

Educating and Communicating Effectively the Benefits and Potential Risks of Biotechnology Products

PBS/MSU

**Biosafety Curriculum Development for Trainers of Academic
and Non-academic Stakeholders in East Africa**

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*This is **ISAAA...***

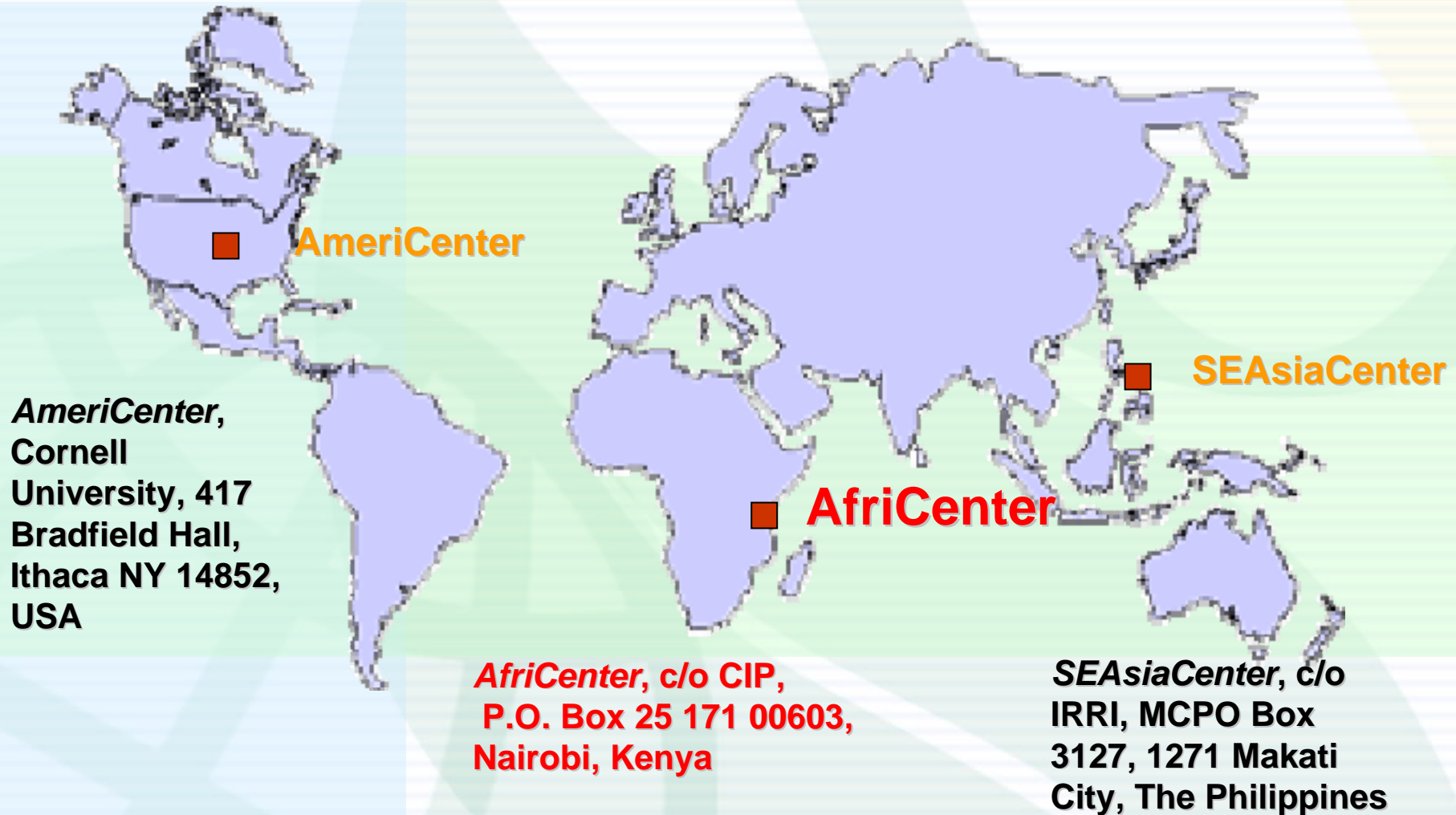
**International Service for the
Acquisition of Agri-biotech
Applications**

www.isaaa.org/kc

*A not-for-profit international **network** founded in 1990
to facilitate **acquisition** and **transfer** of agric.
biotechnology applications for the benefit of
resource-challenged farmers in developing world*

The ISAAA Network Centers

Global mandate

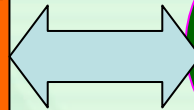


ISAAA: International Service for the Acquisition of Agri-biotech Applications

ISAAA Africenter Program Areas

Agri-Biotech Transfer

- *Tissue Culture Banana - EA*
 - *Clonal Forestry - EA*
- *Enabling Policies (Global)*

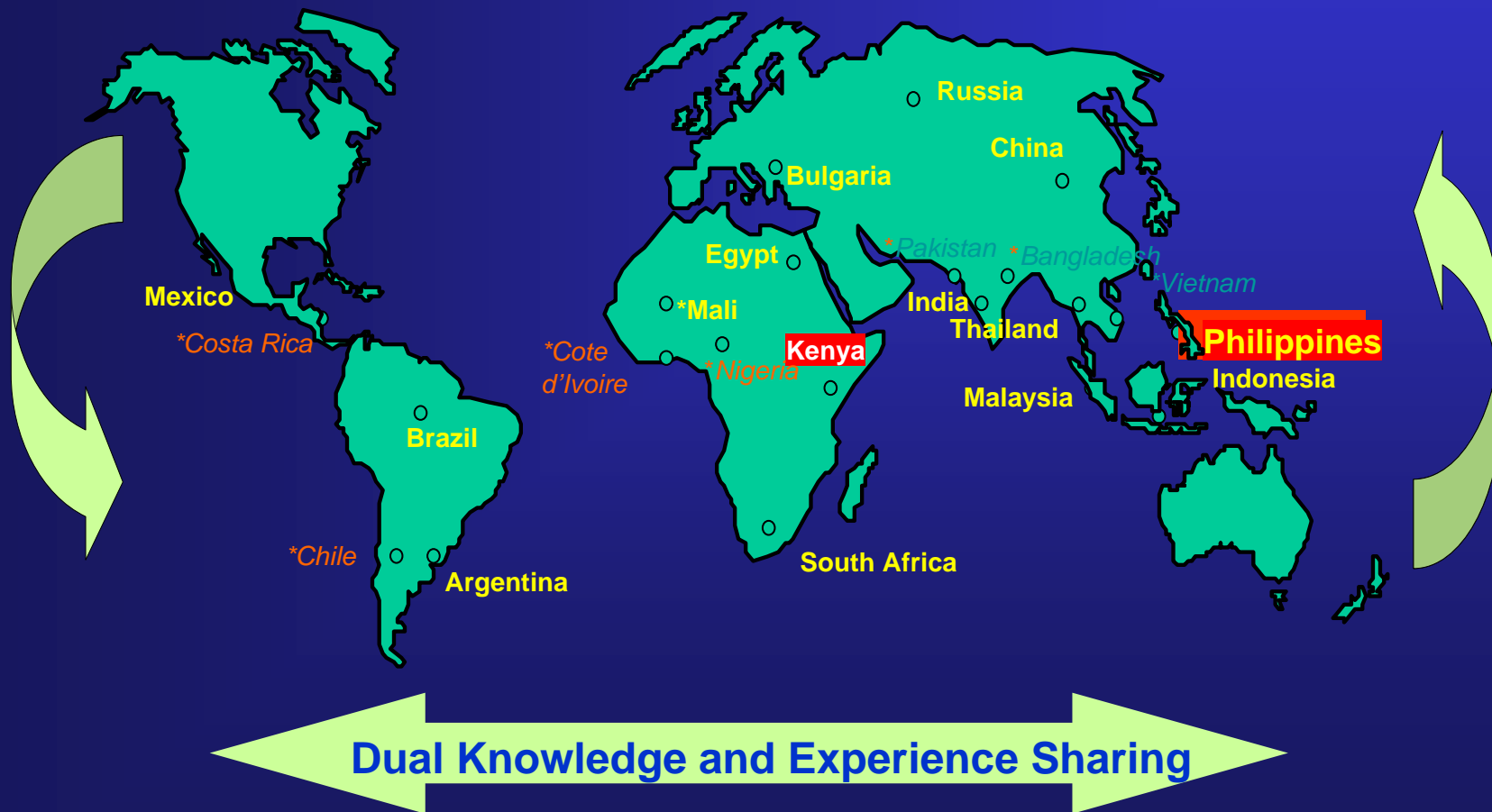


*Communication Education
Knowledge-sharing,
Process documentation*

ISAAA's Global Network of Biotech Information Centers



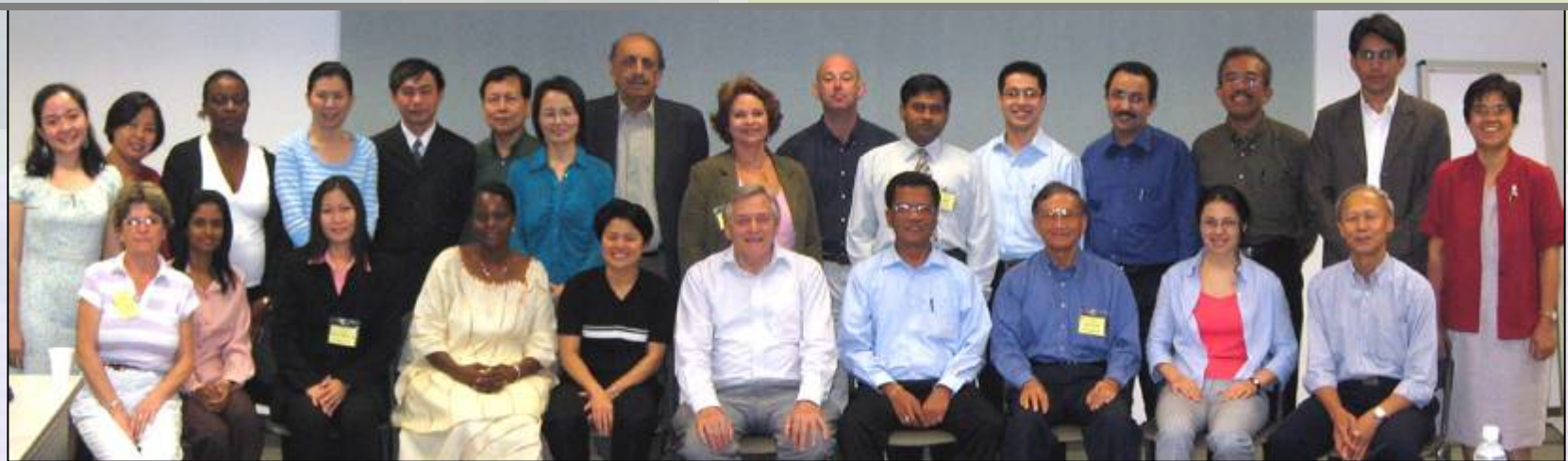
- 20 Operational nodes under the Global Knowledge Center (KC)
- 7 Future nodes



ISAAA's Global Network of BICs / Nodes



Country	Date Established	Country	Date Established
Philippines	July 2000	Mali	June 2003
Thailand	July 2000	Bulgaria	January 2004
Malaysia	December 2000	Russia	January 2004
South Africa node	January 2001	India	August 2004
Kenya	July 2001	Bangladesh	February 2005
Vietnam node	November 2001	Brazil node	March 2005
Indonesia	October 2002	China	July 2005
Egypt	March 2003	Pakistan and Sri Lanka	2006
		Spain	2007



Effective Communication: *Why should we be concerned?*

We work in a very challenging environment...

- It is not enough just to do good science; it is equally important that this be communicated to our stakeholders
 - single issue activists offer over-simplified and distorted sound-bites
 - media ever eager to sensationalize and trumpet half-truths
 - politicians eager to offer populist and cosmetic spins

Result: Varied Perceptions/opinions on benefits and risks

Society's Filter (network of opinion leaders)



Companies can no longer directly market their products – especially those involving what's perceived as a new technology to consumers without first understanding and dealing with broader public issues and concerns

Media

The Communication Challenge



- Different information needs for stakeholders
- Different languages (who speaks to whom?)
- Perceived interest vs actual/real interests
- Lack of openness
- Few coherent efforts
- Communication not a “national” priority
- Limited resources (human and finances)
- Mind-sets; “Proponents verses “opponents”

Who speaks to whom?

- | | | |
|--|---|-----------------------|
| <input type="checkbox"/> Policy makers | X | Scientists |
| <input type="checkbox"/> Policy makers | X | Industries |
| <input type="checkbox"/> Scientists / Industries | X | Farmers |
| <input type="checkbox"/> Policy makers | X | Religious authorities |
| <input type="checkbox"/> Scientists | X | Religious authorities |
| <input type="checkbox"/> Scientists / Industries | X | Consumers |
| <input type="checkbox"/> Scientists | X | Lawyers |
| <input type="checkbox"/> Media | X | All |

..and who listens to who?

The Different languages

- ❑ Scientists - science
- ❑ Policy makers/regulators - safeguarding nation's interest
- ❑ Lawyers - legal issues
- ❑ Media - sensational news / salient point
- ❑ Industries - \$\$\$\$
- ❑ Farmers - \$\$\$\$
- ❑ Consumers - safety, benefits
- ❑ Religious authorities - principles
- **Politicians - Votes**

**How do we enhance comprehension?
Pack/unpack/integrate**

Setting the Pace...

The Operating environment

The Fantasies/Fairly tales
The Reality
The Implications

Fantasy



mutant meals

Marie Claire, April
2000

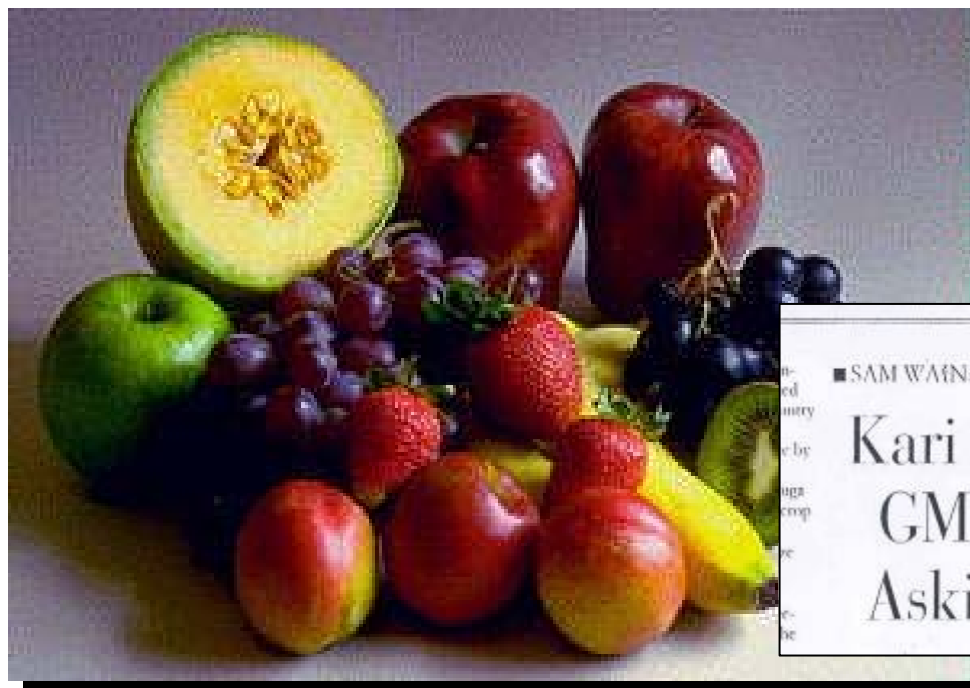
Are you eating
science's
mistakes?

eat, drink and be wary

Source: CropBiotech Net Collections

Fantasy

Mutant Food...



...or Gene Food?

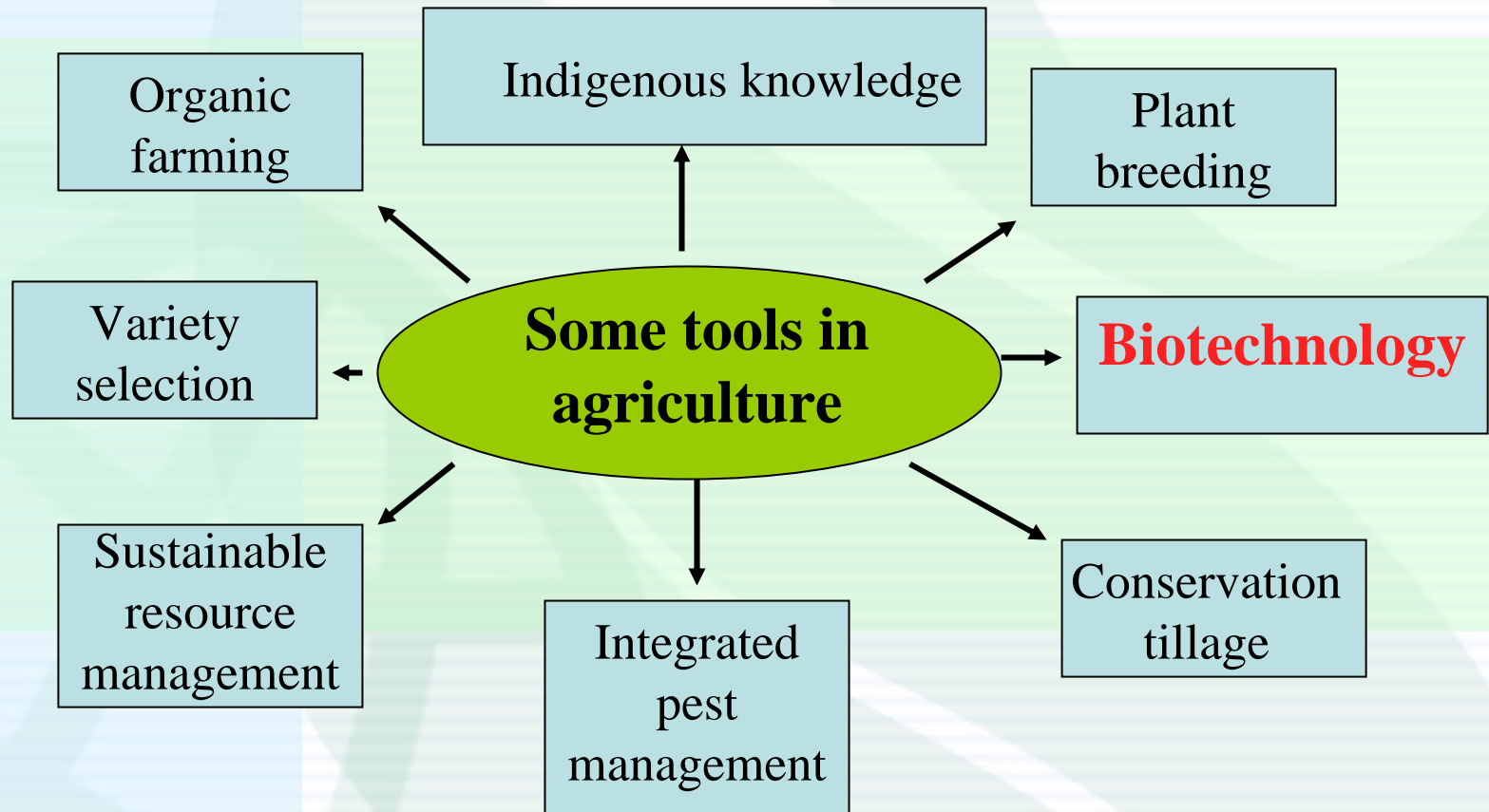
Source: CropBiotech Net Collections

Fairly tales



These pumpkins have camel genes -now we don't have to water them anymore !

Real need to improve agriculture sector *Different Options*



Biotech is a tool **NOT a SYSTEM** and will not replace traditional agriculture

REALITY

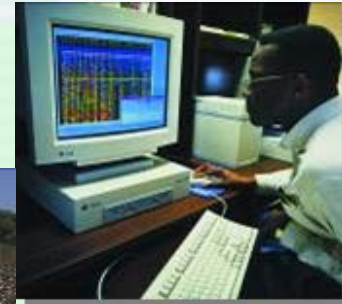


What it take to develop a new biotech (GM) crop

6-11 Years (modest)



Farmer release (seeds)



Extensive risk assessment



Field testing



Glasshouse



Laboratory

Biosafety regulations applied at each stage

Source: PBS Docs, ISAAA collections.



Global trade in Biotech: Big Business!

The Global Value of the Biotech Crop Market, 1996 to 2005

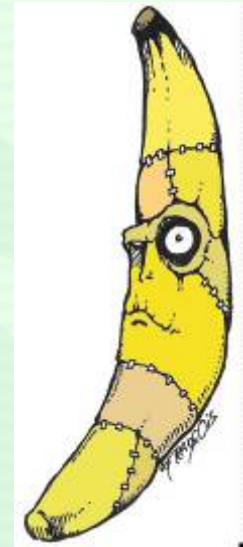
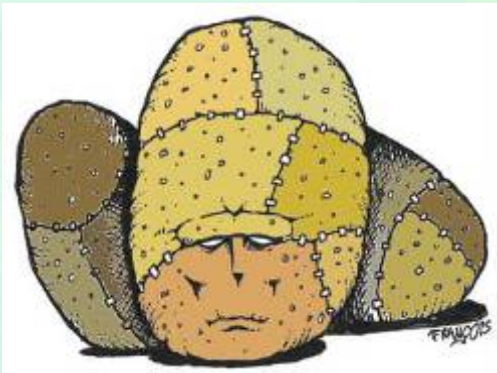
	Value (Million of \$US)
1996	115
1997	842
1998	1,973
1999	2,703
2000	2,734
2001	3,235
2002	3,656
2003	4,152
2004	4,663
2005	5,250
Total:	30, 000
Source: Cropnosis 2005	

15% of global crop protection market

18% of global commercial seed market

From: James, 2004 ISAAA

NEW TECHNOLOGY BRINGS NEW RESPONSIBILITIES...and maybe some possible problems?



The technology in the wrong hands could be very dangerous. Strict legislation is necessary

Effective communication

Includes ensuring transparency and openness
at all levels, and serves the needs of
audiences with diverse levels of knowledge
and sophistication

Risk Communication in Biotechnology

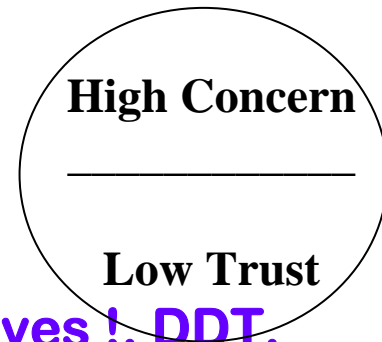
- Interactive exchange of information and opinions throughout the risk analysis process
 - *Ultimate objective is to clarify misconceptions and promote clear understanding of the real issues in biotechnology*

What is Risk Communication?

“A science-based approach for communicating effectively in:

- High concern;***
- Low trust;***
- Sensitive; or***
- Controversial situations.”***

Avian flu, Test-tube babies, GMOs, microwaves !, DDT, contraceptives.....



“the science of communicating effectively in high concern situations”

Source: Dr Vince Cavello, Center for Risk Communication

Defining Risk

...the probability of loss of that which we value

...lack of control

...a threat – real or perceived; quantified or not

What is so special about high risk/stress situations?

- When people are stressed, their perceptions and decisions are influenced by a wide range of factors, knowledge of hazard often being the least important (worth less than 5%)

Risk Communication Goals



- Better educate public about risks, risk assessment and risk management

Risk = hazard x exposure

Must have both **hazard** and **exposure** to have risk

Risk assessment: impact assessment, environmental impact

Biosafety: Provide a means for dealing with uncertainties and incomplete data in order that decisions may be made in full consideration of potential consequences

Risk management: Developing procedures for managing accidental release and may include inspection; monitoring for specific data gaps and communicating on decisions taken

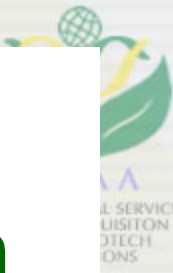
NB: Decisions are influenced by policy choices, individual experience and public reaction

Constraints to risk communication in modern biotechnology

1. Uncertainty, complexity, incompleteness of biosafety data
2. Distrust; skepticism; suspicion
3. Selective reporting by news media
4. Psycho-social factors that determine how people process information about risk

1. Uncertainty, complexity, incompleteness of biosafety data

- Risk cannot be quantified
- Not all non-target organisms can be studied
- Testing cannot be done indefinitely
- **Standards for testing not universally accepted**
- Outcome of risk assessment are estimates: conclusion reflects value judgment



2. Distrust, Skepticism, Suspicion,

- Disagreement among experts
- Lack of coordination among risk management organizations
- Inadequate risk communication skills
- History of arrogance, distortion, exaggeration
- **The problem of risk communication is not so much to regain trust as to function without it.**

3. Selective reporting by news media

- Tend to select stories about unusual situations such as verbal confrontations rather than agreements, and on sensational situations such as disasters (imagined or real)
- Tend to exaggerate “outrage factors”, heightening perception of risk
- **Truth in journalism is different from truth in science: journalists present both sides of an issue as if they are equally important**
- **Journalists tend to obtain information from accessible sources**

4. Psycho-social factors that determine how people process information on risk

- Bias: making judgments with little information
- Lack of interest
- Unrealistic optimism: “it is a threat to others, not to me”
- Language difficult to understand: e.g. use of bacteria, viruses, gene gun, plasmid etc for genetic engineering
- Dislike for statements of probability: “Is it safe or unsafe?... Give me a quick answer.”
- Reluctance to change strongly held beliefs
- Flaw in how we judge actual magnitude of risk

Note: Scientific studies show that there is a low correlation between the level of risk and the amount of worry that it arouses

There is no
such thing as
"zero risk"



...so, how do we
communicate risk?



Risk Communication helps in developing messages that are:

- 1. Believable**
- 2. Convincing**
- 3. Clear and concise**
- 4. Positive**

Source: Dr. V. Covello, Center for Risk Communication

Risk Communication Skills

Messages

1. Believable
2. Convincing
3. Clear and Concise
4. Positive

Scientific Basis

- I – Trust Determination Theory
- II – Risk Perception Theory
- III – Mental Noise Theory
- IV – Negative Dominance Theory



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The Four Theories of Risk Communication

I – Trust Determination Theory

Being Believable

- People who are upset are often distrustful.
- When people think they may lose something, their acceptance of a message is based on **trust & credibility**
- Upto 75% of the message in high risk/low trust situations has nothing to do with content – **completely non-verbal**

Being Believable..

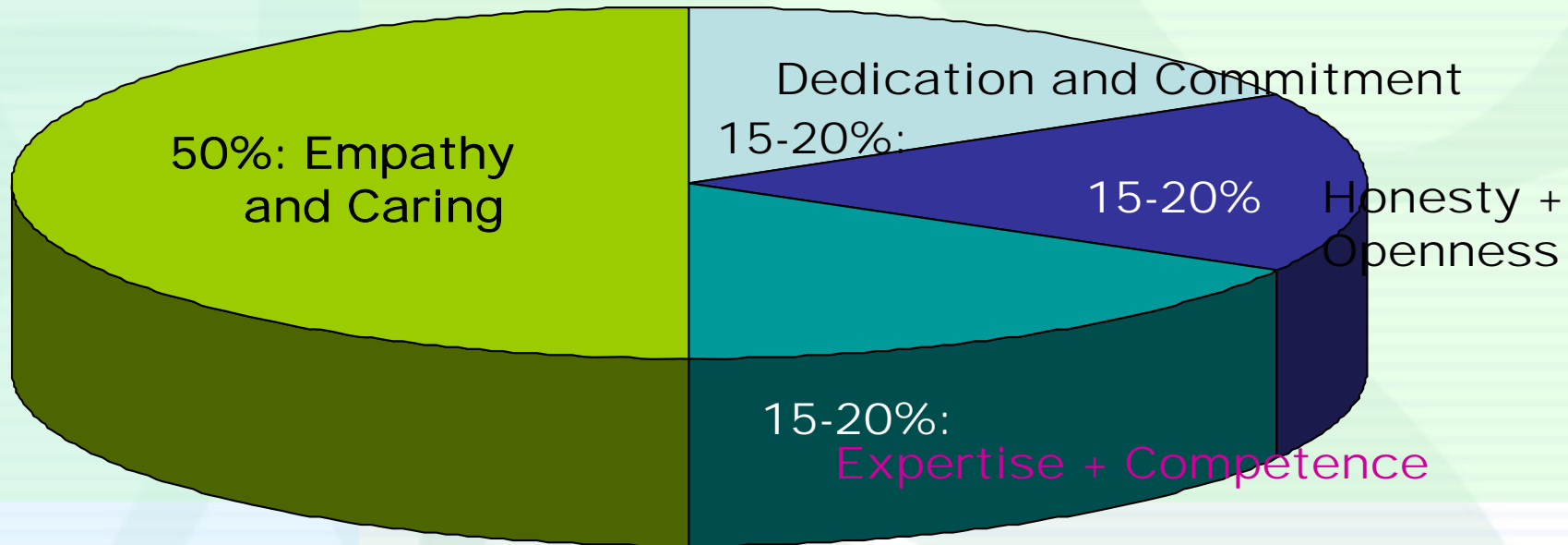
There are **2 main ways** to establish trust:

i) Being perceived as **having the attributes** of a **trustworthy and credible** person or organization

ii) Being perceived as **having the support** of **third parties** having the attributes of **trustworthiness and credibility**

Question: What are 2 things you use to decide if you trust someone/information?

What matters most in building Trust and Credibility in low trust and/or high concern situations?



Note: People want to know that you care before they care what you know!

Trust and Credibility Factors



- Empathy and caring
- Dedication and commitment
- Competence (use 3-10 times more facts, statistics)
- Honesty and Openness

Question: Describe some non-verbal factors that would build trust and credibility
Gender dimensions of trust?? - Some thoughts on nature of training

How do you establish trust?



Through 3rd parties: Speech by Norman Borlaug, Nobel Peace Laureate, to ADB Annual Meeting, April 29 1999 *“Biotechnology, together with conventional breeding and better soil use, crop tillage and pest management, can boost production on the shrinking land area used for agriculture”*

Quote from reputable sources: EUROPEAN UNION RELEASE POSITIVE REPORT ON BIOTECH RESEARCH

Reports by WHO, FAO

SUMMARY: Trust Determination Theory



- Empathy and Caring:
50% !
- Non Verbal
Communication
- Credibility Ladders:
 - Credible endorsements

Theories of Risk Communication..

II. RISK PERCEPTION

Be Convincing

II – Risk Perception Theory

Being Convincing

- Many factors affect perception of risk, including:
 - Worry
 - Concern
 - Fear
 - Anxiety
- People who are upset have perceptions of risk very different from scientific experts



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P = R

**Perceptions (real or imagined) is
Reality**

It doesn't matter whether the fear is perceived or real!

If someone perceives it, then it needs to be addressed as real!

What Influences Public Perception of Risk?



- Four factors:

Trust, Benefit, Control, Fairness

- The perception of risk is magnified greatly if the public negatively perceives any of these 4 factors. **In the case of trust, by 2000 times!**
- Perceived trust is the most important
- People need to feel they are in control
(Have the knowledge and choice)

Types of Perceived Risks in Biotechnology

- What are the risks associated with applying the technology to food, feed, environment, health?

Food safety

- Safety assessment process/regulations
- Nutritive value
- Allergens
- Toxins
- Long term effects

Environmental safety

- Regulation of field releases
- Out-crossing
- Non-target effects
- Unknown long term disturbances

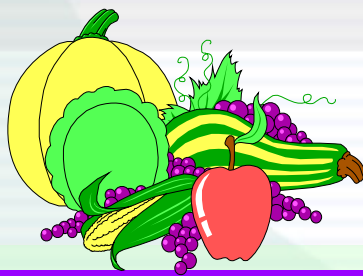
- What are the risks of ignoring the technology?

Being Convincing - the Truth..

For many controversies..

- The public is often aware of the issues BUT not very knowledgeable about which information is accurate
- The same is found in groups such as civil society, farmer associations, University departments or schools – majority of the staff may be aware there is an issue BUT most do not have details on pros and cons, or are unable to separate facts from hearsay

Steps of GM Safety



Summary of Risk Perception



Different perceptions of risk

Perception = Reality

Trust vs. lack of trust

Control vs. lack of control

Theories of Risk Communication..

III. Mental Noise Theory

Be Clear and Concise

III - Mental Noise Theory

Being Clear and Concise

- People who are upset have difficulty hearing and processing information
- In the presence of a perceived threat, there is limited attention to information and limited ability to process information

Being clear and concise - the Truth..

•As much as **80% of information can be lost** because of:

- Fear,
- Anger,
- Anxiety,
- Mind-sets
- State of mind

**Question: How can we overcome
“mental noise?”**

Overcoming Mental Noise ...

- Limit the number of messages to **THREE**;
- Repeat the message **TWICE**
- Keep communication **SIMPLE**



Simple messages (without a product)



Criticism	Response
GMOs unknown	We'd like to know about it
GMOs untested	We'd like to test it
GMOs unpredictable	We'd like to find out for ourselves
GMOs bad	Let us judge for ourselves

Note: Quite Challenging without products!!

*Most effective (but expensive) Strategy - Seeing-is-believing visits
Others; Demonstration plots, exhibitions*

Simple messages (with approved product)



Criticism	Response
GMOs unknown	Farmers: We have planted it!
GMOs untested	Scientists: We have tested it
GMOs unpredictable	Farmers: More predictable than what we have
GMOs bad/harmful	Farmers: It is better than what we have

*Essential: Support Data on acreage; no. of farmers, countries, market value
- seed, import and exports, field trials; food and environmental safety
processes for both conventional and GM*

Message Map

Area of Concern
Delayed Legistaion

Key Message 1

The Poor & hungry
cannot wait

SF1

SF2

SF3

Key Message 2

The problems require that we
explore **all** possible solutions

SF1

SF2

SF3

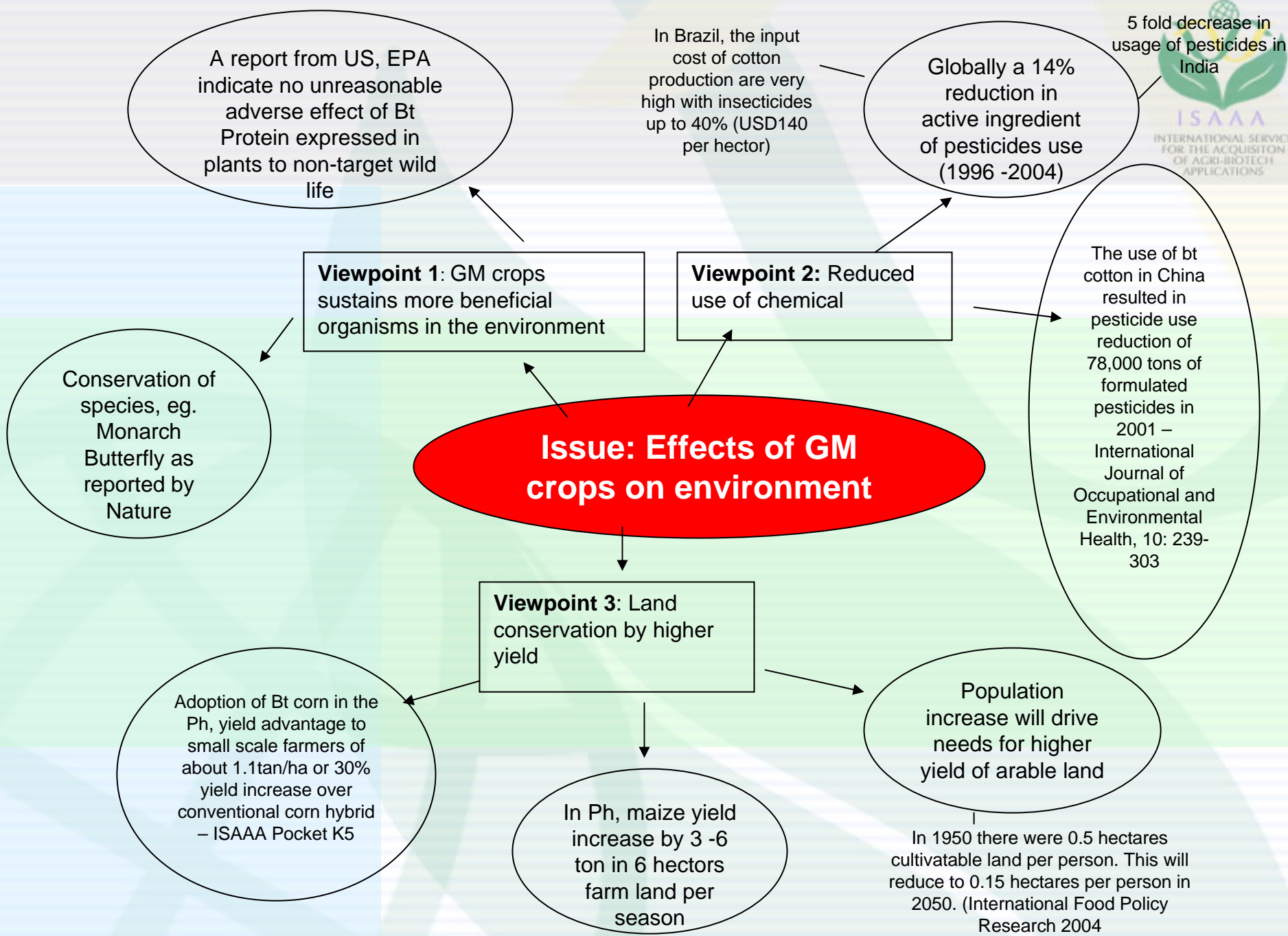
Key Message 3

Risks from GM are **no greater**
than other farm technologies

SF1

SF2

SF3



A report from US, EPA indicate no unreasonable adverse effect of Bt Protein expressed in plants to non-target wild life

In Brazil, the input cost of cotton production are very high with insecticides up to 40% (USD140 per hector)

Globally a 14% reduction in active ingredient of pesticides use (1996 -2004)

5 fold decrease in usage of pesticides in India

Viewpoint 1: GM crops sustains more beneficial organisms in the environment

Viewpoint 2: Reduced use of chemical

Issue: Effects of GM crops on environment

Conservation of species, eg. Monarch Butterfly as reported by Nature

The use of bt cotton in China resulted in pesticide use reduction of 78,000 tons of formulated pesticides in 2001 - International Journal of Occupational and Environmental Health, 10: 239-303

Viewpoint 3: Land conservation by higher yield

Population increase will drive needs for higher yield of arable land

Adoption of Bt corn in the Ph, yield advantage to small scale farmers of about 1.1tan/ha or 30% yield increase over conventional corn hybrid - ISAAA Pocket K5

In Ph, maize yield increase by 3 -6 ton in 6 hectors farm land per season

In 1950 there were 0.5 hectares cultivatable land per person. This will reduce to 0.15 hectares per person in 2050. (International Food Policy Research 2004)



Checking for simplicity in language:

- Vocabulary
- Number of syllables
- Length of sentence
- Length of paragraph
- Passive or active construction
- Position of verb in sentence

Note: Practice the rule of 27/9/3: This means 27 words in 9 seconds for 3 messages

Example

Can you guarantee that Bt corn is safe?

“I can guarantee that safety evaluation of Bt corn was done according to rigorous scientific standards. These standards are accepted by WHO. Results are verified by independent evaluators.”

Note: 27 word, 9 seconds, 3 messages. Message enhanced by referring to credible authority



Summary Mental Noise Theory



**3 Messages
and repeat (twice)**

**Language which
a 12-yr old can understand**

Keep sentences short

Note: Familiarize with the APP Model: Anticipate; Prepare; Practice

Theories of Risk Communication...

IV. Negative Dominance Theory

Be Positive !

IV - Negative Dominance Theory

Being Positive

When people are upset . . .

- **Negative information carries more weight than positive information**
- **People tend to think negatively**

Rule of Thumb

$N = 3P$

or

One negative = Three positives
Practice the CCO Principle

Apply CCO Principle



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Message	Example
Compassion	I sympathize with your concern
Conviction	I believe that it is important
Optimism	We can get over the difficulties

Illness linked to GM crop

Filipino villagers stricken with a mysterious illness have put the blame on transgenic corn, writes JOHN AGLIONBY.

THE recently planted rows of pineapple plants in the 1.5ha field on one side of the Malayon family home look neat and well-tended, but are otherwise not really worth a second glance.

But what occurred last year on and around this plot in Kalyong village, on the southern Philippine island of Mindanao, is threatening to turn this unremarkable field into a battleground in the war over genetically modified (GM) crops.

For the first time there are indications that the pollen from the bacillus thuringiensis (Bt) maize sown here last year may have contributed to human illness.

Dr Terje Traavik, the scientific director of the Norwegian Institute of Gene Ecology, who was asked last October to analyse blood samples from 39 of the 100 people who fell ill, has said that a link might exist between GM crops and human health.

"My interpretation is there is a coincidence in time between two different phenomena," he said. However, he stressed that more tests were needed before a more definite conclusion could be drawn.

The landowners, government

"Within a week I too was sick with a stomach ache and diarrhoea." Others noticed that their livestock was suffering. "One day the horse ate some of the corn plants and its appetite disappeared," said Nestor Catoran. "The belly swelled, its mouth started frothing and it slowly died."

Villagers are linking the corn to the deaths of four other horses, which were disposed of without any analysis.

However, all the villagers are convinced that the corn is in some way responsible for their illness. One of the owners of the land, Sensie Victoriano, accepts that the villagers fell ill, but laughs at suggestions it was because of the corn, tens of thousands of acres of which were cultivated across the country last year with no resulting accusations. Victoriano blames "a group of activists who are against GMOs".

Traavik, who describes himself as a GMO sceptic and not an opponent, says it is highly unlikely the Bt toxin was the only cause of the villagers' sickness. "There's no illness that's caused by only one factor," he said. "What happened in there (Kalyong) could have been an underlying viral

The landowners, government officials and Monsanto, the multinational company that provided the seeds planted on the plot, insist the corn is not the cause. They claim that the villagers are being manipulated by anti-GM campaigners.

Villagers say the trouble began in July last year when the genetically engineered maize plants started flowering. "There was this really pungent smell that got into our throats," said Maryjane Malayon. "It was like we were breathing in pesticides."

Her sister, Amanuel, their parents, Samuel and Merlina, and Maryjane's nine-month-old daughter, Eileen, began coughing, vomiting, feeling dizzy and suffering from head and stomach aches.

Within days, people living a little further away, on the other side of the dusty road that runs through this village on the slopes of the remote 2,300m volcano Mount Matutum, were experiencing similar symptoms.

Pablo Semon, a community leader, says about 100 people were affected. Maryjane says the situation got so bad that the family was forced to move to a relative's home three miles down the mountain.

"We were the only ones who moved because we were so close," she explains. "But within a week we had all recovered."

A villager who had no home at the time, Bernhard Nanquil, says he rented the Malayon home after they left.

have been an underlying viral infection that could explain the symptoms, but that does not exclude the possibility that this has been exacerbated by a new allergenic protein from the Bt corn."

The head of the corn programme at the department of agriculture, Dr Artemio Salazar, has no time for the villagers' allegations. "The phenomenon – the supposedly allergenic reaction – was also occurring in areas where there was no Bt corn," he said, without being able to name any of the other regions.

One of his microbiology experts, Dr Nina Barzaga, from the University of the Philippines, added: "We have to see the results. "But I think they're trying to create some panic ... the Bt toxin has never been associated with any sickness anywhere in the world."

Travik said he would be very willing to share his results with Barzaga but cautioned against saying there had never been problems with Bt maize.

Monsanto was not available for comment but has said recently that it was extremely unlikely that the maize was responsible for ill health in the village.

"There have been no documented cases of allergic reactions to Bt maize after seven years of broad commercial use on millions of hectares in the United States, Canada, Argentina, Spain and South Africa, starting in 1996," a spokesman told Reuters. – Guardian Newspapers Limited

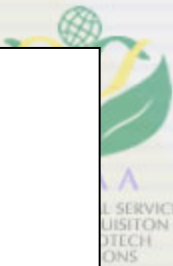


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Example 1: News clip of mistruth

Example - False allegation

- **Allegation:** According to tests done by Masipag, Bt corn can cause cancer
- 1. Repeat the question: “The question is about the safety of Bt corn.”
- 2. Indicate that the opposite of the allegation is important: “Safety is so important that regulatory agencies set rigorous procedures to assure consumers.”
- 3. Bridge to 3 facts that relate to the opposite: (e.g. safety record, the University of Iowa experiment)



IV – Negative Dominance Theory

Overcoming Negativity in Communication

- Avoid words like:
 - *“No”*
 - *“Not” (“can’t”, “don’t”)*
 - *“Never”*
 - *“Nothing”*
 - *“None”*



Summary Negative Dominance Theory



N = 3 P

Be Positive

Know your topic

Apply CCO principle

Some Communication lessons learned

- **Listen attentively** — patiently
- **Question actively** — facts — feelings — attitudes
- **Be Empathetic** — “people want to know that you care before they care what you know”
- **Be Assertive, not aggressive or passive** — find compromise, I win/you win, collaboration, finding middle ground
- **Communicate Competence** — have facts and figures — but present with feeling, cite credible sources (credibility transfer theory)
- **Be Believable** - Empathy, Openness, Expertise, Endorsement
- **Be Convincing** — Perception = Reality, Trust, level of Control
- **Be Clear & Concise** — 3 messagesX2, simple language, short sentences.
- **Be Positive** — hundreds of millions of farmers, billions of consumers, thousands of experts and years of experience are on your side!
- **Have Products** – **Seeing is Believing, but Growing is Knowing !**

Remember....

Communication is a Skill
Practise, practise, practise

Trust and Credibility are key !

Lessons/Strategies from ISAAA and Partners



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1. Invest in hands-on training of journalists for accurate reporting, linking journalists to "experts", labs, farmers with biotech products etc.

Lessons/Strategies..



Training workshop for
Provincial extension officers

*Prof. R Oniang'o - MP,
Kenya Parliament in a
biotech exhibition*



2. Demystify biotechnology by exposing policy-makers to the processes and products

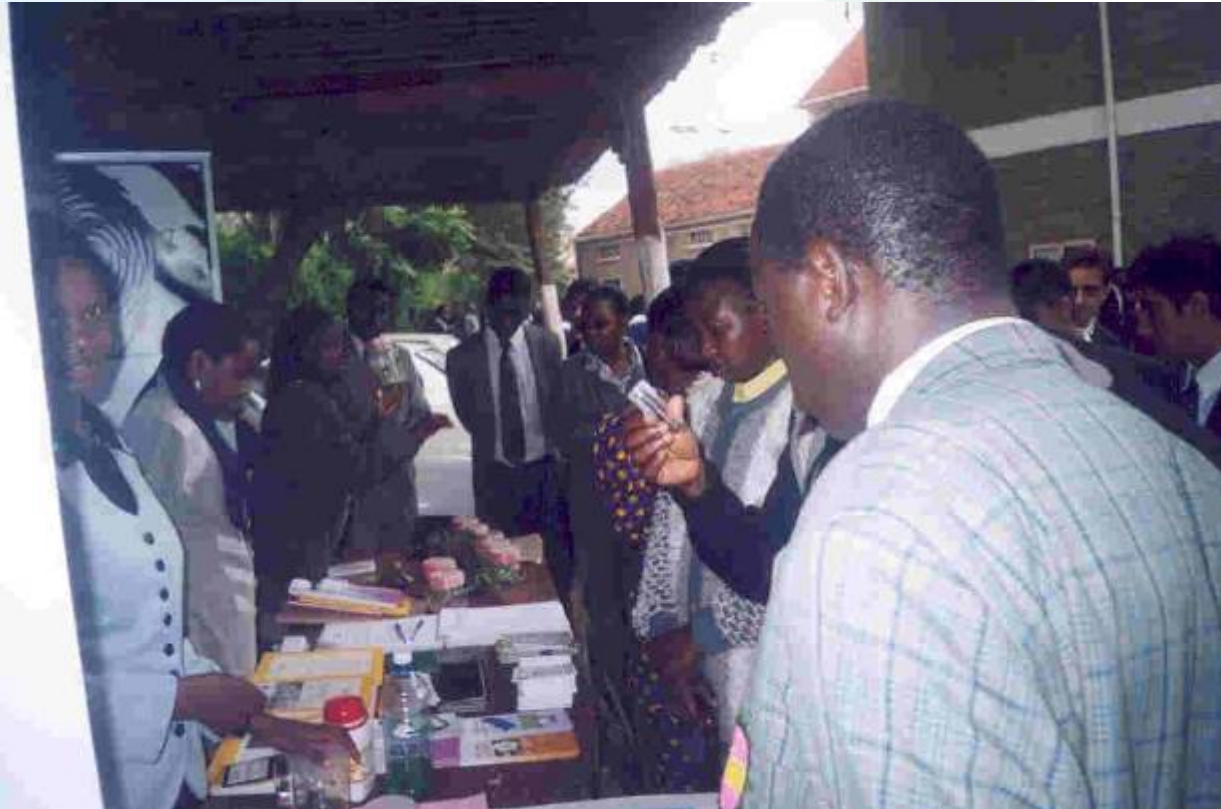
Lessons/Strategies..



Hon. Kamba, MP
EAC Parliament

3: Share experiences with neighbouring countries to facilitate policy harmonization

Lessons/Strategies..



4: Relate biotech with day-to-day events to build public confidence & policy support

Lessons/Strategies..

Simplify/repackage info briefs

Annual Reviews – “Global Status of GM Crops

Newsletters – BiotekAfrica, Crop Biotech
Topical Newsbriefs, K-sheets

Pocket Ks – Localised/translated
(14 languages including Swahili, French, Arabic)

Flyers – Targeted mails to Stakeholders

Calendar – Biotech info & education (with
ABSF and partners)



ISAAA Briefs



Pocket Ks (Arabic)



Lessons/Strategies..



**Kenyan parliamentarians
visit to South Africa**



**Farmers from Uganda and
Tanzania visit to Kenya**



**West Africa Stakeholders
visit to Burkina**



Thank you...and
Invites YOU to join our network

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