

TRANSGENIC CROPS

AND

CONSUMER CONCERNS

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FBAE

**REGISTERED NON-PROFIT BODY FORMED
IN JANUARY 2001, TO**

- **Promote public awareness of scientific issues of biotechnology**
- **Enhance levels of biotechnology education and training**
- **Support safe and beneficial technologies**
- **Oppose unethical practices of any of the stakeholders**

CONSUMER/PUBLIC

- The 'Consumer': the **end user** of a commercialized product **other than the technology developer and product producer**
- The term '**general public**' is often used in place of 'consumer', but is **equally imprecise**

ACTUAL END USER

- Depends upon the transgenic trait
- ***Bt* cotton primarily benefits the farmer**
- ***Bt* brinjal's benefits both the farmer and actual consumer of the product**
- **Golden Rice is primarily a consumer product, also benefits the farmer**
- **Farm feed is primarily the concern of the farmer**
- **Food transgenics concern everyone including technology and product developers**

WHO ARE THE 'PUBLIC'?

- **EVERY ONE IS A PART OF THE 'PUBLIC' IN ONE CONTEXT OR THE OTHER**
- **ALL STAKEHOLDERS NEED TO BE ADDRESSED APPROPRIATELY**

WHAT IS PUBLIC OPINION?

- PUBLIC GETS ACTIVIST PROPAGANDA THROUGH THE MEDIA
- **ACTIVISTS DO NOT REPRESENT THE GROUPS WHOSE INTEREST THEY PRETEND TO PROTECT**
- WIDESPREAD IGNORANCE: ZERO% OF PUBLIC UNDERSTAND GE, TRANSGENICS, RISK EVALUATION, & C
- **THERE IS NOTHING CALLED 'PUBLIC OPINION' IN SCIENCE**
- **IT IS ONLY 'PUBLICIZED OPINION'**

WHAT TO CONVEY AND TO WHOM?

ISSUES ARE STAKEHOLDER DEPENDENT

- **Farmers**
- **Consumers**
- **Man in the street**
- **Politicians**
- **Scientists**
- **Regulators**
- **Students, Teachers**
- **Media**

THERE IS NO SINGLE UNIVERSAL SOLUTION

PUBLIC AWARENESS

- **PUBLIC EDUCATION ALMOST TOTALLY NEGLECTED**
- **PRODUCT DEVELOPERS, SCIENTISTS, RESEARCH INSTITUTIONS LARGELY SILENT**
- **ACTIVISTS TOOK ADVANTAGE OF THIS OVERALL IGNORANCE TO HIJACK PUBLIC SENTIMENT WITH THE ACQUISCENCE OF THE MEDIA**

WHO IS RAISING ISSUES?

- The farmers or consumers have not raised issues against GE crops
- The activists throw up 'concerns' of all sorts as self-appointed advocates of the farmers and consumers
- ALL SCIENCE IS QUESTIONED BY SCIENTIFIC ILLITERATES

ISSUES RAISED

- Toxicity, Allergenicity
- Impact on Non-target Organisms
- Vertical and horizontal gene flow
- Super weeds
- GE crops adversely impact Ecology and Biodiversity
- Terminator Gene in GE crops affects the farmer
- *Bt* cotton caused farmer suicides
- GE Technology is rejected by other countries

ANSWERSING ISSUES

- **Science based assurances given on issues raised do not reach the consumers**
- **Almost always rejected out of hand by the activists**
- **EVERYONE SUPPORTING TECHNOLOGY IS BRANDED**

REVIEW OF THE MOEF'S ORDER ON *BT* BRINJAL MORATORIUM AND ANNEXURES

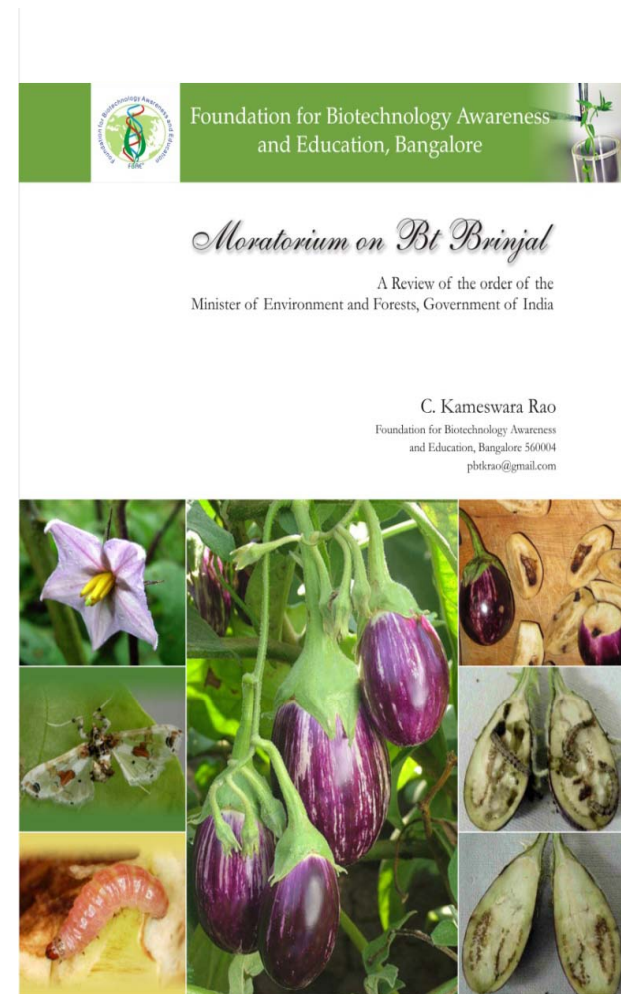
REVIEW OF 550 PAGES
OF ORDER
POINT BY POINT
RESPONSE

SINCE JUNE 2010

>200 HARD COPIES

>180 BY E-MAIL

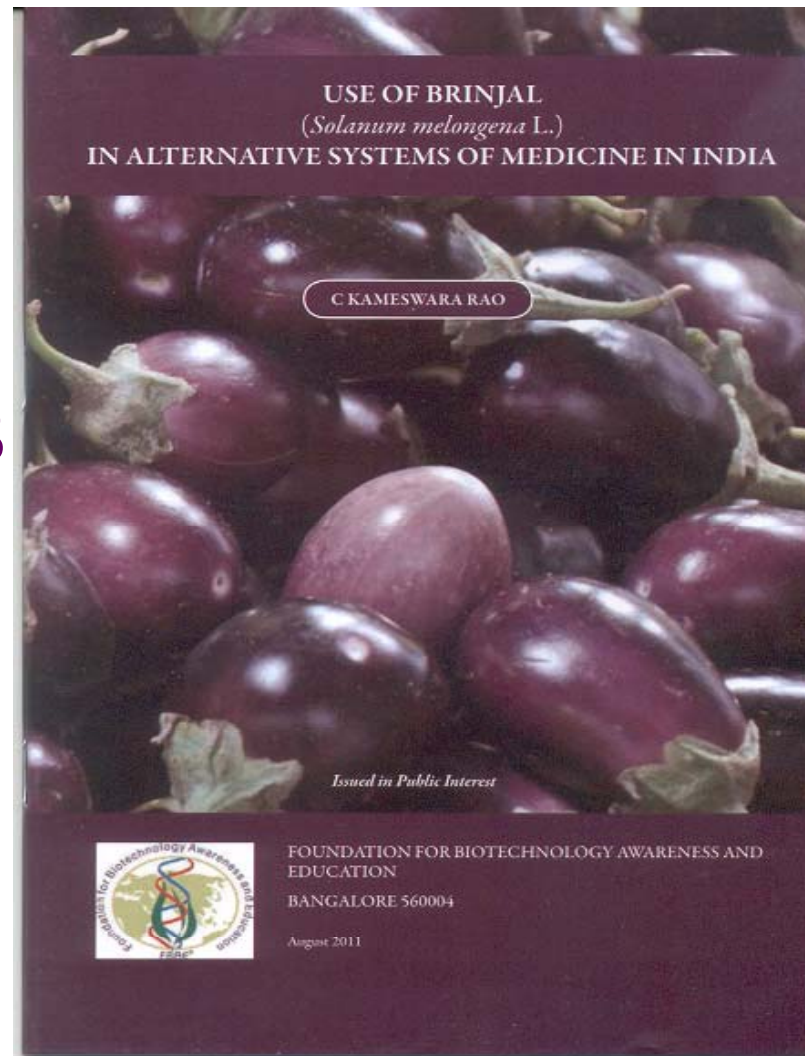
distributed
internationally



USE OF BRINJAL IN INDIAN MEDICINE

ACTIVISTS AND THE MOEF
CLAIMED THAT
BT BRINJAL WOULD
JEOPARDIZE THE USE OF
BRINJAL IN INDIAN SYSTEMS
OF MEDICINE

THERE IS NO BASIS IN
LITERATURE FOR THIS
ASSERTION



NEED FOR A PRODUCT

The public needs to know

- Why a product is developed using expensive and time consuming technology
- For which both the farmer and the consumer may have to pay a little higher than for the standard product

***BT* CONTROLS**

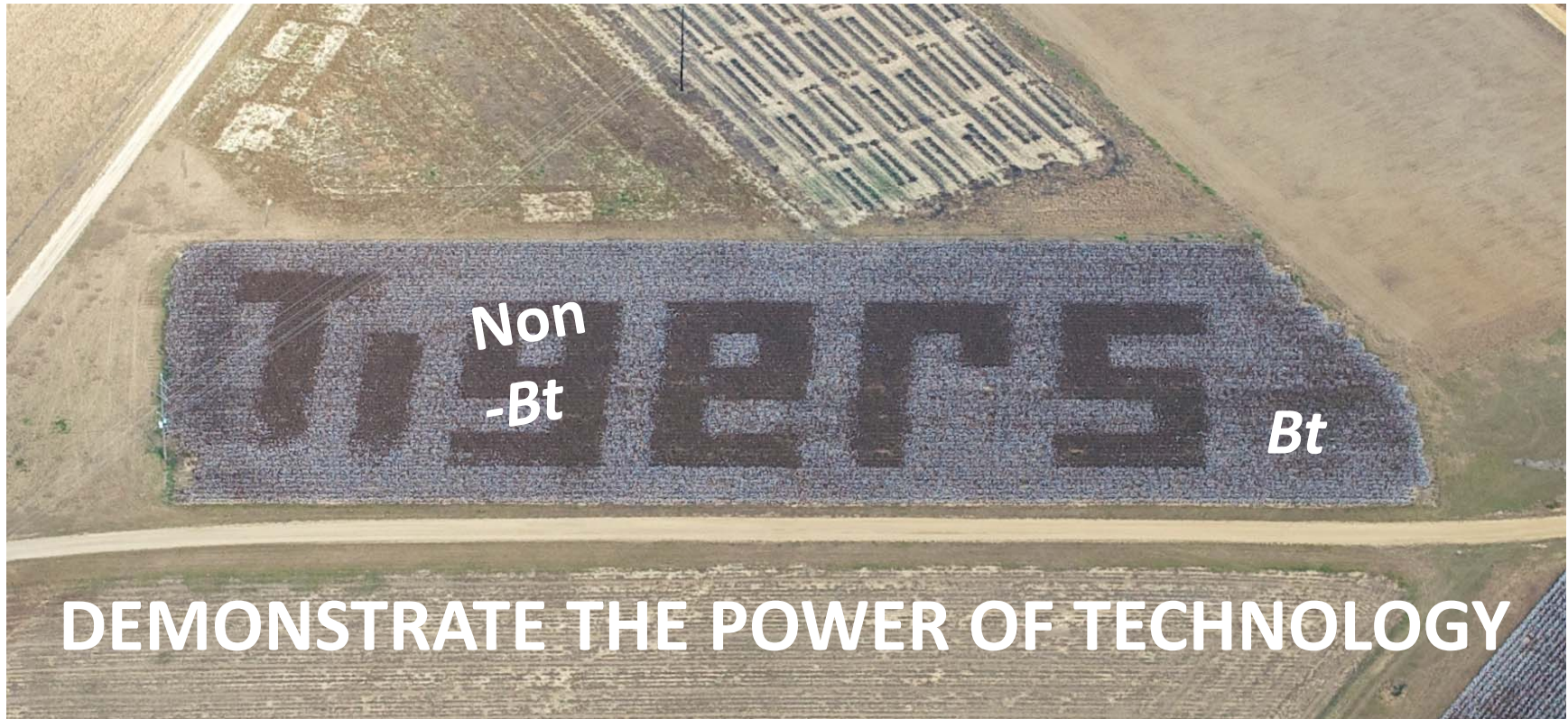
COTTON BOLLWORM



- ***HELICOVERPA ARMIGERA***
- **MOST SERIOUS COTTON PEST**

NON-BT AND BT COTTON

Aerial photograph



DEMONSTRATE THE POWER OF TECHNOLOGY

BRINJAL SHOOT AND FRUIT BORERS

Leucinodes orbonalis



DAMAGE IS CAUSED
BY THE LARVAE



Helicoverpa armigera

Cry1Ac controls both
the pests

BRINJAL SHOOT DAMAGE



BRINJAL FRUIT DAMAGE



LOSSES FROM BRINJAL SFB

- **FARMERS' LOSS: 50-70%**
MARKATABLE YIELD
- **CONSUMER LOSS: 15-25%**
PURCHASED FRUIT

GOLDEN RICE

RICE WITH
GENES FOR β -
CAROTENE

PRECURSOR OF
VITAMIN A



DEMONSTRATED BENEFITS OF GE CROPS

NOT PUBLIC KNOWLEDGE

- **Prevention of pre-harvest crop losses**
- **Fewer insecticide sprays**
- **Reduction of exposure to pesticides (farmers and families, farm labour, consumers)**
- **Easier and effective weeding**
- **Enhanced nutritional benefits**
- **Reduction of production costs**
- **Farmers' socioeconomic security and peace of mind enhanced**
- **Benefits to climate, biodiversity**

GE CROPS

The public do not know that

- GE agricultural products are extensively and rigorously evaluated for product efficacy and biosecurity as per mandatory regulations
- Management problems are projected as technology problems
- Conventional agricultural products do not undergo any biosecurity evaluation

SOCIO-ECONOMIC BENEFITS

- **THAT THE TRAIT IN QUESTION HAS APPRECIABLE SOCIO-ECONOMIC BENEFITS AND**
- **A FAVOURABLE COST-BENEFIT RATIO SHOULD BE MADE KNOWN**

ECONOMIC BENEFITS OF *BT* BRINJAL

- **ENHANCES MARKATABLE YIELD OVER 200%**
 - **CONSUMER BENEFIT UP TO 60%**
 - **ECONOMIC GAIN TO THE COUNTRY:**
 - Would add between 30,000 to 119,000 tons**
 - Rs. 577 cr at 15% adoption**
 - Rs. 1,167 cr at 30%**
 - Rs. 2,387 cr at 60%**
- (National Centre for Agricultural Economics and Policy Research (ICAR), New Delhi, December, 2010)**
- **West Bengal, Orissa and Bihar: most benefits**

LABELLING

- **Labelling is a consumer issue but with a largely illiterate population it has minimal advantages to the consumer**
- **Labelling a product as 'GE' or as 'contains GE produce' sounds like a warning and implies that it is not safe as the non-GE products**
- **Labelling contravenes WTO provisions**
- **No mandatory international agreements on labeling GE products**

COEXISTENCE OF TRANSGENIC CROPS

- **There is no credible scientific evidence against the co-existence of transgenic crops with conventional and other cultivation practices such as organic farming**
- **International organizations recognize coexistence as a viable option**
- **This is a concern for the farmer, but activists made this a general issue**

TECHNOLOGY COSTS

- **Costs of technology and product development fall on the farmer/consumer**
- **Average costs: US \$ 134 million and 14 years**
- **Recovery period: 7 to 10 years**
- **Regulatory costs often more than technology development costs**
- **Event based regulation reduces costs**
- **Higher levels of adoption reduce costs: Bt cotton seed costs in 2002 and now**

TECHNOLOGY AND VARIETY DEVELOPMENT COSTS

Technology costs vary with the crop/trait

- **BGI seed costs more than BGI seed**
- **Bt brinjal: OPVs have no technology burden while hybrids have**
- **Golden Rice: Golden Rice Humanitarian Board gives cost free technology**

GE CROPS IN THE WORLD

PUBLIC ARE NOT AWARE THAT

- **GLOBAL CULTIVATION OF GE CROPS INCREASED** from 1.7 mill ha in 1996 to 148 mill ha in 2010
- **ADOPTED BY 19 developing and 10 developed** countries
- **NOT POSSIBLE WITHOUT BENEFITS, SAFETY AND FARMER ACCEPTANCE**

GE CROPS IN INDIA

CROPS AND TRAITS:

- >30 Crops >80 Traits
- Public Sector 50 traits
- Autonomous institutes 10 traits
- Private sector 20 traits

R & D ORGANIZATIONS:

- 59 UNIVERSITIES
- 109 INSTITUTES (168)
- 63 COMPANIES

THE PREDOMINANT PARTICIPATION OF THE PUBLIC SECTOR IS IGNORED

***Bt* COTTON IN INDIA**

- *Bt* cotton cultivation increased phenomenally reflecting farmer acceptance

2002: 0.5 mill ha

2010: 9.4 mill ha (6.3 mill. farmers)

From **three to >800 hybrids**

From one to 6 events

From one to 40 seed companies

- **Bollgard II (with stacked genes Cry 1 Ac and Cry 2 Ab) is gaining over Bollgard I with only the Cry 1 Ac gene**

BT COTTON IN INDIA

- **Cotton production:**
2001-2002: 17.5 mill bales (Bale=170 KG)
2009-2010: 580 mill bales
- ***Bt* cotton made India the second largest cotton exporter from an importing country**

PUBLIC INFORMATION IS THAT *BT* COTTON IS A FAILED TECHNOLOGY THAT CAUSES FARMER SUICIDES AND DEATH OF FARM ANIMALS

ANTITECH ACTIVISM: SOURCES AND CAUSES

- Anti-GE activists get very liberal support from EU
- PMO has identified support of foreign agencies against Kundanakulam Nuclear Power Project

Montek Singh Ahluwalia:

Many of the NGOs in India protesting against *Bt* brinjal were associated with and funded by European NGOs Dinesh Sharma, India Today, Sept. 3, 2011, quoting Wikileaks

SUPPORT FOR ANTI-TECH ACTIVISM

Pesticide industry and dealers

Conventional seed developers

Organic lobby

EU and European countries

Ideology: Political philosophy

Mere prejudice: ANTI-MNC

Vote-bank politics

Liberal foreign funding

THE PUBLIC DO NOT KNOW ANY OF THIS

SCIENCE OR POLITICS?

- MOEF, January 10, 2011 (The Hindu, Jan 11)

'IT IS FOR THE POLITICAL SYSTEM TO DECIDE WHETHER TO INTRODUCE *BT* BRINJAL'

CAN SCIENCE POLICY BE A POLITICAL DECISION?

MOEF

CURRENT SCIENCE, 10 JUNE 2011

- ***“IF I SAID YES TO BT BRINJAL, THE CIVIL SOCIETY WOULD HAVE JUMPED ON ME”***
- ***“IF 90% OF THE GM SEED IS GOING TO BE CONTROLLED BY ONE COMPANY.....”***

MS SWAMINATHAN DOES NOT CONSIDER THAT DOMINANCE OF A FEW MNCS AFFECTS THE COUNTRY’S SEED BUSINESS AND FARMERS

- ***“I HAD A PERSONAL BIAS”***

IS THIS A RATIONAL APPROACH?

THE MEDIA

MOTIVATE THE MEDIA TO

- **ANALYZE NATIONAL AND INTERNATIONAL SOURCES OF ANTITECH ACTIVISM**
- **PLAY A MORE PROACTIVE ROLE BY VERIFYING FACTS WITH PRODUCT DEVELOPERS, SCIENTISTS AND CULTIVATORS OF *BT* CROPS, TO PROVIDE THE PUBLIC WITH FACTUAL INFORMATION**

WEBSITES & E-MAIL

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