Agricultural Biotechnology Support Project II

Supporting agricultural development through biotechnology

SUCCESSFUL PUBLIC-PRIVATE PARTNERSHIPS IN AGRICULTURAL BIOTECHNOLOGY RESEARCH AND PRODUCT DEVELOPMENT

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Partnership for Food Security

Food security, poverty reduction and economic growth are massive challenges

No country can address these in isolation

How can this effort be accelerated?

Leverage biotechnology to deliver effective and efficient solutions not otherwise achievable

Partnerships in global efforts focused on poverty reduction and food security

Converging public and private sector *to leverage complimentary* competencies

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ABSPII Public-Private Partnerships in South Asia

- Fruit and Shoot Border Resistant Eggplant /Bt Eggplant (India, Bangladesh, Philippines)
- Late Blight Resistant Potato (India, Bangladesh, Indonesia)
- Stress Tolerant Rice (India, Bangladesh)

Issues in Agricultural Biotechnology: Six Elements

Developing countries lack:

1. Access to biomaterials and technologies
2. Research infrastructure
3. Human capacity development
4. Product validation ability
5. Sharing of regulatory data
6. Product delivery mechanisms

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Element 1. Access to Biomaterials and Technologies

Proven technologies and biomaterials are legally protected by public research institutions in OECD countries or by private enterprises

Challenges in leveraging for global development:

Unlocking the intellectual property for responsible usage in less developed regions

→

Preparing ***institutions*** to ***assimilate*** technologies and ***deploy*** them

→

Ensuring affordability in dissemination of such solutions

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Technology Access for Public Good

Enabling access – How to operationalize?

Pool available technologies through a structured technology licensing process

Assign or license technologies for intended deployment

Each ***technology donor enters into a licensing*** agreement as part of pooling process

Recipients assume ***responsibility for deployment of technology***

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Potato Development Partnership

TECHNOLOGY DONORS

- UNIVERSITY OF WISCONSIN, MADISON (PUBLIC INSTITUTION)
- VENGENZA INC, NC (PRIVATE SECTOR)

PRODUCT DEVELOPERS

- CENTRAL POTATO RESEARCH, SIMLA, INDIA
- BANGLADESH AGRICULTURE RESEARCH, BANGLADESH
- ICABIOGRAD, INDONESIA
- SUPPORTED BY
  - CORNELL UNIVERSITY
  - UNIVERSITY OF WISCONSIN, MADISON
  - VENGENZA, SATHGURU & OTHERS

FUNDING PARTNERS

- USAID
- INDIAN COUNCIL OF AG.RESEARCH, INDIA
- BARI & BARC, BANGLADESH
- ICABIOGRAD, INDONESIA
- CORNELL UNIVERSITY, SATHGURU

PRODUCT DELIVERY

- CPRI, INDIA
- BARI, BANGLADESH
- ICABIOGRAD, INDONESIA
- PRIVATE SEED COMPANIES SECURING LICENSING RIGHTS IN ALL COUNTRIES

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Eggplant Development Partnership

TECHNOLOGY DONORS

- MAHYCO, INDIA (ORIGINAL GENE LICENSED BY MONSANTO TO MAHYCO)

PRODUCT DEVELOPERS

- MAHYCO (PROPRIETARY HYBRIDS)
- TAMILNADU AGRICULTURE UNIVERSITY
- UNIVERSITY OF AG.SCIENCES, DHARWAD
- UNIVERSITY OF PHILIPPINES, LOS BANOS
- BANGLADESH AGRICULTURE RESEARCH INSTITUTE
- LAL TEER SEEDS, BANGLADESH & OTHER SEEDS COMPANIES TO BE IDENTIFIED LATER

FUNDING PARTNERS

- USAID
- DEPARTMENT OF BIOTECHNOLOGY & INDIAN COUNCIL OF AGRICULTURE RESEARCH, INDIA
- PUBLIC UNIVERSITIES, INDIA
- BANGLADESH AG.RESEARCH INSTITUTE & BANGLADESH AG.RESEARCH COUNCIL
- CORNELL UNIVERSITY & SATHGURU
- PRIVATE SEED COMPANIES

PRODUCT DELIVERY

- INDIA : TNAU, UAS, DHARWAD,
- IIVR, MAHYCO AND OTHERS
- BANGLADESH: BARI AND OTHERS
- PHILIPPINES: UPLB AND OTHERS

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Stress Tolerant Rice Partnership

TECHNOLOGY DONORS

- CORNELL UNIVERSITY, USA
- GREENGENE, KOREA

PRODUCT DEVELOPERS

- ICGEB, DELHI
- TAMILNADU AG. UNIVRESITY, CHENNAI, INDIA
- DIRECTORATE OF RICE RESEARCH, HYD, INDIA
- BANGLADESH RICE RESEARCH INSTITUTE
- BANGLADESH AG.RESEARCH COUNCIL
- CORNELL UNIVERSITY
- PRIVATE SEED COMPANIES

FUNDING PARTNERS

- USAID
- DEPARTMENT OF BIOTECHNOLOGY & INDIAN COUNCIL OF AGRICULTURE RESEARCH, INDIA
- PUBLIC UNIVERSITIES, INDIA
- BANGLADESH AG.RESEARCH INSTITUTE & BANGLADESH AG.RESEARCH COUNCIL
- CORNELL UNIVERSITY & SATHGURU
- PRIVATE SEED COMPANIES

PRODUCT DELIVERY

- INDIA : ICAR, TNAU, NATIONAL SEED CORPN & PVT SEED COS
- BANGLADESH: BARI AND PRIVATE SEED COMPANIES

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Biotechnology Access Issues

Challenge: Valuable genes are protected by patent

Opportunity: 'Intel Inside' model may provide an example of a 'win-win' solution utilizing PPPs

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Element 2: Research Infrastructure

THE CHALLENGE:

- Development of biotech crops, testing and product safety evaluation requires advanced infrastructure
- While human skills are diverse in public sector, countries such as Bangladesh, lack in research infrastructure

OUR APPROACH AND SOLUTION

- Private sector research Infrastructure shared with Public sector fills an important gap
- To accelerate transfer of gene to Bangladesh. Philippines and Indian eggplant varieties in 2005 the transfer was carried out by Public Scientists in Mahyco facility in India, when none of them had biosafety compliant green house

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Element 3: Human Capacity

BRIDGING THE GAP:

- **Intra-country partnership**s in human capacity creation used as a quick and cost effective way to bridge gaps in competency
- Leveraged support **public partners** in other countries to support research ability; Leveraged complementary capacity in **private partners for field validation, selection and commercial product development**

BUILDING SUSTAINABLE CAPACITY AND CONTRIBUTING TO THE ECOSYSTEM:

- Public institutions in developing regions gain considerably when exposed to contemporary scientific technologies and tools and augment internal capacity in a sustainable manner

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Human Capacity Development for LBR Potato Project

The LBR potato case:

A live example of human resource collaboration in action to bridge resource gaps

Scientists from Bangladesh, Indonesia and India undergo long term training in Wisconsin, Madison and Cornell

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Scientists from Asian region undergo training in CPRI, India

→

Scientists collectively engage to develop product advancement protocols and gene stacking strategy

Similar approach adopted for other products

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Element 4: Capacity building for Product Validation

THE CHALLENGE

- Biotech products require extensive assessment of their safety
- Countries such as Bangladesh, Uganda lack capacity to carry out safety studies on their own
- Inter-disciplinary teams needed for safety studies – Molecular biologists, agronomists, pathologists, Entomologists, food safety specialists, economists, statisticians et al, beyond the reach of single institution

OUR APPROCH

- Pool human resources and competency through global Public-private partnership to provides product validation ability to all partners

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Consolidating Product Validation Abilities - Example

The LBR potato case

ABSPII Partners in USA, India, Indonesia and Bangladesh develop joint validation protocols for evaluation of Late Blight resistant Potato

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Scientists in countries such as Bangladesh and Indonesia gain exposure to product validation procedures and field trial evaluation methods

→

Effective partnerships helped bridge capacity and create permanent capacity for sustained use

Similar approach adopted for other products

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Element 5: Sharing Regulatory Dossier

Regulatory validation for GM crop is the most expensive part of development process

Beyond the reach of developing countries to meet on their own for small acreage crops

ABSPII demonstrated the effectiveness of partnership in regulatory dossier development

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Sharing Regulatory Information

WHAT WE DID

- Investment pooled by USAID, Private partner(Mahyco) and national bodies in India, Bangladesh and Philippines for single toxicology package to assess gene safety
- In-country trials funded jointly by USAID and national governments for public sector products
- Adoption of stringent standards in regulatory dossier development due to common approach

THE BENEFIT

- **Cumulative investment – less than $ 6 mn on total dossier**
- **A SAVING OF OVER $ 30 MN FOR 22 PUBLIC VARIETIES AND ADDITIONAL HYBRIDS DEVELOPED BY ALL PARTNERS**

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Element 6: Product Dissemination Mechanisms

Reaching seeds to farmers – most challenging effort in feed the future countries. Innovative approaches required to solve the problem:

Public-private partnerships:

- Public sector and private sector bring different abilities in seed production and delivery
- Reach of public extension complimented by private sector seed distribution network

Differential pricing strategy

- Varieties by public sector at no profit and hybrids by private sector at market prices ensures technology reach to every needy farmer

Outreach:

- Combining abilities in farmer education and outreach

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PPP Synergies for Accelerated Gains from Product Development and Delivery

Public research brings inter-disciplinary rigor to finding biotechnology led solutions

Private sector has the ability to accelerate development process and deliver products to needy communities

Industry is proximate to markets and academia is proximate to scientific solutions

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The Goals of Public Institutions

- Facilitate the commercialization of research results for the ***public good***
- Reward, retain, and recruit researchers
- Induce closer ties to industry
- Promote ***economic growth*** through income generation
- Concern for ***national priorities*** and ***socio-economic factors*** with ***long term vision***

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Private Sector Research Focus

- Technology ***commercializatio***n is a mandate
- Return on Investment (***ROI***) focus
- Access/control of ***intellectual property*** – Freedom to Operate.
- Retention and reward mechanism for key inventors (stock options, incentives, etc.)

The public and Private sector collectively can contribute to increased income, nutrition and food security by combining their complementary strengths

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ABSPII: Public & private partners contributing to public good without compromising objectives

IP Pooling

- Public IP and Private IP combined for greater benefit – **LBR Potato, Bt eggplant, Drought and salinity tolerant rice**

Convergence of competencies

- Developing protocols for safety assessment, field evaluation protocols, strategy for durable resistance management et al.

Addressing complimentary markets with common development efforts

- Combined development effort for high cost hybrids and affordable varieties

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Research in frontier sciences for public good requires cross country, cross cultural partnerships

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Cross Country Partnerships Challenges

- Policy and regulatory differences.
- Geo-political relationships.
- Territorial definitions and agreements.
- Intellectual property protection laws.
- Convention on Biodiversity – Misuse by opposing NGOs with false complaints and limitations on inter-country & intra-country material movement
- International liability issues.
- Global consortium projects for public goods differ in characteristics as compared to private tech transfer

ABSPII has set successful models for high impact cross-country public good partnerships

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Role of Technology Partnership Facilitators

Leveraging technology management specialists and expertise to drive success in complex projects with multiple partners:

- Strategy:
  - Advising IP protection strategies.
- Operational:
  - In-licensing and out-licensing.
- Organizational and cultural:
  - Faculty/ researcher counseling.
  - Helping partners understand key factors discussed so far.
  - Strategic definition of role and responsibilities.
  - Advising on matters relating to Cross cultural, cross country parameters

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Requirements for Agriculture Biotechnology Commercialization

Collaborative networking

- Bringing collaborative partners to a common goal

Transparency

- Most developing countries have evolving system of regulations that are less transparent
- In less transparent environment, the partners, more specifically private partners are liable for legal actions brought by opponents of GMOs – This drives away support from private partners
- The case by National Biodiversity Authority in India is an example

Harmonized goals

- Public and private institutions must perceive unity of goals to harness their power effectively

Overcoming cultural barriers

- Cross-country cultural restrictions that at times limit the progress of science

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Public and Private Enterprises Must Collaborate in Communication & Outreach Efforts

- A major challenge of PPPs is that the role of public partners is not acknowledged in the debate over GMOs
- Private sector gains are exaggerated and benefits to social welfare are overlooked (farmer incomes, nutrition, food security)
  - Example: False allegations of gains to Monsanto for Bt Eggplant where Monsanto is not a beneficiary

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Conclusion

Biotech gains for ensuring food and nutritional security need involvement of public & private sector

The partnership helps to pool resources, knowledge, people, infrastructure, development capacity and product delivery capacity. Pooling has significant benefits:

Shrink time involved:	**Reduce costs and optimize efforts:**
The partnership has potential to reduce development time significantly due to complimentary efforts	The partnership can reduce overall investment by 70% and thereby make technologies affordable to resource poor farmers

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Conclusion

Impediments to success:

- However, Public and Private partnerships are given a twist by Activists to block progress and deny technology to resource poor farmers

Required solutions:

- PPPs require high recognition by national governments
- PPPs require a sound project management entity that monitors progress and ensures all partners working towards common goals
- PPPs require a structured model to reach the research results to needy resource poor farmers

PPPs have potential to create sustainable capacity in FTF nations to develop their own products in their own right for their own markets and for the benefit of other countries

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