

International Maize Improvement Consortium for Asia: Case Study of a Public-Private Partnership Model

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Globalization of India's Crop Improvement Research

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International Maize Improvement Consortium–Asia (IMIC-Asia Phase I): 2010-15

A Partnership for Targeted Impacts



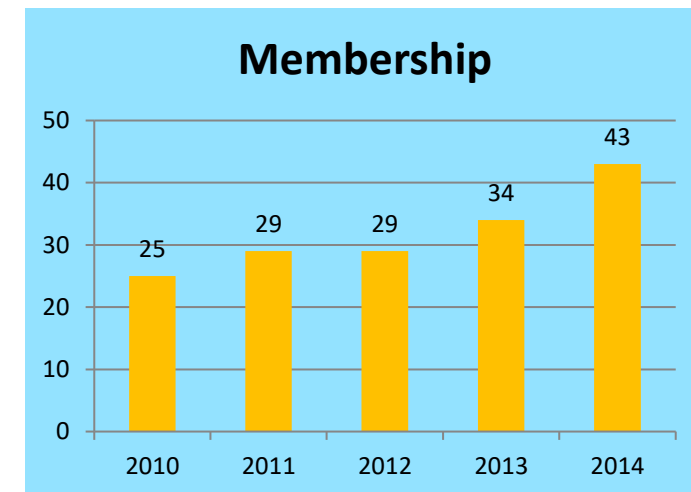
IMIC-Asia Launch: 22 Feb 2011



First IMIC-Asia Field Day - March 2012
620 of 1060 lines selected by members

Purpose

- Partnership with maize R&D institutions
- To deliver impact through development of hybrid maize for targeted priorities



2014: 38 Gold & 5 Silver members

International Maize Improvement Consortium for Asia Phase II (IMIC-Asia II) - India Chapter

A Partnership for Targeted Impacts



IMIC-Asia II Launch; 8 June 2017

- A model for intensive engagement, especially with private seed companies
- Partners: maize R&D institutions including Indian Maize Program
- Annual membership fee
 - ▶ Commitment, Accountability, Focus, Impact Tracking



IMIC- Asia III Partners



Sunrise Agri Tech Private Limited



22 seed companies + AICRP Maize led by ICAR-IIMR



CIMMYT

+ Genebank
(Diversity)



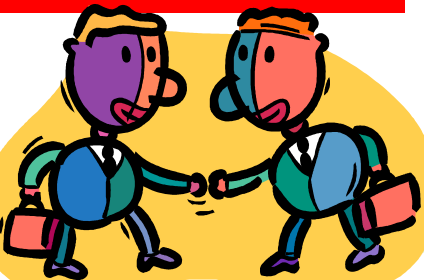
+ Stress
Resilience



+ Training



+ Network-NARS
NGOs ARIs...



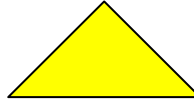
Private Seed EnterprisesCIMMYT's perspective

Seed Companies

Small



Medium



Big



National



Regional



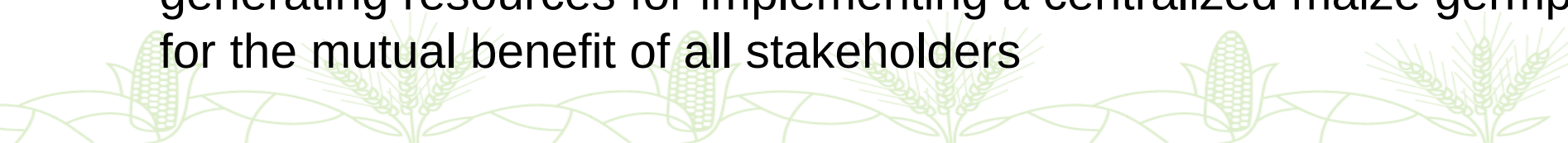
Multinational

- Improved stress resilient maize source germplasm and inbred lines
- Training
- Multi-Location Hybrid Evaluation Network
- CIMMYT ready-made (pre-commercial) hybrids
- Value-Added Services: QA/QC, DH development, Screening for specific diseases PFSR, TLB



IMIC is essentially a platform for....

- distribution of germplasm materials under development (MUD)
 - Diverse and Elite Inbreds and Breeding Sources for partner identified priorities and maize market segments (not purely CIMMYT / donor identified priorities)
- enhancing, guaranteeing and prioritizing availability of high-value maize breeding source germplasm in an era where germplasm sharing is becoming difficult
 - 13 CIMMYT Maize Lines (CMLs which are notified lines freely available to all) vs
 - 5455 lines displayed in IMIC-Asia Field Days = 0.24% of lines available to non-IMIC)
- tapping into complementary strengths of CIMMYT and its private partners in a “win-win” mode, especially since CIMMYT has a mandate for farmer-level impact but no mechanism to deliver seed to the farmer.
- giving an equitable chance for small and medium sized private enterprises to build a maize hybrid business.
- generating resources for implementing a centralized maize germplasm improvement for the mutual benefit of all stakeholders



In doing so.....

- activities for supportive processes were introduced
 - Hybrid evaluation
 - Training
- Thereafter, IMIC evolved into offering value added services like
 - Quality Control and Quality Assurance (QC/QA) genotyping
 - Disease Phenotyping – Charcoal (*Macrophomina*) Rot, *Fusarium* Stalk Rot, TLB
 - Drought phenotyping
 - Root Phenotyping
 - Doubled Haploid (DH) line development service



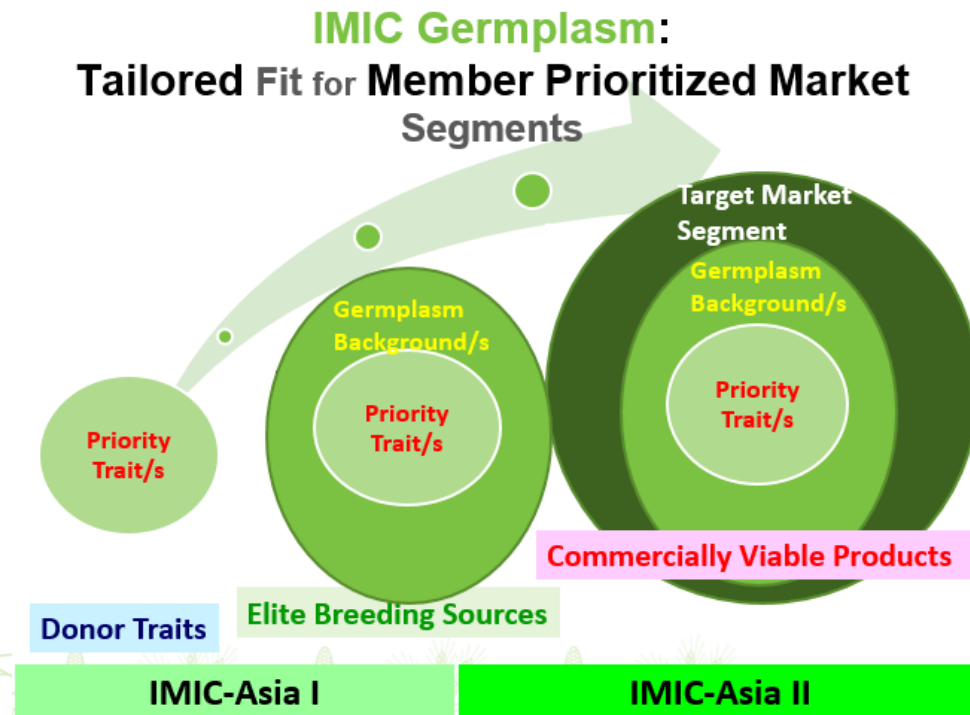
Questions addressed ..

1. A brief analysis of the need for partnerships, especially the Public- Private and Private-Private partnerships in the 21st century.
2. Discuss the comparative and competitive advantages of the Public sector vis-a-vis the Private Sector.
3. Since Private Sector Seed Companies now have strong R&D set-ups, what are its implications on the type of projects for public sector breeding
4. What are the perceived limitations of the Private Sector in accessing the germplasm and breeding materials?, and possible suggestions to ease the bottlenecks
5. What are the continuing concerns, and accrued benefits of PPP to both Public and Private sectors, and to the end user--the farmers.
6. How does the Biodiversity Authority (BDA) rules and regulations affect the germplasm exchange within and between the public and private sectors, especially across the countries/ globally.
7. How does the Plant Breeders Rights (PBR)/ Patented Technologies affect the partnerships in the PPP module, and possible policy interventions.



This “Business Unusual” model with a membership-based approach has.....

- Guaged the pulse of the farmer
 - Shifted CIMMYT’s breeding program from trait-based approach to developing commercially viable products for target market segments
 - Product profiles and trait priorities determined by members (based on market demand)
- Brought in enhanced research focus and accountability of all stakeholders
- Yielded cost sharing benefits
- Expanded collaborative testing



The Challenge for IMIC Asia III

1. Balancing Germplasm Diversity

- Diverse Breeding Germplasm Sources -- Pools, Populations, Inbred Lines

2. Stress Tolerance, Wide Adaptation, Stability-Hybrids

3. Niche Hybrid Performance

4. Enhanced Genetic Gains

5. International Public Goods

with Eliteness

versus Elite lines for commercially viable hybrids

versus Yield in optimal envt, specialty maize

versus Broad Inbred Parent Adaptation

versus Optimization of Costs

versus Proprietary germplasm



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Source germplasm for start-up breeding programs

- Germplasm bank accessions – E.g. CIMMYT, USDA
- National Programs, Kasetsart University (Thailand) – purchase lines
- IITA – OPVs and lines on SMTA
- CIMMYT
 - CIMMYT Maize Lines (CMLs) – Elite, CIMMYT's gold standard (passed through rigorous internal scrutiny, publicly available without any restriction (SMTA))
 - Materials Under Development (MUD) – available free till 2010. Now available only for members of the International Maize Improvement Consortium (IMIC)
 - License of CIMMYT hybrids (exclusive vs non-exclusive). Hybrid combination is confidential, inbreds remain IPG
 - Sub-license CIMMYT hybrids from public sector (Agriculture Universities)
- US Off-PVP lines
- B2B licensing of commercially viable lines
- Selfing of commercial (heterotic hybrids) [subject to country laws, plant breeder's rights can be invoked – proof of hybrid purchase or permission]

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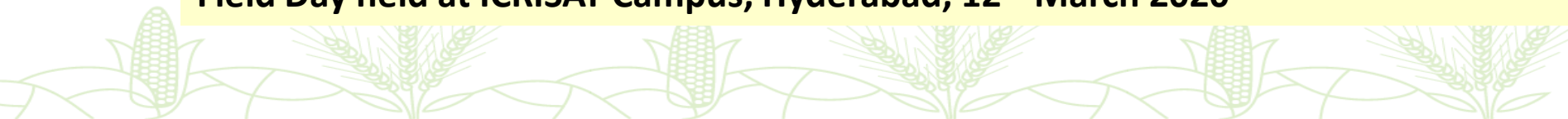
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IMIC Asia II Field Day – 12th March 2020



**Participants of the International Maize Improvement Consortium for Asia Phase II (India Chapter)
Field Day held at ICRISAT Campus, Hyderabad, 12th March 2020**



Asia's first, state-of-the-art public maize Doubled Haploid facility inaugurated – 3rd Dec 2021

- Established at Agricultural Research Station in Kunigal, Tumkur District, Karnataka over 12 acres of land
- Will produce 25,000 maize DH lines/year.
- Will provide maize DH line production service for CIMMYT, UAS-Bangalore, national agricultural research systems (NARS) [including AICRP Maize] and small- and medium-sized seed companies
- DH line development service ongoing for public partners, available from *Kharif* 2023 for IMIC-Asia seed companies



Outcome: accelerated development and deployment of a greater number of elite, climate-resilient and nutritionally enriched maize hybrids in tropical Asia.

IMIC-Asia Phase III (since Jan 21)



1026 genetically diverse inbred lines displayed. After mid-season selection, over 800 lines were demonstrated.



767 unique lines in 6851 packets were distributed to both the public and Indian private sector (mainly SME seed companies)



97 public and private participants from 52 institutions attended the IMIC Asia III Field Day held at ICRISAT Campus, Hyderabad, 29th March 2022



The IMIC General Body

Fall Armyworm Net Houses Established at ICRISAT



Bird's Eye View of FAW net houses at ICRISAT



Native genetic variability for
FAW resistance



Infestation of FAW

- 4 net houses each of 1000 sqm established on ICRISAT campus with funds from CRP MAIZE
- 86 inbred lines with a cob damage score of 6 or less (1-9 scale where 1 is best, 9 is worst) were displayed during the IMIC-Asia III Field Day held on 29th March 2022.

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Seed Exchange Challenges (with private sector outside the country)

- Inability to get export permission (from NBPGR) for (100%) CIMMYT germplasm to the private sector outside the country even though they are partners on CIMMYT projects. NBA route takes years. Has majorly affected collaboration models and impact.
 - IMIC for regional seed companies cannot be executed from India
 - Will affect DH line development service to regional private companies



Seed Exchange Challenges (with public sector and CIMMYT global locations)

- Export restriction on seed -- limit of only half kg of seed of an entry can be exported. Often breeding materials have to be exported in kilogram quantities – for e.g. deposit of 5 kgs of candidate CIMMYT Maize Lines at CIMMYT-Mexico before it is globally announced as CML.
- Applications for export permit restricted to 3 or 4 windows in a year. This derails the speed of project execution.
 - While most of the export can be planned, there are many instances where urgent shipment needs to be done.
 - Once-a-month applications need to be entertained.



Seed Exchange Challenges (with public sector and CIMMYT global breeding hubs)

- Import of seed for trials (only evaluation and not for breeding) is difficult as authorities are insisting that trials should be replicated and have minimum seed quantities to be considered as a trial
 - Often single row evaluations (or in lab evaluations or genomic evaluations) are done with as little as 30 seeds.
 - Usually there are hundreds of entries in trials and importing them as germplasm would make the proposition very expensive and not sustainable.
 - Trials -- INR 2360 per consignment
 - Germplasm – INR 180 per sample + handling charges



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Thank you for
your interest!

