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“Socio-economic consideration and biosafety: Capacity building”

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From left to right: a) Damage by Asia corn borer and b) Bt maize plot in Barangay Conel, Mindanao, The Philippines, c) Transgenic Garden, UP-LB Los Baños, Luzon, Philippines

The Program for Biosafety Systems

- Led by IFPRI
- 2004-2013
- Funded by USAID, USAID missions, core and national partners, regional bodies
- Core countries
 - Kenya
 - Indonesia
 - Malawi
 - Nigeria
 - Philippines
 - Uganda
 - Vietnam
- Regional Efforts
 - Common Market for East and Southern Africa (COMESA)
 - Asia strategy

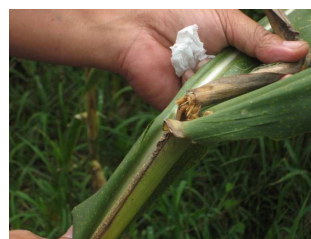
- Core Consortium
 - IFPRI
 - BIGMAP – Iowa State University
 - Donald Danforth Plant Sciences Center
 - University of Minnesota
- National partners
- Regional partners
- International programs and research centers

What are socio-economic impact assessments?

- Examine benefits, costs, and risks from the adoption and use of a technology
- Diverse research focus
 - Household, Farm, Communities, Industry, Consumer, Trade
 - Gender, health, age, institutional issues, poverty, biodiversity, food security
- May be done before (*ex ante*) or after adoption of the technology (*ex post*)
- Compare effects of intervention against an alternative (counterfactual)



- Impact assessment is a scientific process that significantly incorporates art in its implementation
- The practitioner has to in many cases subjectively address many problems with data, assumptions, models and uncertainties



Working towards a conceptual framework on SECs

- Prudent for countries to clearly describe rationale for inclusion
- Countries have many policy options and choices
- Implies a detailed evaluation of costs and benefits of SEC assessment inclusion (Regulatory Impact Assessment)
- Clear decision making rules and standards



Consider
innovation and opportunities lost/gained
due to additional regulatory hurdles
and
who
is impacted more by regulatory actions and technology decisions



Regulatory design implies
establishing a balance between

Societies' democratic right to know

vs.

Freedom to operate

vs.

Freedom to choose



Specific questions about potential
inclusion of socio-economic issues

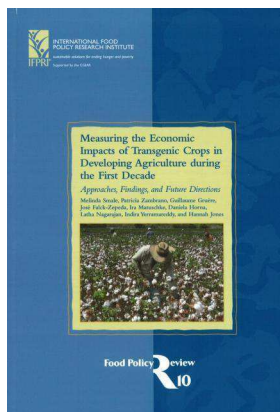
- Does inclusion of socio-economic considerations improve society's welfare?
- Can all socio-economic considerations be assessed *ex ante* and/or *ex post*?
- Are we considering all cost, benefits and outcomes of regulatory processes?
- How are assessment outputs going to be used in a decision making process?

Answers to these questions: "It's a mixed bag of outcomes", "no", "no" and "I am not sure"



What do we know from the economic impact assessment literature to date? –

- A review of 187 peer reviewed studies
- Examined studies with a focus on:
 - Farmers, household and community
 - Industry and markets
 - Consumers
 - Trade



Citation: Smale, Melinda; Zambrano, Patricia; Grùère, Guillaume; Falck-Zepeda, José; Matuschke, Ira; Horna, Daniela; Nagarajan, Latha; Yerramareddy, Indira; Jones, Hannah. 2009. Measuring the economic impacts of transgenic crops in developing agriculture during the first decade: Approaches, findings, and future directions. (Food policy review 10) Washington, D.C.: International Food Policy Research Institute (IFPRI) 107 pages



Food Policy Review 10 conclusions

- On average LMO crops have a **higher economic performance** — but averages do not reflect the variability by agro-climate, host cultivar, trait, farmer
- Too few traits, too few cases/authors—generalizations should not be drawn yet...need more time to describe **adoption**



These conclusions are no different than those for most technologies released to date...



Food Policy Review 10 conclusions

- Address cross cutting issues for further study including impacts of poverty, gender, public health, generational
- Develop improved methods and multi-disciplinary collaborations to examine broader issues



II. *Ex ante* studies completed by IFPRI and partners



Black Sigatoka Resistant Bananas in Uganda

- Consider irreversible and reversible cost and benefits by using the Real Option model
- One year delay, forego potential annual (social) benefits of +/- US\$200 million
- A GM banana with tangible benefits to consumers increases their acceptance for 58% of the population

Kikulwe, E.M., E. Birol, J. Wesseler, J. Falck-Zepeda. A latent class approach to investigating demand for genetically modified banana in Uganda Agricultural Economics 2011.



Photos credits: Kikulwe 2009 and Edmeades 2008



Bt cotton in Uganda

- Positive yield impacts and net benefits
- Smaller rate of return probably explained due to low base yields
 - Need to improve overall cotton productivity
- Probability of a negative return can be as high as 38% with a technology fee as charged elsewhere



Photos credit: © Horna 2009



Horna, et al. (2011). "Economic Considerations in the Approval Process of GM Cotton in Uganda: Designing an Ex-ante Assessment to Support Decision-making." IFPRI Policy Note, Under review.



Other *ex ante* studies

Country	Crop/Trait	Representative findings
India, China, Philippines and other Asian countries	Bt rice	<ul style="list-style-type: none"> • Adoption gains are up to 10 times the level of losses due to potential closing of export market to trade sensitive countries
West Africa	Bt cotton	<ul style="list-style-type: none"> • Countries are worse off by not adopting • Smaller net benefits and returns than other studies • Negotiating downward the technology fee is key
Indonesia and the Philippines	Multiple	<ul style="list-style-type: none"> • Cost of compliance with biosafety regulations can be an important factor for public sector research

Sources:

Gruère, Guillaume P.-Bouët, Antoine Mevel, Simon. Genetically modified food and international trade : The case of India, Bangladesh, Indonesia, and the Philippines. 2007. IFPRI Discussion Paper 740. Washington, D.C. International Food Policy Research Institute (IFPRI)
<http://www.ifpri.org/sites/default/files/publications/ifpridp00740.pdf>

Falck Zepeda, J.B., D. Horna, P. Zambrano and M. Smale. "Policy and Institutional Factors and the Distribution of Economic Benefits and Risk from the Adoption of Insect Resistant (Bt) Cotton in West Africa." 2008. Asian Biotechnology Development Review 11(1):1-32.

Falck Zepeda, J., D. Horna and M. Smale. "Distribution of economic benefits and risk from the adoption of insect resistant cotton in West Africa" 2008. African Journal of Agricultural and Resource Economics.



III. *Ex post* studies completed by IFPRI and partners



Bt maize in the Philippines

- Growing Bt maize significantly increases profits and yields
- Significant insecticide use reductions
- Adopters tend to be
 - Cultivate larger areas
 - Use hired labor
 - More educated
 - have more positive perceptions of current and future status



Change in economic surplus	
(mill pesos)	
Producer Surplus	7906
Seed Innovator	703
Total Surplus	8609
Producer Share (%)	92
Innovator Share (%)	8

Bt maize studies in Philippines led by Dr. Jose Yorobe Jr. with 466 farmers in 16 villages Isabela Province, Luzon, South Cotabato Province, Mindanao



Bt cotton in Colombia

- Evidence of yield enhancement rather than pesticide reductions
- Bt farmers benefited where the target pest is economically important
- Sampling bias important: adopters were better-off farmers
- Institutional context critical



Photos credit: © Zambrano 2009



Source: Zambrano, P., L. A. Fonseca, I. Cardona, and E. Magalhaes. 2009. The socio-economic impact of transgenic cotton in Colombia. In *Biotechnology and agricultural development: Transgenic cotton, rural institutions and resource-poor farmers*, ed. R. Tripp. Routledge Explorations in Environmental Economics 19. London: Routledge. Chapter 8. Pp. 168-199



Bt maize in Honduras

- Excellent target pest control
- Bt yield advantage 893-1136 Kg ha⁻¹ yield (24-33%)
- Bt maize yields preferred even by risk averse producers
- 100% higher seed cost than conventional hybrid
- Institutional issues important



Photos credit: © Sanders and Trabanino 2008



"Small "Resource-Poor" Countries Taking Advantage of the New Bioeconomy and Innovation: The Case of Insect Protected/Herbicide Tolerant Maize in Honduras." Jose Falck Zepeda, Arie Sanders, Rogelio Trabanino, Oswaldo Medina and Rolando Batallas-Huacon. Paper presented at the 13th ICABR Conference "The Emerging Bio-Economy", Ravello, Italy June 17-20, 2009.

III. Practical Considerations and Options for Implementation

Considerations for regulatory design

Issues	Options
Type of inclusion?	<ul style="list-style-type: none"> No inclusion vs. Mandatory vs. Voluntary
Scope?	<ul style="list-style-type: none"> Narrow interpretation article 26.1 Narrow set of socio-economic issues Broader set of assessments (SIA or SL)
Approach?	<ul style="list-style-type: none"> Concurrent but separate vs. Sequential vs. Embedded Implementation entity
Assessment trigger?	<ul style="list-style-type: none"> Each submission vs. Event-by-event vs. class of events
When?	<ul style="list-style-type: none"> Laboratory/greenhouse vs. CFTs vs. Commercialization For post release monitoring At all stages?
How?	<ul style="list-style-type: none"> Choice of methods for <i>ex ante</i> assessments is much more limited than for <i>ex post</i> Decision making rules and standards Method integration, standards, tolerance to errors



Attributes of functional biosafety regulatory process

- Transparent
- Feasible
- Cost and time efficient
- Fair
- Explicit rules and decision making standards
- “Maximizing the benefits...”

Will our decision for each design option make the overall biosafety and technology decision making process better?



Potential implications from SEC inclusion into decision making

- Potential for introducing uncertainty that can lead to an unworkable system if rules and standards are not clear
- Gain **more and/or better** information about technology impacts for decision making
- **Balance** gains in information, additional costs & effort, and innovation



Potential outcomes from SEC inclusion into decision making

- Cost of compliance will increase
- Time to completion may increase
- Impact on national innovative capacity
 - Consider impacts on public sector and crops and traits of interest to developing countries
- Difficulties for R&D investments



Contrasting benefit levels from GE crop adoption with higher costs and regulatory lags in the Philippines

	Bt eggplant	MVR tomato	Bt rice	PRSV resistant papaya
Net Benefits baseline (NPV US\$)	20,466,196	16,748,347	220,373,603	90,765,793
Impact on net benefits due to an increase in the cost of compliance with biosafety				
75% higher	0%	-1%	0%	0%
200% higher	-2%	-3%	0%	0%
400% higher	-5%	-7%	-1%	-1%
Impact on net benefit due to an Increase regulatory time lag				
1 year longer	-28%	-36%	-12%	-27%
2 years longer	-56%	-71%	-23%	-49%
3 years longer	-79%	-93%	-34%	-67%

Notes: 1) Source: Bayer, Norton and Falck Zepeda (2008), 2) Discount rate for the estimation of NPV = 5%, 3) Change in Net benefits defined as the total benefits estimated using the economic surplus minus total regulatory costs.



IV. Following national policy decision, options for developing and/or strengthening functional capacity

Building capacity

- Capacity building activities have to address existing needs
 - avoid building capacity when not needed
- Consider status of applications and country policies
 - Moratoriums
 - If country is at the stage of confined field trials vs. accepting applications for commercialization
- Approach has to be coordinated (especially with risk assessment), systematic, anticipatory and long-term
- Gradient approach



Approach 1. Promoting initial discussion on why countries want socio-economic assessments

- **Target**
 - Countries without any discussion
 - Countries who have inserted requirement in NBF documents and/or policy but not on law
- **Key messages**
 - Under the Protocol, inclusion of SEC under Article 26.1 is **not mandatory**
 - Article 26.1 has a very specific scope, target and objectives
 - Recognize that countries have the freedom of incorporating approaches beyond Protocol, but need to think carefully about benefits and costs, implementation issues and consequences from such action



Approach 2. Promote discussions on implementation options for socio-economic assessments

- **Target**

- Countries who have already incorporated or who are likely to incorporate socio-economic assessments in their national policies, laws and/or regulations

- **Key messages**

- Focus on alternative policy options and developing a feasible/functional system
- Focus on implementation issues especially on what will be covered in such assessment
- Analyze tradeoffs between cost of compliance and technology deployment



Approach 3. Developing functional capacity to conduct socio-economic assessments

- **Target**

- Countries who have already incorporated socio-economic assessments in their national policies and/or laws

- **Key messages**

- Focus on implementing regulations
- Address transparency, feasibility, decision making standards
- Ensure capacity to conduct feasible socio-economic studies in a cost efficient and timely manner



Potential target audience, issues and capacity building activities

Audience	Issues	Examples
Practitioners / Experts	<ul style="list-style-type: none"> • Methods • Relationship with decision making • Outcome interpretation 	<ul style="list-style-type: none"> • 4 day workshop on advanced methods for LAC Biosafety • Workshop on SEC for RAEIN Africa • bECON searchable database on the economics literature • Development of research and process guidelines • Literature and methods searchers/reviews • Developing F2F and online training modules
Developers	<ul style="list-style-type: none"> • Methods • Compliance • Communication 	<ul style="list-style-type: none"> • Workshops on communication • Technical backstopping for implementation of SEC assessments
Biosafety regulators and/or policy/decision makers	<ul style="list-style-type: none"> • Methods • Compliance • Outcome interpretation • Trade-offs 	<ul style="list-style-type: none"> • 1 day workshop on SEC issues to the NBC Indonesia • Presentations to the NBC Uganda on Bt cotton • Consultation on specific issues and questions
General public	<ul style="list-style-type: none"> • Understanding assessment outcomes • Communication 	<ul style="list-style-type: none"> • Policy briefs + pubs • Communication activities • Blog, Web, publications

IFPRI's proposed SEC expert's assessment knowledge support platform

- Literature database – IFPRI's bECON
- Depository of secondary and primary datasets, computer routines, procedures
- Expert discussion platforms at the national/regional level
- Training on advanced methods and approaches
- Network with internationally recognized experts in the field
- Developing communication and policy outreach capacity
- Development of quality protocols/standards to conduct research (for experts?)



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