these factors and seeing the interlinkages among them, it becomes easier to determine pathways or directions to attain objectives. It is also less of a problem to determine what communication strategies can be done as the BIC's capability to implement these are underscored. Thus, results of a SWOT analysis can be used to set objectives, develop and analyze existing strategies, and prepare plans for implementation.

An external review or experts' meeting is organized to allow experts to review and analyze, and come up with recommendations to improve and redirect goals, objectives, and strategies. For a potential BIC, the meeting can also be a venue to get perspectives on the directions that it should pursue based on the national political climate, biotechnology environment, and stakeholder interests and perceptions.

The KC was reviewed by an external expert who went through publications and communication outputs, interviewed respondents, and attended a network meeting. The reviewer described and analyzed the network in terms of audience, objectives, strategies, and impact. The highlight of the review is a list of recommendations that was used to refocus directions, and justify continued support for the program.

By evaluating efforts and assessing impact, organizations such as the KC and the BICs can distill a list of experiential lessons that enrich projects in communicating biotech.



When the Global Knowledge Center on Crop Biotechnology and a few of the Biotechnology Information Centers began operations in late 2000, only a few other players were involved in communicating biotechnology. The KC network thus had a lead start in gaining prominence in the arena of biotechnology communication. It is now identified as a key player in communicating biotechnology globally. In the words of an external reviewer, "...no other place in the developing countries performs such functions as the KC does in this subject" (Castillo, 2003).

The network has had the opportunity to conceptualize, plan, and evaluate strategies aimed at increasing awareness and understanding of crop biotechnology as well as getting involved in efforts to share knowledge on the field in various levels - state, national, regional, and international. In the process many lessons were learned that enriched the field of science communication in general, and biotechnology communication in particular. In addition, ideas forwarded by experts have been incorporated into the following insights:

1. Communication is not merely a one-way process of dishing out information to people based on the assumptions that lack of understanding stems from inadequate information or that ample information can compel action. Rather, it involves social negotiation and dialogue between and among varied audiences – policy-makers, academics, scientists, and ultimately, consumers.
2. Biotechnology is an example of 'science in the making' and therefore likely to be provisional and controversial. Science in the making depends much more from those involved in the process of public understanding of science. The various 'publics' need to take an active role in the process of creating knowledge – hence, an informed discussion on science and biotechnology, regulations, safety issues, ethical dimensions, and socio-economic perspectives. In addition, equally important is the sharing not only of topics related

Synthesizing Lessons Learned



- to crop biotechnology (science of biotech) but also the science and practice of science communication.
3. Science communication should be looked at as a dynamic process with various communication strategies as mere components. Communicators are not merely skilled people who are expected to process information. Instead, they must contribute to being part of the process of developing 'socially robust' knowledge and facilitating its development. They facilitate the process by which science understands the public and the public in turn, understands science. Ultimately, science communicators must be able to proactively attend to and respond to the nuances of their field of interest, i.e., biotechnology.
 4. In embarking on any science communication initiative, it is important to take stock of the current environment for biotech taking into consideration scientific developments, political support, role of key players vis a vis biotech, and influence of stakeholders in the decision-making process. There is a need to identify issues considered most important to stakeholders, key information sources, information gaps that need to be addressed, barriers and opportunities to biotechnology acceptance in the country, among others. Goals are defined based on a global vision while objectives focus on local needs.
 5. Identifying stakeholders is crucial. While it is tempting to reach out to as many clients as possible, limited manpower and resources necessitate the need to prioritize stakeholders. The local environment dictates which audiences to prioritize. Three major groups – the academic community, the media, and the government sector – are important. The academic community often serves as resource persons and is highly regarded as credible sources of information. The media is one of the most effective means of reaching the public and is a powerful institution in setting the science agenda. It is often the tri-media that is the primary source for information on science. Due to their role in legislation and policies, the government sector is a critical sector as well. The multiplier effect of communication enables other sectors to be reached.
 6. The different 'publics' are not merely passive potential audiences for science communication but are active constituents of the system in which the scientific community thrives and functions.
 7. Communication modalities or approaches are merely tools to facilitate communication. The choice on their use and frequency as well as combination of strategies is dependent on objectives, and stakeholders' needs and concerns. Evaluation is necessary to determine if we are gaining impact from the use of communication strategies.
 8. The Biotechnology Information Centers should not start and end as mainly information centers. They should strive to be significant players in the development of enabling environments for informed decisions regarding the role of crop biotechnology in their respective countries. In addition, they need to set the stage for biotech crop adoption and commercialization.
 9. The Biotechnology Information Centers while focused on specific country concerns, have the potential to create a bigger impact on a regional basis. Some BICs have been able to conceptualize projects that focus on stakeholders that transcend country-specific concerns, i.e. issues regarding Islam and biotechnology.
 10. Together the Global Knowledge Center on Crop Biotechnology and the Biotechnology Information Centers have the potential to be a collective voice on crop biotechnology by consistently sharing key messages globally that are credible and compelling.

Bridging the knowledge divide between and among stakeholders is a crucial role in the acceptance of crop biotechnology particularly in developing countries that need it the most. It is equally important to ensure that different stakeholders have access to and are able to avail of science-based, up-to-date information to make informed decisions. Therefore, having an institutional mechanism in place as a conduit of knowledge sharing is essential to increase awareness and understanding of crop biotechnology. To attain these desired goals, the International Service for the Acquisition of Agri-biotech Applications (ISAAA) established the network of Biotechnology Information Centers under the umbrella of the Global Knowledge Center on Crop Biotechnology (KC). The network provides a systematic plan to adequately address specific interests and concerns in developing countries. This handbook highlights the importance of location specific strategies while keeping in view the global environment for communicating crop biotechnology. It also stresses the need to:

- Understand the scenario of agricultural biotechnology and the role of biotechnology communication;
- Identify and prioritize stakeholders, expected objectives, and corresponding communication strategies based on a participatory approach;
- Use a combination of communication strategies based on specific information needs and audiences;
- Evaluate and assess impact of communication strategies; and
- Learn from experiences in communicating biotech to continuously improve information dissemination efforts and sharing of knowledge.

The years of cumulative knowledge and experiences of the KC and the Biotechnology Information Centers have been documented in this handbook to show how they addressed challenges in communicating crop biotechnology. View these experiences not as a recipe book, but as a guidepost to chart the directions in communicating crop biotechnology.

XI

Conclusion



References

- Africa: Program Activity Review. 2007. Report presented at ISAAA's Annual Board Meeting, New Delhi, India on October 23-25, 2007.
- Benson, Andrew. 2007. Consumer Attitudes and Communications Regarding Food Biotechnology. Paper presented during the High Level Policy Dialogue Workshop on public perception of agricultural biotechnology. Lima, Peru, October 4-5, 2007.
- Biotechnology Information Center Reports. 2005-2007. International Service for the Acquisition of Agri-biotech Applications (ISAAA).
- Brossard, Dominique, James Shanahan and T. Clint Nesbitt (eds.). 2007. *The Media, the Public and Agricultural Biotechnology*. CAB International, United Kingdom. Pp. 405.
- Canales, Claudia. 2007. Science Communication and Technology Acceptance. Paper presented at the Consultative Workshop on Bt Cotton. Faisalabad, Pakistan.
- Castillo, Gelia. 2003. Science Communication Whose Time Has Come: An evaluation report on the Global Knowledge Center on Crop Biotechnology, International Service for the Acquisition of Agri-biotech Applications. Los Banos, Laguna, Philippines.
- Cormick, Craig. 2007. What We Know. Paper presented during the High Level Policy Dialogue Workshop on public perception of agricultural biotechnology. Lima, Peru, October 4-5, 2007.
- Covello, Vincent. Risk Communication. 2007. Center for Risk Communication. New York, New York. http://www.gchd.us/ReportsAndData/Presentations/PublicHealthWeek2007/Dr_Covello_Risk_Communication_Presentation.pdf (Accessed March 17, 2008).
- Covello, Vincent. Message Mapping. ERC CDCnergy Resource. http://publichealth.yale.edu/ycphp/cercfiles/TrainerResources/Covello_message_mapping.pdf (Accessed May 8, 2008.)
- Escaler, Margarita and Mariechel Navarro. 2002. Biotech Information for the Developed World. In *AgroLinks*. CropLife Asia. Bangkok, Thailand. Pp. 12-15.
- Gibbons, Michael. 1999. Science's New Social Contract with Society. *Nature* 402 (Suppl.), C81. Macmillan Publishers Ltd. http://sciencepolicy.colorado.edu/students/envs_5100/Gibbons_1999.pdf (Accessed March 4, 2002).
- Gregory, Jane and Miller, Steve 1998. *Science in Public: Communication, Culture, and Credibility*. Plenum Press, New York.
- Haight, T., Buonaiuto M., Kane-Potaka, J., and Ruppert, S. 2007. Evaluating the Impact of Your Website: A Guide for CGIAR Centers to Evaluate the Usage, Usability and Usefulness of Their Websites. ICT-KM Program of the CGIAR, Rome, Italy.

- Health Canada. Public Involvement Continuum. 2006. http://www.hc-sc.gc.ca/ahc-asc/pubs/public-consult/2000decision/pol-continuum_e.html. Health Canada. September 9, 2006. Minister of Public Works and Government Services Canada (Accessed April 8, 2008).
- ISAAA-KC Program Activity Overview. 2007. ISAAA Board Meeting, New Delhi, India.
- James, Clive. 2007. The Global Status of Commercialized Biotech/GM Crops: 2007. ISAAA Brief No. 37. ISAAA: Ithaca, New York. 125 pp.
- Juanillo, Napoleon. 2003. The Social and Cultural Dimensions of Agricultural Biotechnology in Southeast Asia: Public Understanding, Perceptions, and Attitudes Towards Agricultural Biotechnology. University of Illinois at Urbana-Champaign and the International Service for the Acquisition of Agri-biotech Applications (ISAAA).
- W.K.Kellogg Foundation. Creating a Plan- Communication ToolKit. Retrieved from <http://www.wkkf.org/Default.aspx?tabid=90&CID=385&ItemID=5000034&NID=5010034&LanguageID=0> (Accessed May 2, 2008).
- Medlock, J., R. Downey and E. Einsiedel. 2007. Governing Controversial Technologies: Consensus Conferences as a Communications Tool. In *The Public, the Media and Agricultural Biotechnology*. CAB International, United Kingdom. Pp. 308-326.
- Navarro, Mariechel, Margarita Escaler, Ma. Inez Ponce de Leon, and Sonny Tababa. 2007. The Bt Maize Experience in the Philippines: A Multi-stakeholder Convergence. In *The Public, the Media and Agricultural Biotechnology*. CAB International, United Kingdom. Pp. 327-337.
- Navarro, Mariechel and Monina Villena. 2004. Media Monitoring of Agri-Biotechnology in the Philippines: Understanding the Biotech Debate. *The Philippine Agricultural Scientist*. Vol. 87, No. 4. University of the Philippines Los Baños, College, Laguna, Philippines. Pp. 439-451.
- Navarro, Mariechel. 2003. Knowledge Networking on Crop Biotechnology in the Developing World. In *International Association of Agricultural Information Specialists Quarterly Bulletin*. Vol. XLVIII, No. 1/2. Allen Press, Lawrence, Kansas. Pp. 44-47.
- Navarro, Rex, S. Gopikrishna Warriar and Crispin Maslog. 2006. Genes are Gems: Reporting Agri-biotechnology: A Sourcebook for Journalists. Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics. 136 pp.
- Nordenstreng, K. 2001. Something to be Done: Transnational Media Monitoring. Paper presented during the conference on The Ethics of Journalism: Comparison and Transformations in the Islamic-Western Context in Berlin. Retrieved from <http://www.tbsjournal.com/Archives/Spring01/nordenstreng.html>
- Saner, Marc. 2007. What is Public Involvement? Paper presented during the High Level Policy Dialogue Workshop on public perception of agricultural biotechnology. Lima, Peru, October 4-5, 2007.
- Strengthening Knowledge Sharing Initiatives on Crop Biotechnology in the Developing World: The Global Knowledge Center on Crop Biotechnology. 2008. International Service for the Acquisition of Agri-biotech Applications (ISAAA). 4 pp.
- Strengthening Knowledge Sharing Initiatives on Crop Biotechnology in the Developing World: Five Year Review, September 2000-September 2005. 2006. International Service for the Acquisition of Agri-biotech Applications (ISAAA). 8 pp.

Traynor, Patricia, Marta Adonis, and Lionel Gil. 2007. Strategic Approaches to Informing the Public about Biotechnology in Latin America. *In* Electronic Journal of Biotechnology. <http://www.ejbiotechnology.info/content/vol10/issue2/full/12/index.html> (Accessed April 8, 2008).

Teng, Paul. 2001. Communicating to the Public: Strategies of the Private Sector. Paper presented at the Global Knowledge Center on Crop Biotechnology Communication and Network Planning Workshop, Bangkok, Thailand.

Torres, Cleofe, Madeline Suva, Lynette Carpio, and Winifredo Dagli. 2003. Public Understanding and Perception of and Attitude Towards Agricultural Biotechnology in the Philippines. International Service for the Acquisition of Agri-biotech Applications, SEARCA, and College of Development Communication, University of the Philippines Los Baños. 100 pp.

Van Zanten, Ir. Jasper, Anatole Kratiger, and Randy Hautea. 2000. Food Biotechnology: European and North American Regulatory Approaches and Public Acceptance- A Traveling Workshop: Summary Report for Policy Makers. ISAAA Briefs No. 18-2000. The International Service for the Acquisition of Agri-biotech Applications (ISAAA), Ithaca, New York. 22 pp.

Verzosa, Cecilia Cabanero. 2003. Strategic Communication for Development Projects. 2003. The International Bank for Reconstruction and Development/The World Bank, Washington, D.C., USA. <http://siteresources.worldbank.org/EXTDEVCOMMENG/Resources/toolkitwebjan2004.pdf> (Accessed April 8, 2008).

Watson, Lisa. 2002. Sharing Information on Biotech: A How to Guide. Global Knowledge Center on Crop Biotechnology, International Service for the Acquisition of Agri-biotech Applications (ISAAA), Philippines. 15 pp.

Wimmer, Roger and Joseph Dominick. 2006. Mass Media Research: An Introduction. 8th Ed. Wadsworth Publishing Co. 468 pp.

Author and Contributors

Mariechel J. Navarro is Manager of the International Service for the Acquisition of Agri-biotech Applications' (ISAAA) Global Knowledge Center on Crop Biotechnology (KC). She has a Ph.D. in Development Communication from the University of the Philippines Los Baños. She has been with the KC since its inception in September 2000. Her internship at the CAB International in the United Kingdom on managing a biotechnology information system on the Internet led to the development of the weekly e-newsletter Crop Biotech Update.

Bhagirath Choudhary is the National Coordinator of the South Asia Office of ISAAA based in New Delhi, India. He obtained his Bachelor in Agricultural Engineering and Masters of Business Administration in Technology Management from Asian Institute of Technology in Thailand. He is currently pursuing his Ph.D. from the Ghent University, Gent, Belgium.

Margaret Karembu is Director of ISAAA's *AfriCenter* based in Nairobi, Kenya. She holds a Ph.D. in Environmental Science Education from Kenyatta University and has over 10 years of experience in University teaching. She has wide experience in participatory training and technology diffusion research on small-scale agriculture and gender dimensions of agri-biotechnologies. A science communications' educator, Margaret oversees the Africa-based Biotechnology Information Centers in East and Central Africa (Kenya), Francophone Africa (Mali/Burkina Faso), and Egypt.

Mahaletchumy Arujanan is Executive Director of the Malaysian Biotechnology Information Center (MABIC) in Petaling Jaya. She holds a Bachelor of Science degree in Microbiology and Biochemistry, and a Master degree in Biotechnology. She is currently pursuing her Ph.D. in Science Communication at University Malaya. She has been with MABIC since 2003 and is a strong advocate of biotechnology.

Sonny Tababa and Rochella Lapitan are Network Administrator and Project Management Assistant of the SEARCA Biotechnology Information Center in Los Baños, Philippines, respectively. Sonny earned her Master of Science degree in Agriculture from the University of the Philippines Los Baños while Rochella earned a Bachelor of Science degree in Computer Science at Trace College also in the Philippines.

Muhammad Iqbal Choudhary is the Director of the Pakistan Biotechnology Information Center and concurrently, Acting Director of the International Center for Chemical and Biological Sciences (H.E.J. Research Institute of Chemistry), Dr. Panjwani Center for Molecular Medicine and Drug Research of the University of Karachi. He has a Ph.D. in Bioorganic Chemistry from the University of Karachi and completed his Ph.D. research at the Pennsylvania State University, USA, as a transfer student on a National Science Foundation Fellowship.

Supat Attathom is the Director of the Biotechnology and Biosafety Information Center based at the College of Agriculture, Kasetsart University in Nakhon Pathom. He holds a Ph.D. in Plant Pathology from the University of California at Riverside, USA.

Ismail Abdel Hamid is the Director of the Egypt Biotechnology Information Center in Cairo. He holds a Master of Science degree in Biological Control from the Faculty of Agriculture Cairo University and a Ph.D. in Molecular Virology from the same University.

Acknowledgment

This handbook is the sum total of the insights and experiences of many people who live and practice science communication. The staff of the International Service for the Acquisition of Agri-biotech Applications (ISAAA) and the Biotechnology Information Centers shared not only their communication initiatives and photos, but also the excitement in developing this publication. In particular, Bhagirath Choudhary of ISAAA's South Asia Office in India and Margaret Karembu of AfriCenter in Kenya did substantial review of the manuscript and provided critical inputs. In addition to colleagues from Malaysia, the Philippines, Pakistan, Thailand, and Egypt, they contributed to the section on "BICs in Action". Colleagues Von Mark Cruz and Rhodora Aldemita helped clarify some technical inputs. Acknowledgment is also due to Dr. Paul Teng of the Nanyang Institute of Technology, Singapore whose comments at the early stages of the manuscript motivated the author to complete this handbook. Former ISAAA staff Drs. Margarita Escaler and Claudia Canales took the time to suggest pragmatic ways to improve the material. Dr. Randy Hautea, ISAAA global coordinator, gave full support to this publication. Special thanks to Eric John Azucena for the cover design and layout, Noel Amano, Jr. for the annex inputs, and Clement Dionglay for facilitating the printing of this publication – this trio shared the agony of endless revisions, last minute editing, and the anxiety and joy of seeing this handbook grow from a dream to a tangible product.

Annex

List of Biotech and Science Communication Resources

AfricaBio

Location: South Africa
 Areas of interest: Crop biotech, biotech communication, etc.
 Website: <http://www.africabio.com/index.shtml>
 Contact: Remi Akanbi (Information Manager) remi@africabio.com

Agbios

Location: Canada
 Area of Interest: A daily collection of global crop biotech news
 Website: <http://www.agbios.com/main.php>
 Contact: Morven A. McLean (President) mamclean@agbios.com
 Donald J. Mackenzie (VP) djmackenzie@agbios.com

AgBio Forum

Location: United States
 Description: Monthly journal of Agro Biotechnology Management and Economics
 Website: <http://www.agbioforum.missouri.edu>
 Contact: editor@agbioforum.org

AgBio World

Location: United States
 Area of Interest: A daily collection of news and commentaries on ag-biotech
 Website: <http://www.agbioworld.org>
 Contact: C.S. Prakash prakash@agbioworld.org

Agricultural Biotechnology Support Project (ABSP-II)

Location: United States
 Areas of Interest: Crop biotech, technology transfer
 Website: <http://www.absp2.cornell.edu>
 Contact: Andrea Besley (Communication and Outreach Director)
alm62@cornell.edu

Agriculture Network Information Centre

Location: United States
 Description: Publishes biotech news items from various sources around the world
 Website: <http://www.agnic.org>
 Contact: agnicadmin@nal.usda.gov

Asian Food Information Centre (AFIC)

Location: Thailand
 Description: Provides information on nutrition, health and food safety for the Asian Region
 Website: <http://www.afic.org>

Biotech Knowledge Centre

Location: United States
 Description: Publishes biotech articles from all over the world, also publishes the Crop Biotech Update
 Website: <http://www.biotechknowledge.com>
 Contact: Connie Vivrett (Managing Editor, Website)
connie.l.vivrett@monsanto.com

Biotech Industry Organization (BIO)

Location: United States
 Description: A biotechnology organization, providing advocacy, business development and communications services for more than 1,150 members worldwide.
 Website: <http://www.bio.org>
 Contact: info@bio.org

Biotechnology and Biological Sciences Research Council

Location: United Kingdom
 Description: The UK's leading funding agency for academic research and training in the non-clinical life sciences
 Website: <http://www.bbsrc.ac.uk/>

Biotechnology Online (Australian Government Initiative)

Location: Australia
 Description: Provides biotech information, teaching materials assistance, etc. Maintained by the Australian Government agency Biotechnology Australia
 Website: <http://www.biotechnologyonline.gov.au/foodag/foodandag.cfm>
 Contact: ba@biotechnology.gov.au

CABI-AgBiotechNet

Location: United Kingdom
 Description: Provides latest information about agbiotech research and biosafety
 Website: <http://www.agbiotechnet.com>

CheckBiotech

Description: Provides information about rare diseases, life sciences, and biofuels and agricultural genetics
 Website: <http://checkbiotech.org>

Co-Extra

Description: An EU supported program concerned with co-existence and traceability of GM crops
 Website: <http://www.coextra.eu>
 Contact: Claus Minol or Yves Bertheau info@coextra.eu

Consultative Group on International Agricultural Research (CGIAR)

Location: United States (headquarters)
 Description: A strategic partnership, whose 64 members support 15 international centers, aiming to achieve sustainable food security and reduce poverty in developing countries through "scientific research and research-related activities in the fields of agriculture, forestry, fisheries, policy, and environment".
 Website: <http://www.cgiar.org>
 Contact: cgiar@cgiar.org

Commonwealth Scientific and Industrial Research Organization (CSIRO)

Location: Australia
 Description: Information on Agbiotech research in the Australian region
 Website: <http://www.csiro.au/science/Crops.html>
 Contact: Beck Eveleigh Rebecca.Eveleigh@csiro.au
 Huw Morgan (Manager, CSIRO Communications) Huw.Morgan@csiro.au

Council for Biotech Information (CBI)

Location: United States, Canada, Mexico
 Description: "...communicates science-based information about the benefits and safety of agricultural and food biotechnology to sustainable development."
 Website: <http://www.whybiotech.com>
 Contact: agrobio@agrobiomexico.org.mx

Crop Life International (CLI)

Location: Belgium, United States
 Description: Global federation representing the plant science industry and a network of regional and national associations in 91 countries.
 Website: <http://www.croplife.org>, <http://www.croplifeasia.org/> <http://croplifela.org/cms/>
 Contact: croplife@croplife.org

EurekaAlert Agriculture

Location: United States
 Description: An online, global news service operated by AAAS, the science society, It provides a central place through which universities, journals, government agencies, and other organizations engaged in research can bring their news to the media.
 Website: <http://www.eurekaalert.org/bysubject/agriculture.php>
 Contact: webmaster@eurekaalert.org

European Association for BioIndustries (EuropaBio)

Location: Belgium
 Description: An association with some 81 corporate and 5 associate members operating worldwide that aims to promote an "innovative and dynamic biotechnology-based industry in Europe".
 Website: <http://www.europabio.org>
 Contact: info@europabio.org

European Commission-Joint Research Centre (JRC)

Location: Italy
 Description: Publishes information about deliberate field trials and placing on the market of genetically modified organisms
 Website: <http://gmoinfo.jrc.it>
 Contact: gmoinfo-comments@jrc.it

European Food Safety Authority (EFSA) - GMO Panel

Location: Italy
 Description: Information on GMO approvals in the EU
 Website: <http://www.efsa.europa.eu/en/science/gmo.html>
 Contact: info@efsa.europa.eu

European Molecular Biology Organization (EMBO)

Location: Germany
 Description: "...promotes excellence in the molecular life sciences in Europe through targeted programmes and activities."
 Website: <http://www.embo.org/index.html>
 Contact: embo@embo.org

FAO – Biotechnology in Food and Agriculture

Location: Italy
 Description: Source of biotech information and publications
 Website: <http://www.fao.org/biotech>
 Contact: Shivaji Pandey (Chair, Inter-Departmental Working Group on Biotechnology) Shivaji.Pandey@fao.org

French Agricultural Research Centre (CIRAD)

Location: France
 Description: Publishes a monthly e-magazine on agbiotech in developing countries
 Website: http://www.cirad.fr/en/le_cirad/index.php
 Contact: www@cirad.fr

GEO-PIE Project

Location: United States
 Description: Provides educational materials exploring scientific and social issues associated with biotech
 Website: <http://www.geo-pie.cornell.edu>
 Contact: Bruce Lewenstein b.lewenstein@cornell.edu

Genetic Engineering Approval Committee (GEAC)

Location: India
 Description: Information on GM crops license application procedures, field releases and biosafety
 Website: http://www.envfor.nic.in/divisions/csurv/geac/geac_home.html

GMO Compass

Location: Germany
 Area of Interest: Information on genetically modified organisms with focus on European Union countries
 Website: <http://www.gmo-compass.org>
 Contact: info@gmo-compass.org

FAO/WHO- Codex Alimentarius

Location: Italy
 Description: Established to develop food standards, guidelines and related texts such as codes of practice under the Joint FAO/WHO Food Standards Programme.
 Website: <http://www.codexalimentarius.net>
 Contact: Codex@fao.org

Foundation for Biotechnology Awareness and Education (FBAE)

Location: India
 Description: Aims to create public awareness about the potential benefits and perceived risks of biotech intervention in human, animal and plant health, environment protection, etc.
 Website: <http://www.fbae.org>

Information Systems for Biotechnology (ISB)

Location: United States
 Description: Information hub on biotech research biosafety and regulatory issues in agbiotech
 Website: <http://www.isb.vt.edu>
 Contact: isb@vt.edu

International Centre for Genetic Engineering and Biotechnology-Biosafety

Location: Italy
 Description: Compiles and disseminates selected document on biosafety and biotechnology
 Website: <http://www.icgeb.trieste.it/biosafety>
 Contact: biosafe@icgeb.org

International Food Information Council (IFIC)

Location: United States
 Description: An Information hub on food biotechnology and capacity building
 Website: <http://www.ificinfo.health.org/index14.htm>

International Food Policy Research Institute (IFPRI)

Location: United States
 Description: "...seeks sustainable solutions for ending hunger and poverty." One of the 15 centres supported by the CGIAR
 Website: <http://www.ifpri.org>
 Contact: ifpri@cgiar.org

IFPRI- Program for Biosafety Systems (PBS)

Location: United States
 Description: "...supports partner countries in Africa and Asia in the responsible development and safe use of agricultural biotechnology."
 Website: <http://www.ifpri.org/themes/pbs/pbs.htm>
 Contact: Mark W. Rosegrant (Division Director) m.rosegrant@cgiar.org
 Catarina Cronquist (Program Analyst) c.cronquist@cgiar.org

International Service for the Acquisition of Agri-biotech Applications (ISAAA)

Location: The Philippines, Kenya, and the U.S.
 Areas of interest: Crop biotech, technology transfer, biotech communication, and capacity building
 Website: <http://www.isaaa.org/>
 Contact: isaaa-seasia@isaaa.org

National Centre for Biotechnology Information (NCBI)

Location: United States
 Description: Important resource for molecular biology information
 Website: <http://www.ncbi.nlm.nih.gov>
 Contact: info@ncbi.nlm.nih.gov

Nuffield Council on Bioethics

Location: United Kingdom
 Description: Examines ethical issues raised by new developments in biology and medicine
 Website: <http://www.nuffieldbioethics.org>
 Contact: bioethics@nuffieldbioethics.org

Meridian Institute Food Security and Ag-Biotech News

Location: United States
 Description: Daily news service covering the most important global developments related to agriculture and food security, with a strong emphasis on issues related to the controversy over agricultural biotechnology
 Website: <http://www.merid.org/fs-agbiotech>

Organization for Economic Cooperation and Development - Biotrack

Location: France
 Description: Database on GM crops, information related to the regulatory oversight of products of biotech and capacity building
 Website: http://www.oecd.org/departement/0,3355,en_2649_34385_1_1_1_1_1_1,00.html
 Contact: news.contact@oecd.org

Science and Development Network (SciDev.net)

Location: United Kingdom
 Area of Interest: News, views and information about science, technology and the developing world
 Website: <http://www.scidev.net>
 Contact: David Dickson editor@scidev.net

Seedquest (Global information service for seed professionals)

Area of Interests: Crop biotechnology, marker assisted breeding, intellectual property protection, crop protection, coexistence, seed coating technology, etc.
 Website: <http://www.seedquest.com/News.htm>
 Contact: info@seedquest.com, editor@seedquest.com smarcion@yahoo.com.br

South Asia Biosafety Project (SABP)

Location: United States, India, Bangladesh
 Areas of Interest: Crop biotech, capacity building
 Website: http://www.agbios.com/sabp_main.php
 Contact: Imdadul Hoque (Bangladesh) imdadul@agbios.com
 Viba Ahuja (India) vibhaahuja@biotech.co.in

United Nations Environment Program (UNEP)-Biosafety

Location: Switzerland
 Description: Biotech and biosafety backgrounder, news, publications and training
 Website: <http://www.unep.org/Biosafety/Default.aspx>
 Contact: Alex Owusu-Biney (Africa Coordinator) alex.owusu-biney@unep.org
 Fee Chon Low (Asia Coordinator) feechon.low@unep.ch

UNEP - Biosafety Clearing House (BCH)

Location: Canada
 Description: "...a mechanism set up by the Cartagena Protocol on Biosafety to facilitate the exchange of information on Living Modified Organisms (LMOs) and assist the Parties to better comply with their obligations under the Protocol."
 Website: <http://bch.biodiv.org>
 Contact: bch@cbd.int

UNIDO - Biosafety Information Network and Advisory Service (BINAS)

Location: Austria
 Description: Database on global development in regulatory issues and guidelines from many countries and capacity building
 Website: <http://binas.unido.org/binas/>

United States Department of Agriculture (USDA) – Biotech

Location: United States
 Description: Depository of USDA biotech publications
 Website: http://riley.nal.usda.gov/nal_display/index.php?info_center=8&tax_level=2&tax_subject=8&topic_id=1067&&placement_default=0

USDA, Animal and Plant Health Inspection Service (APHIS)-Biotech

Location: France
 Description: Provides information on US Biotech regulatory procedures, requirements for licence application and field releases
 Website: <http://www.aphis.usda.gov/biotechnology/index.shtml>
 Contact: biotechquery@aphis.usda.gov

USDA Agricultural Research Service (ARS)

Location: United States
 Description: Aside from its daily ag-research news, ARS also publishes a monthly e-magazine on the recent developments in agriculture research
 Website: <http://www.ars.usda.gov/main/main.htm>

United States Regulatory Agencies Unified Biotech Websites

Country: United States
 Description: Focuses on the agricultural products of modern biotechnology, and provides database on GM crops
 Website: <http://usbiotechreg.nbio.gov/index.asp>

World Health Organization – GM Food

Location: Switzerland
 Description: Provides general information on a range of issues in the field of biotechnology and human health, including safety evaluation of vaccines produced using biotechnology, human cloning and gene therapy
 Website: <http://www.who.int/foodsafety/biotech/en>
 Contact: foodsafety@who.int

Recent Biotech Research Developments

American Association for the Advancement of Science <http://www.sciencemag.org/>

Nature Publishing Group <http://www.nature.com/index.html>

Nature Biotechnology <http://www.nature.com/nbt/index.html>

Proceedings of the National Academy of Sciences of the USA <http://www.pnas.org/>

Public Library of Science ONE (PLoS ONE, interactive open-access journal) <http://www.plosone.org/home.action>

Biotech Journals that Occasionally Feature Free Research Papers:

Transgenic Research <http://www.springerlink.com/content/100225/p=69d67d16521742c38983510057cf12c6&pi=0>

Plant Biotechnology Journal <http://www.blackwell-synergy.com/loi/pbi>

Plant Molecular Biology <http://www.springerlink.com/content/100330/p=dc1ef97806cc4db9aaa3529646eb9ae5&pi=11>

Molecular Breeding <http://www.springerlink.com/content/100317/p=bf783c192be24e4b9542ec7119d5ba95&pi=0>

Precision Agriculture <http://www.springerlink.com/content/103317/>

Plant Science <http://www.sciencedirect.com/science/journal/01689452>

Molecular Breeding <http://www.springerlink.com/content/100317/p=bf783c192be24e4b9542ec7119d5ba95&pi=0>

ISBN 978-9719398318



9 789719 398318