

GM foods affect
physiology of animals

Thai GM tests contaminate farm
Engineered corn under fire
Biotechnology cited
in fight vs hunger
Study shows biotech crops are
environmentally safe
For a more sober look
at the Golden Rice

Oil-rich GM plant
may save fish

Pinoys in the dark
on GM food's effect

Growing acceptance
of GMO products bared
Report on Bt corn toxin confirmed

Media, Messages & Metaphors

How Philippine Newspapers Define Agri-biotech



ISAAA
INTERNATIONAL SERVICE
FOR THE ACQUISITION
OF AGRIBIOTECH
APPLICATIONS



Studies show that the general public gets their information on science and technology from the mass media, e.g. television, radio, and newspapers. Hence, media plays a significant role in defining what the general public understands about a technology, and at the same time provides an environment by which public opinion is formed. News media in particular serves as an important source of informal learning and contributes to how citizens reach judgments about the complexities of science and technology or policy debates.

How does the print media define biotechnology? The Philippines is a unique case to study as it is the first and only Asian country to approve the planting of Bt corn, a genetically modified food/feed crop. Some 250,000 small resource-poor farmers are estimated to be growing biotech corn and the country is ranked 11th worldwide in terms of area planted to biotech crops. A ten-year study (2000-2009) was conducted to see the level and nature of media attention given to agricultural biotechnology by three major national newspapers - *Manila Bulletin*, *Philippine Daily Inquirer*, and *Philippine Star*. Specifically, it sought to determine tone, news sources, and use of keywords, prominent media frames, and metaphors.

The study underscores the relationship between science and media as it details the process of negotiating public or popular images of science. Each system has its own language and culture but both come to a common agreement in meaning and context over time. While the study is that of the Philippine media, it provides insights by which other developing countries can help determine the direction of the biotech debate and in understanding the future for media reporting on science. How media portrays science in general, and biotechnology in particular, can have a positive or adverse impact on public understanding and policy development.

With over 95% of all studies on the media coverage of science focusing on North America and Europe, this research initiative from a developing country is an important contribution to the literature.

Print Media & Biotechnology in the Philippines



Although described as the 'freest in Asia', the print media in the Philippines is still regulated to some extent by the government. This incongruent setting merges with high media interest in politics and entertainment. Science and technology is often not front page material. The National Capital Region (Metro Manila) remains to be the center of print media operations of which the *Manila Bulletin* (MB), *Philippine Star* (PS), and *Philippine Daily Inquirer* (PDI) are the dominant papers in terms of circulation and reader preference.

The top three newspapers published a total of 1,355 articles on modern crop biotechnology during a ten-year period or a yearly average of 136 articles (Figure 1). Most articles were published in specific sections such as agriculture, science and technology, and business. Some articles managed to land on the front page of the newspaper. These were news about Golden Rice, government approval of genetically modified (GM) corn, protest and hunger strike against Bt corn, farmer testimony in favor of biotech crops, and a call to stop sale of GM rice from the U.S. A core of writers consistently featured news on biotechnology.

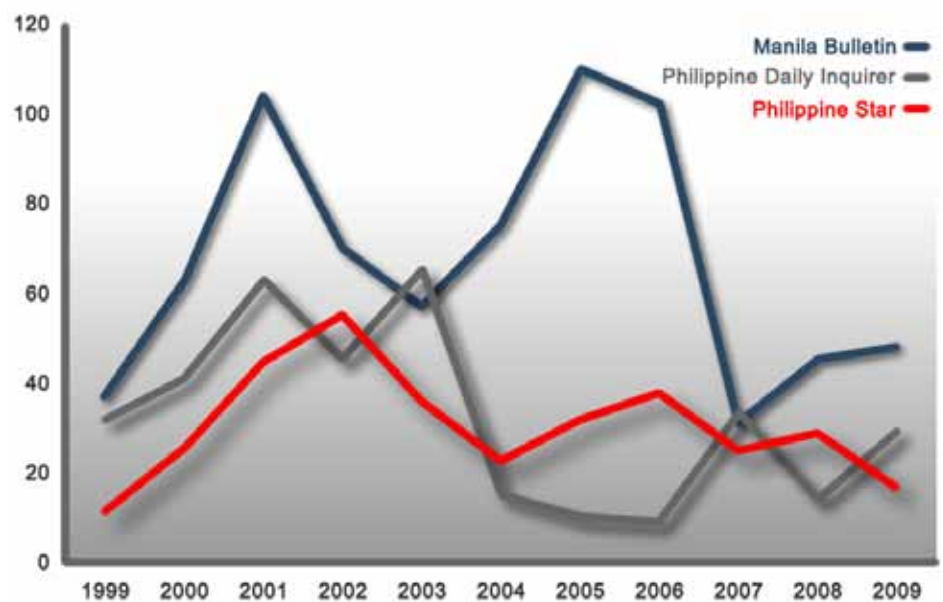


Figure 1. Comparative number of articles published yearly by the top three Philippine newspapers, 2000-2009
Note: 1999 data provided to allow comparison

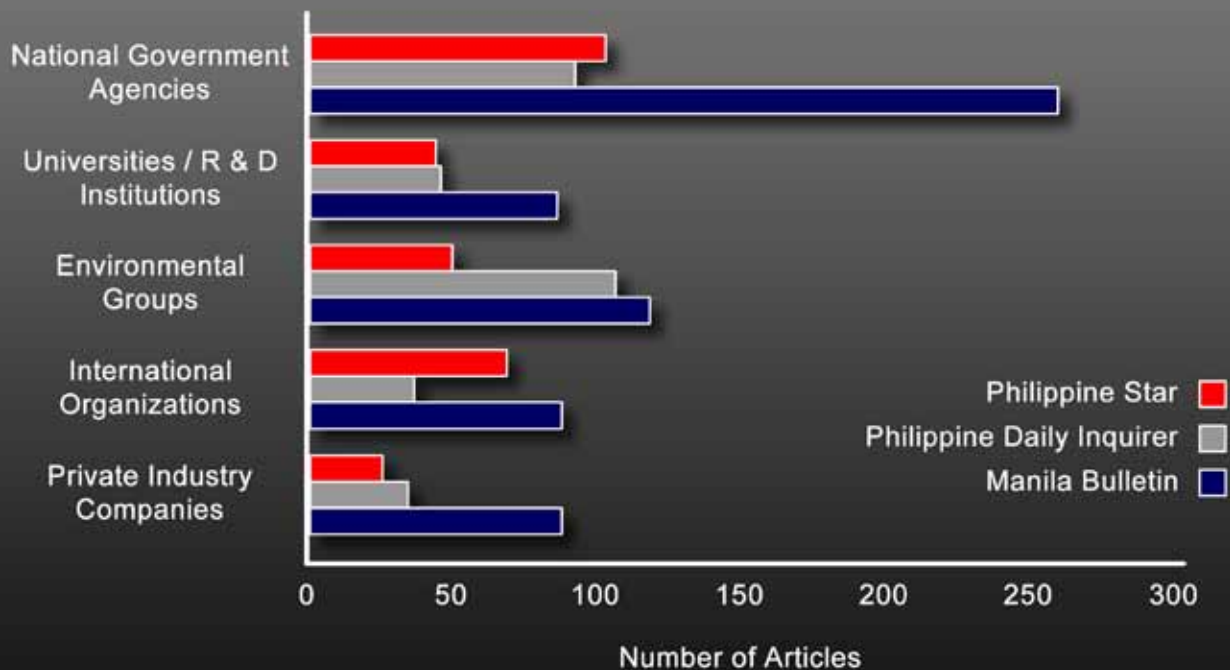


Figure 2. Sources cited by biotech articles of top three newspapers, 2000-2009

Media Coverage. When biotechnology was a relatively new topic, writers used information from foreign news. In the absence of a local biotech product, media coverage was on how the technology could “feed the world population” and at the same time “threaten the planet.” Golden rice which was then in the limelight in Europe and the U.S. was a product being hailed as “super rice for Asia”, and “miracle rice to solve vitamin A deficiency of 24 M children worldwide.” Most of the articles discussed the field testing of GM corn which signaled serious local efforts to join the biotech bandwagon. Significant events which increased interest in the topic were the issuance of support for biotech from the Philippine president in 2001 and release of a government directive allowing propagation and commercialization of GM crops in 2002. Hence, peak coverage was from 2001 to 2003, the period prior to approval of commercial planting of Bt corn, approval of planting on farmers’ fields, and start of commercialization of a first food/feed biotech crop in an Asian country.

However, coverage was down in months when articles had to compete with headline news such as the impeachment and plunder case against a Philippine

president (2001), attempted coup d’etat (2003), national elections (2004), and a government corruption case involving a telecommunication project (2008). Media spikes were often a result of ‘drama’ (e.g. uprooting of field trials by environmental groups, hunger strike protest

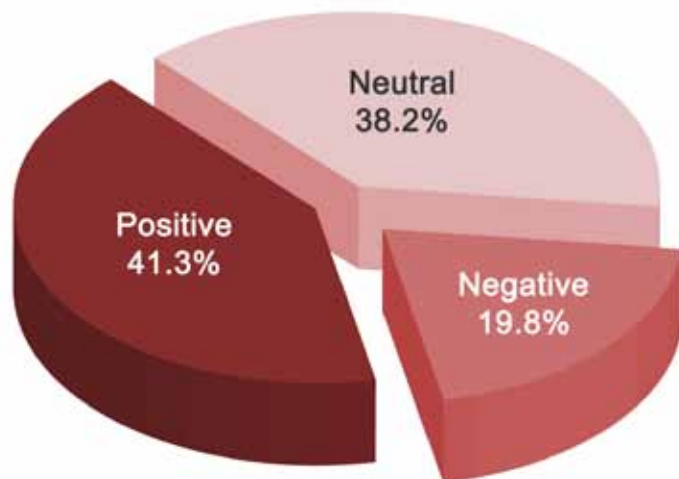


Figure 3. Tone of biotech articles in three newspapers, 2000-2009

Table 1. A framing typology for biotechnology

FRAME	CONTEXT
Public Accountability/Governance	Research in the public good or responsible use or abuse of science in decision-making
Social Progress	Improving quality of life and harmony with nature; Local/global competitiveness
Public Engagement	Focus on poll results, reporting of public opinion statistics, public sentiments, personal testimony of farmer or consumer
Morality/Ethics	Identification with values that determine what is right or wrong, acceptable or unacceptable
Scientific Validity	Expert understanding what is known versus unknown; calls on the authority of sound science or peer-review
New Research	Discovery announcement, new scientific application
Conflict/Strategy	Who's ahead or behind in debate; battle of personalities
Others	Context not included in frames above

against the technology, health issues concerning a cultural minority) thus, suggesting that biotech articles tend to gravitate towards such events rather than to the science.

Sources of Articles. Most news articles are source generated or angled based on the perspective of individuals or organizations. Estimates put half or more of newspaper articles as source originated. It is thus important to identify the ‘voices’ behind the information that serve as basis for how stories are framed.

The media relied on multiple sources of information for articles they published. These were, in the order of frequency of use, government which accounted for 37%, environmental groups (22%), international organizations (16%), universities/R&D institutions (14%) and private industry companies (11%). In contrast to heavy representation of single sources in science writing, the Philippine media strives for balance by citing multiple sources. It is also influenced by the need for newspapers to project neutrality thus crediting representatives of major institutions who in turn have the power to define key issues.

Articles by Tone. Majority of the articles published by the three newspapers were positive (41.3%) and neutral (38.2%) in tone. Only about 19.8% had a negative perspective. Most of the positive articles dwelt on the benefits of the technology, potential scenarios for the technology, and support from government and the science community. Negative articles tend to focus on health issues such as the technology allegedly causing sickness, cancer, and even mental retardation, baldness, and homosexuality. Positive to neutral stories dominated the decade of biotech writing suggesting a positive environment for the technology in the media arena.

Media Frames. Journalists use story frames that determine the importance of a topic or issue. Frames can highlight certain points of view, define perceived areas of significance, and explain how issues should be understood.

Among the three newspapers, the most prominent frame was public accountability or governance (Table 1). Specific focus was on government support for biotechnology, guidelines on the commercialization of Bt corn, regulations related to technology commercialization



Figure 4. Tag cloud of frequently used keywords in article titles, 2000-2009



Figure 5. Tag cloud of frequently used keywords in text or body of articles, 2000-2009

and labeling, responsible use of technology, and government's stand on requests by environmental groups for a moratorium or ban on planting biotech crops. These stories coincided with the period when government was actively seeking the approval of biotech commercialization in the country.

Social progress was another prominent media frame in defining agricultural biotechnology. Articles that used the social progress frame featured small scale farmers benefiting from the technology in terms of higher yields, savings on pesticides use, and higher income. Other articles focused on the potential ability of transgenic crops to lift the country's agricultural competitiveness and the role of GM food in helping to solve hunger and poverty. The first half of the decade saw an increase in the use of public engagement as a story frame. These stories highlighted personal testimonies of farmers and public sentiments. Over time, however, writers did not use a dominant frame but were open to different story angles.

Headlines/Article Titles. Headlines or titles summarize the gist of a news item and provide crucial impression on whether a prospective reader will continue to read the

body of the article. Studies show that 8 out of 10 people read headline copy but only 2 continue to read the rest of the article.

An analysis of the top three newspapers showed that the most used keyword in headline copy was biotechnology/ biotech and GM. Figure 4 shows a visual representation or tag cloud of the most frequently used keyword in titles. Other keywords that appeared although in insignificant numbers were the following: Golden rice, genetically engineered, mutant, gene-altered, genetic crops, engineered, and super rice. It was only in the first milestone that writers coined various terms to refer to biotech crops. Terms to identify new varieties of rice for example were Golden rice, vitamin rich rice, miracle rice, genetically improved rice, super rice, and mutant rice. Towards the second half of the decade, writers were more specific about the biotech crops they were writing about - Bt corn, pest resistant corn, herbicide tolerant corn, and drought resistant corn. This can be attributed to information supplied by research and development organizations regarding local scientific initiatives that highlighted the possibility of new biotech crops in the market.

GM food may help solve hunger

B'laan farmer blames GMO corn for coughs, nausea, even rashes

Report on Bt corn toxin confirmed

Norwegian scientist confirms farm workers were exposed to a Bt toxin
DA asked to revoke Bt corn license

Biotech playing role in clothing industry

A farmers' association has asked the Department of Agriculture to revoke the commercialization license of genetically modified (GM) bacillus thuringiensis (Bt) corn, claiming the crop will contaminate non-Bt corn fields and entangle non-Bt corn farmers in legal suits.
 "Corn is wind-pollinated. If Bt corn is commercialized, cross-pollination through wind action is inevitable, and contamination of our fields will be irreversible. Bt corn is registered as a pesticide in the US Environmental Protection Agency, worse than chemical pesticides, said the Pambansang Kisanong Samahang Magasaka (PKSM).
 PKSM said Bt corn may also implicate non-Bt farmers in a similar case in the US for violating patent rights of Bt corn seed producer Monsanto.
 "Monsanto can sue us for patent infringement as it has done to farmers with Monsanto's patented GM soy and canola, like Eugene Stratemeyer in the US and Percy Schmeiser in Canada. Those farmers had to pay \$20,000 to \$20,000 in fines," it said.
 Bureau of Plant and Industry (BPI) Director Bio Unpac Adiong said earlier that Bt corn's approval has gone through stringent procedures set under Administrative Order 8, the law allowing GM commercialization.
 Adiong said that the National Committee on Biotechnology of the Philippines (NCBP) has approved Bt corn trials from the greenhouse to multiple locations. (DINA)

'Transgenic' crops to feed world population

Butterflies not harmed by transgenic corn

Genetically modified food debate begins to bite in Asia

"This is a good agreement for China, for America and for the world," an elated Clinton told reporters Monday at a news conference in Ankara, Turkey.
 In exchange for Beijing's agreement to slash tariffs and other trade barriers, the US has agreed to slash tariffs on Chinese goods.



For a more sober look at the Golden Rice

Text /Article Body. A tag cloud was also developed for keywords commonly used in the text of articles (Figure 5). Similar to the headline, article text was dominated by the keywords GM organism, biotechnology, genetically engineered, transgenic, genetically altered, and genetically improved. Definitions of these terms were given only during the first few years, after which writers assumed that biotechnology and GM were already part of conventional language. After the first half of the decade, writers preferred the keywords biotechnology and GMO using them interchangeably. Some writers however, saw the nuance in meanings of the two terms and used biotechnology as an over arching term that subsumes GM.

Use of metaphors. Language is a major variable to understand how people think and act. Writers use metaphors to communicate or transform complex ideas into what is perceived as "real" or familiar and concrete. Metaphors often provide only one perspective of an issue by blocking or hiding other viewpoints. In addition, meanings can be ambiguous with context depending on the purpose of the user. As a consequence, how media uses language to define concepts can cause wider social and political implications.

Metaphors or descriptors in the text were grouped using categories that had conceptual similarities (Table 2).

Table 2. Categories of metaphors

CATEGORY	DESCRIPTION
Potential or Promise	Positive images or developments that will affect people in the future
Fear	Negative images about biotechnology and its applications in the future
Ethics	Moral issues and ideas that influence values of people
Human Intervention	Creation of or transformation into something unnatural or different from its former state
Others	Description not among the four categories

New rice variety resistant to flood



LUZON NEWSBITS

CAMAYA COAST AS TOURIST HAVEN

MARILUEN, Luzon — In the heart of Luzon, the beautiful coastline of Camaya Coast is becoming a tourist haven. The area is known for its pristine beaches and crystal clear waters. The town is also known for its rich history and culture. The area is also known for its beautiful scenery and the friendly people who live there. The area is also known for its beautiful scenery and the friendly people who live there.

NEW PUBLIC HIGH SCHOOL BUILT

ANGELES — A new public high school has been built in Angeles City. The school is a modern building with many facilities. The school is a modern building with many facilities. The school is a modern building with many facilities. The school is a modern building with many facilities.



A fisherman in Dagupan city sells his fresh catch of crabs to tourists while they are enjoying a motorized boat built like a Nipa hut. (Zaldy Comanda)

Table 3. Frequency in use of metaphor category by top three newspapers, 2000-2009

Year	Fear	Potential/Promise	Ethics	Human Intervention	Others
2000-2003	92	47	7	26	5
2004-2006	25	22	2	3	2
2007-2009	20	15	1	3	0
Total	137	84	10	32	7
Percent	50.74	31.11	3.70	11.85	2.59

Metaphors used in the body were categorized by dominant domain used (Table 3). Most used category, particularly during the first half of the decade was the Fear domain (51%). These metaphors attempt to project the dark side of the technology by inferring that it causes cancer, homosexuality, physical deformities, baldness, and mental retardation, among others. Examples of these metaphors are: "an infamous cancer-causing progeny of science"; as real as cancer", "are a threat", and "slow, silent poisoning".

An unfamiliar topic was explained through drama and speculation.



Other examples of Fear domain are the use of allusions to scary creatures or products as shown by the following examples: “a monster”, “a nightmare for everyone who eats its products”, “Frankenfood”, “biological time bomb”, “biological polluting genetic mutants”, and “Trojan horse”.

The Fear domain was used extensively during the first years of coverage when biotechnology was a new topic, there was no concrete biotech product in the market, and reference was made to articles from foreign media sources. The concept of fear is used in an environment of uncertainty and abstractness. It is worth noting, however, that its use significantly decreased towards the second half of the decade.

The second most used category is Potential or Promise which comprised 31%. It equates biotechnology with positive images or developments that will affect people in the future. It suggests the possibility of important changes with infinite though vague potentials. Biotechnology as a profitable enterprise, source of wealth, as well as the

solution to major human problems, i.e. food security, and economic upliftment, were popular images portrayed in the media. Examples of these metaphors are:

“New frontier for the wobbling Philippine economy”, “sunrise industry of the millennium”, “new wave in agriculture”, “salvation of the poor”, “savior for the starving masses”, and “future growth engine”.

Metaphors play an important role in the construction of social, cultural, and political reality.



However, the future scenario perspective of this metaphor declined over time as real products were introduced in the global market. Hence, it was easier to present tangible products without resorting to metaphorical representations of objects.

The category on Human Intervention merited 11.85%. Metaphors emphasize the intercession of the scientific process (from biotechnology) resulting in what was perceived as an unnatural product. Such metaphors are exemplified by the following: “superweeds”, “suicide mechanism for seeds of the next generation”, “messing with nature”, “assault on nature”, “quick fix or a silver bullet”, and “humans tinkering with its biological integrity”.

Science and technology as a supernatural process that goes beyond natural order was used 81% in the first few years and decreased in frequency thereafter. Scenarios in the media are the manifestations of the perceived fears and threats of the technology. The science was represented by new, mysterious, and unknown territories that had to be explained by external interventions. The direction for biotechnology is, thus, negative and suggests inherent risk, instability, and absence of regulations and safety considerations.

Ethics is another metaphor category that was used but less than 4% of the time. This encompasses references to moral values and dictates what is perceived as right and wrong. The moral acceptability of the technology of man’s interference with his natural environment has been part of the biotech debate. Examples include: “sacred or divine reality that man must leave alone”, “ungodly ideology”, and “immoral or sacrilegious”.

The use of metaphors in these examples highlights the perception that the technology is morally wrong. The combination of Fear and Ethical domains suggests the need to leave nature to its natural evolution. However, the use of these metaphors was not as prevalent as the use of the Promise and Fear domains suggesting that a value-laden perspective is not a popular story angle.

The use of metaphors declined through the years suggesting a shift in writing style that stressed a less sensational perspective. Media reporting of biotechnology apparently became more accurate and highlighted a scientific angle. Philippine media’s use of metaphors popularized by foreign media was evident but declined as more substantive information was obtained.

Conclusions / Implications



Media coverage may be a contributing factor to the generally favorable perception of the technology in the country. This, despite stories on the technology fueled by event-centered or episodic happenings that generate story interest.

During a decade of biotech journalism, the Philippine media showed maturity in its reporting over time. This was shown by the trend towards positive to neutral stories, preference for institutional sources of information, and a shift from sensational to balanced coverage.

Media coverage in the Philippines is dominated by stories about politics and entertainment. Although biotechnology news was not high in the media agenda as compared to political events, coverage was sustained and had occasional peaks that helped bring attention to and generate interest on the topic.

Media practitioners need to make accurate, science-based representations of reality so that the public is not led to make conclusions based on language used. It is important to provide media with up-to-date information using analogies that complement rather than confuse public understanding of science. Focus of articles should

be on tangible aspects, breakthroughs, or the scientific process that leads to a technology rather than on speculative scenarios, unsubstantiated claims, and false representation of science and technology.

In like manner, scientists and communicators need to develop a shared culture by which science information is negotiated for public consumption. This scenario will enable both actors to maintain interpretative control and in constructing reality based on common meanings.

It is thus important to understand how media works - the frames that media use to communicate issues, the sources they use which influence how stories are framed, and the amount of space allotted to science topics, among others. With opinions being formed on the basis of little information, the role of newspapers is crucial in the communication and better understanding of science.

Acknowledgments

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