

# CIMMYT Seed Systems Interventions & lessons to Bangladesh

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# Outline

- CIMMYT at a glance
- Concepts and terminologies
- Components of a functional seed system
- Why we need seed policies and regulations?
- Seed system experiences from CIMMYT
- Key performance indicators of seed industry development
- Summary and lessons to Bangladesh



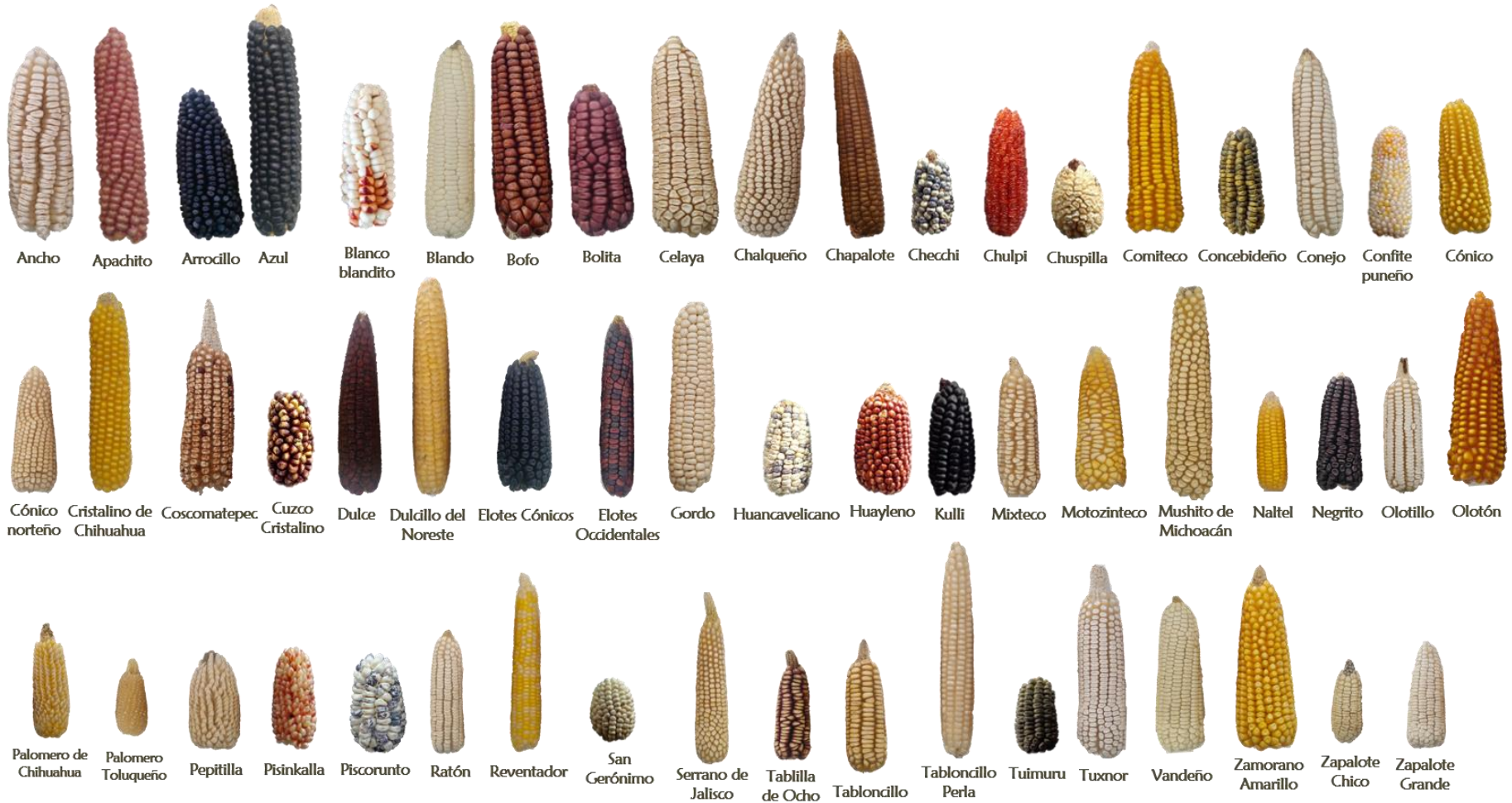
# CIMMYT at a glance

- International Maize and Wheat Improvement center  
(Centro Internacional de Mejoramiento de Maíz y Trigo-CIMMYT, in Spanish)
- Established in 1966, HQ in Mexico and regional offices in Africa (ET,KE,ZM), Asia (CN,IN, PK, NP,BD,TR) and Latin America (CO)
- One of the [CGIAR](https://www.cgiar.org/) centers primarily working on maize and wheat science for improved livelihoods
- More than 28,000 maize and 130,000 wheat accessions at the CIMMYT gene bank available to the public





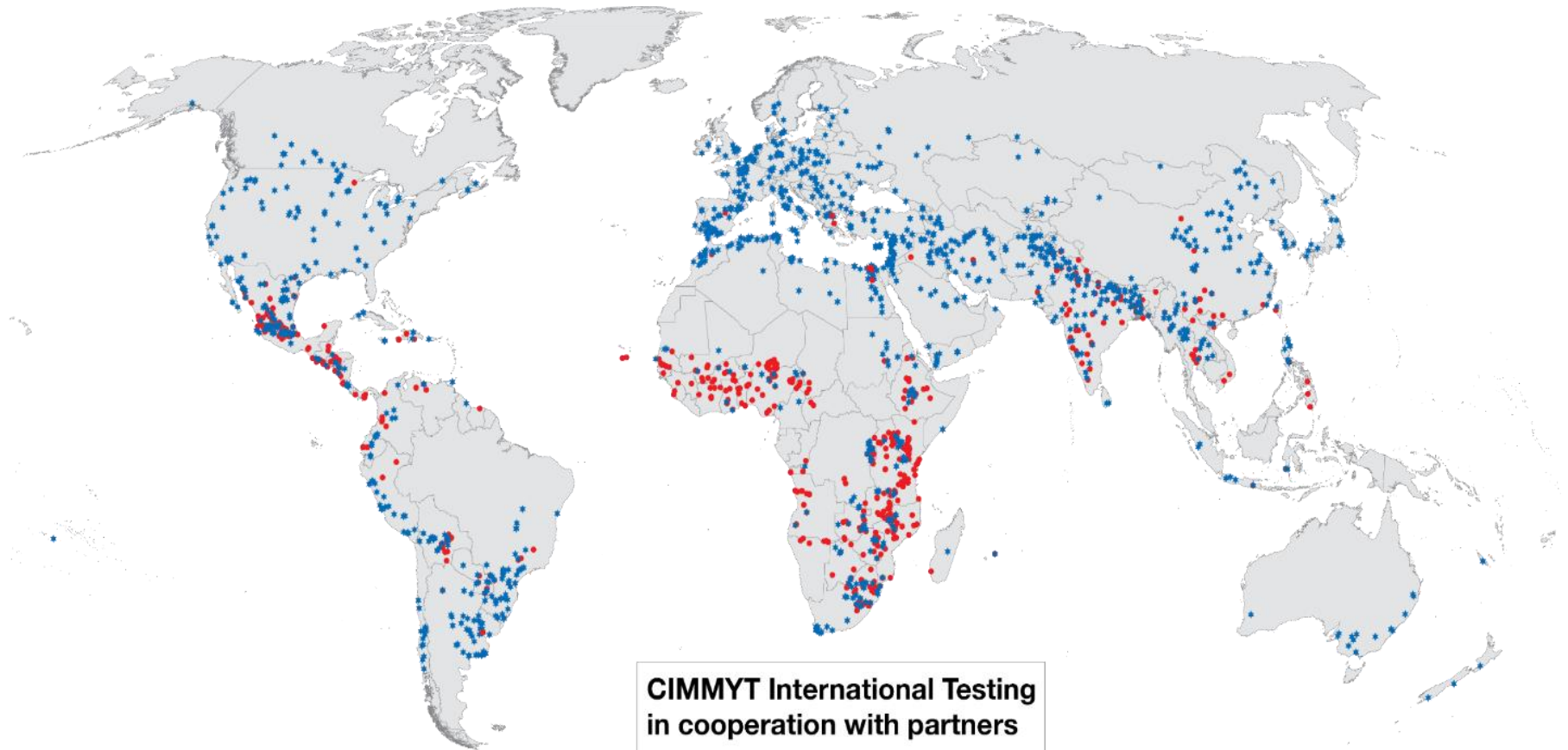
# Diversity to unlock the potential







# CIMMYT's International Testing Network for maize and wheat



CIMMYT International Testing  
in cooperation with partners

Maize •

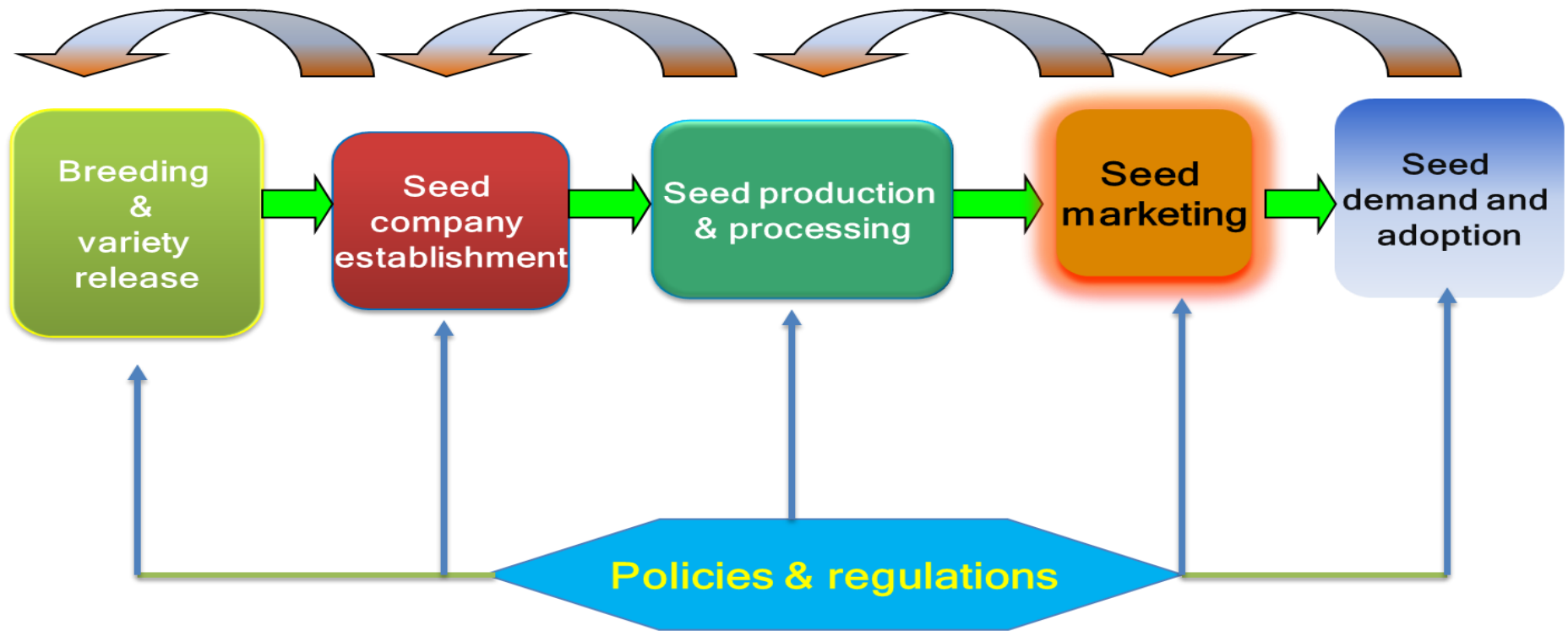
Wheat \*

# Concepts and terminologies

- **Seed System:** a set of activities contributing to variety development , seed production and delivery to farmers.
- **Categories of Seed system**
  - Formal seed system
  - Informal seed system
  - Semi-formal/Intermediate seed system



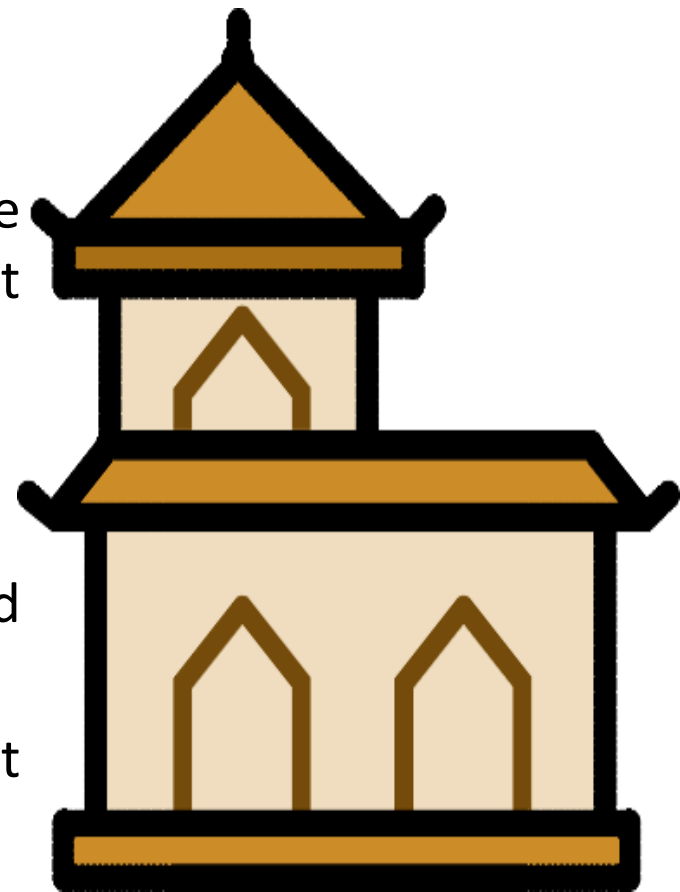
# The Seed Value Chain





# SEED POLICIES AND REGULATIONS

- The seed industry need to be led by enabling policies and implementation of regulations
- Seed is a biological material, and it can cause great harm to a country's economy, if not managed well
- Seed import and export policy
- Policies on PVP and PBR
- Stringent measures on “fake seeds” and “seed piracy”
- Incentives, smart subsidies to attract investment and build competitiveness
- Seed laws and regulations on transgenic crops



# Seed System Experiences from CIMMYT



# Maize seed systems interventions

- Cadre of seed systems specialists based at the different regional hubs (Africa, Asia and Latin America)
- New products announcement and allocation (pre-commercial hybrids)
- Open to both public and private institutions
- Elite germplasm for developing joint products
- Diverse CMLs available for users from gene bank
- A quick business approach for SMEs and start ups.



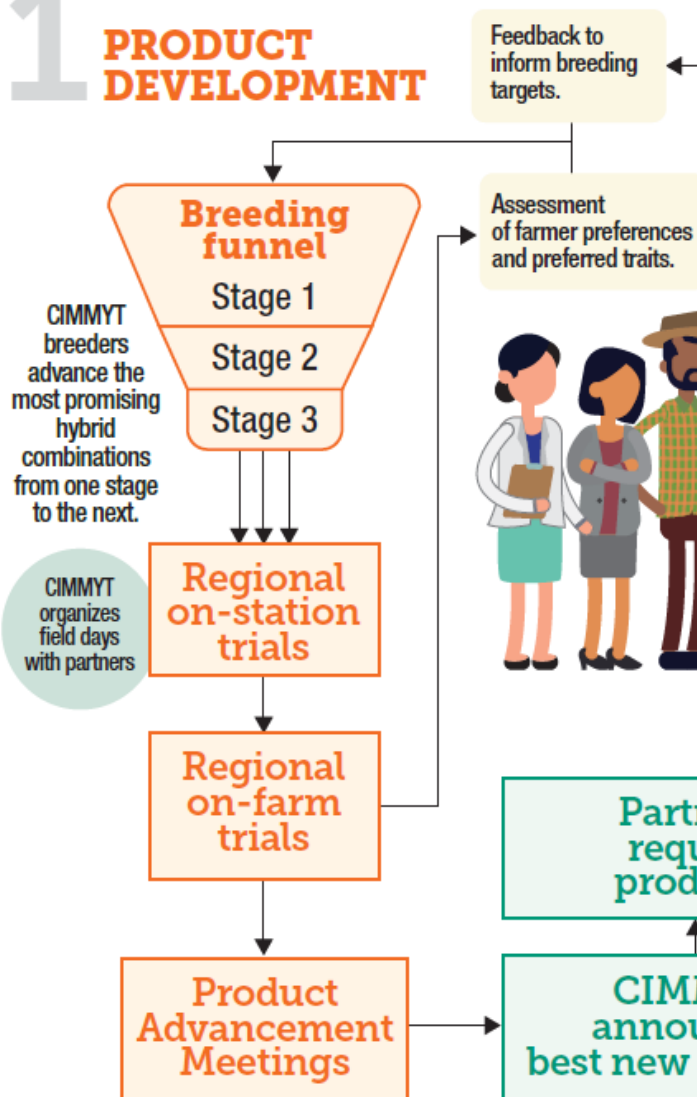




# How does CIMMYT's IMPROVED MAIZE get to the farmer?

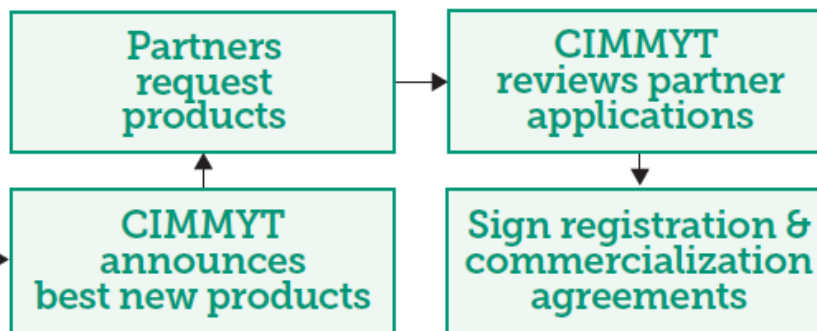
1

## PRODUCT DEVELOPMENT



2

## PRODUCT ALLOCATION



3

## RELEASE & COMMERCIALIZATION



# What CIMMYT offers to hybrid licensees?

- Permission to register and commercialize CIMMYT hybrid within a specific geography
- Geographic exclusivity (in most cases)
- No royalties or licensing fees
- Freedom to use parental lines for further breeding activities



# What CIMMYT asks of licensees

- Nominal recovery for some of the costs associated with seed production and/or shipment
- Commitment to make a genuine effort to commercialize in each of the geographies under license
- Annual reports on progress towards commercialization milestones (What, how and why?)
- Information are strictly confidential





# Products available to partners

- Climate resilient- Heat and drought tolerant, Low soil N stress, waterlogging tolerant
- Biofortified- PVA, Kernel Zn, QPM, QPM+PVA
- White and yellow kernel hybrids and OPVs
- FAW tolerant
- MLN tolerant
- Aflatoxin tolerant (IITA)
- Stem borer tolerant



# Variety releases

- Between 2017 and 2021, South Asia released a total of 48 CIMMYT/IITA derived varieties



# Maize variety releases-2021

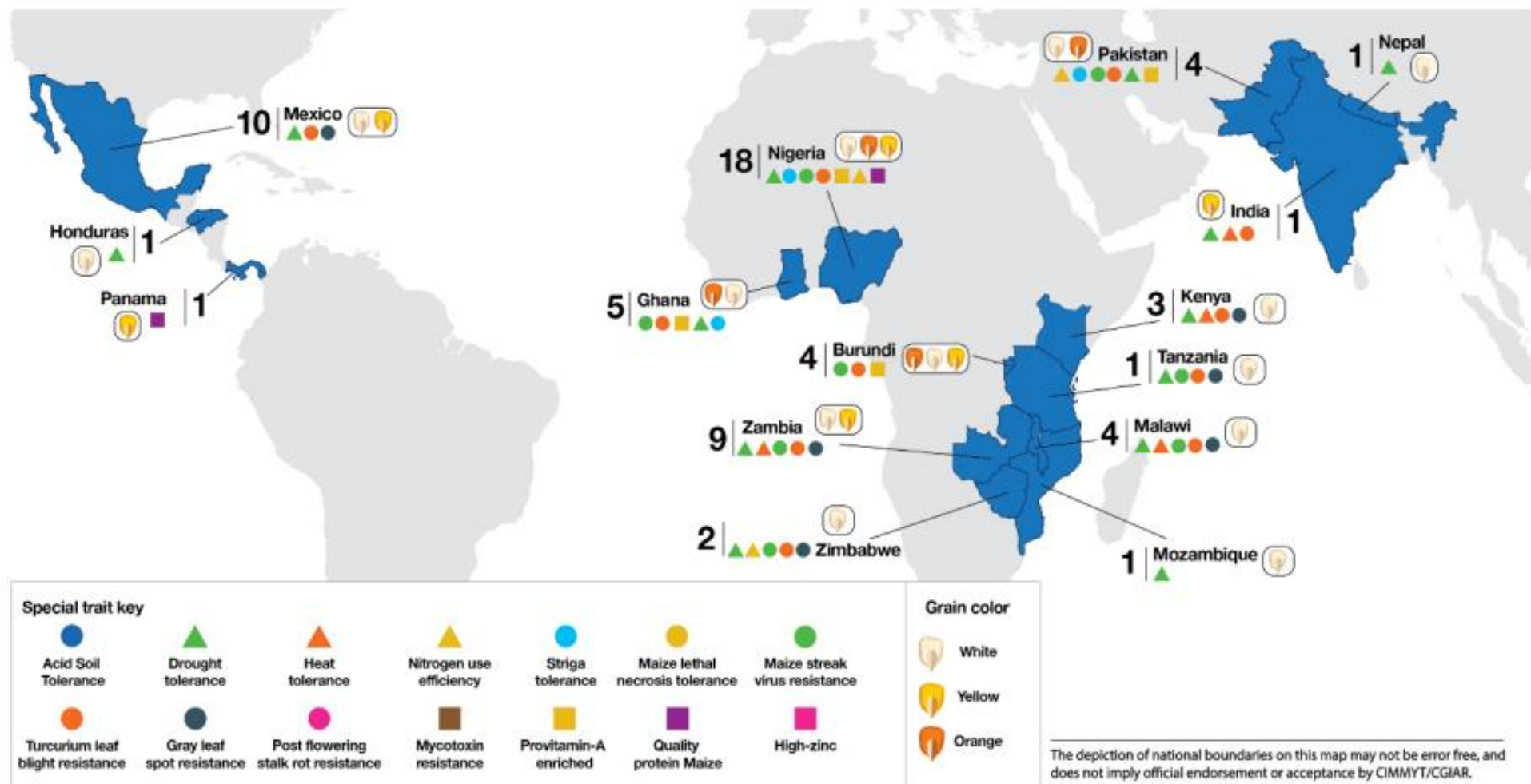


Figure 1: Elite maize varieties released by MAIZE CRP partners in 2021, with depiction of key traits.



# Maize product profiles for the Asian Tropics



# Demand Led Product Development- Market focus

- Maize product profiles based on market segments in South Asia
  - South Asia Drought (SADT)
  - South Asia Water logging +Drought (SAWLDT)
  - South Asia Heat+ Drought (SAHDT)
- Based on “must-have-traits” and “nice-to-have traits”





# Unique products allocations

- Provitamin A/Orange maize hybrids- 8
- Aflatoxin tolerant synthetics- 2
- PVA synthetics- 1
- Orange/yellow maize hybrids- 5
- New Specialty maize (pop & sweet corn) 2



- New products allocated to private seed companies who are now allowed to have R&D license in Nepal





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

## A Partnership for Targeted Impacts

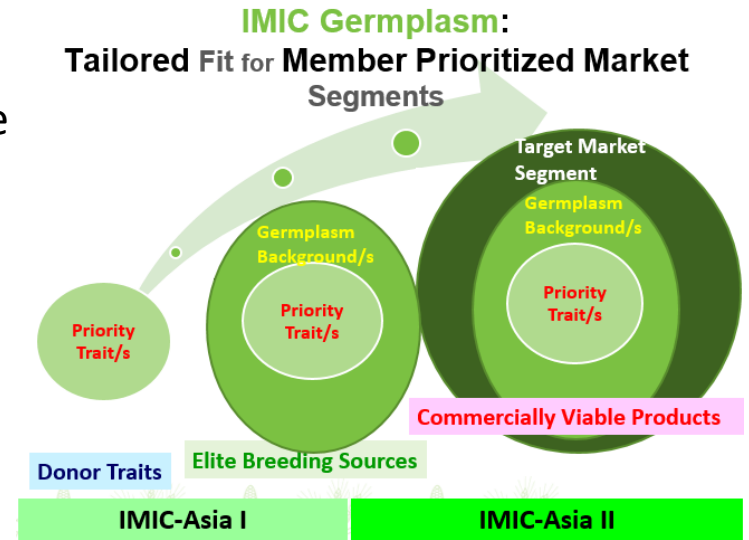


- A model for intensive engagement, especially with private seed companies
- **Partners: maize R&D institutions including Indian Maize Program**
- Annual membership fee
  - ▶ Commitment, Accountability, Focus, Impact Tracking



# Strengthening germplasm and its delivery through IMIC-Asia

- Platform for distribution of germplasm materials under development
  - Diverse and Elite Inbreds and Breeding Sources to IMIC Partners
- Expanded collaborative testing
- Shifted CIMMYT's breeding program from trait-based approach to developing commercially viable products
- Pulse of the farmer
  - Product profiles and trait priorities determined by members (based on market demand)



# What you can get from IMIC-Asia?

## No. Germplasm Background

- 1 Tropical Asia Drought, Heat & Water Logging Tolerant
- 2 Temperate US Corn Belt and US GEM
- 3 Disease Resistant: TLB, *Fusarium*, *Macrophomina*, F+M, DM
- 4 E & S Africa Mid-Altitude DT
- 5 Mexican Sub-Tropical, Tropical Lowland and Tropical Highland
- 6 South America Lowland Tropical (Acid Soil Tolerant), Latin American Cateto, Brazilian Tropical
- 7 Cuban Flint (FAW resistant background)
- 8 Male Sterile (A) and Maintainer (B) - C cytoplasm
- 9 Kasetsart University (Thailand), Suwan1, Tropical Vietnam
- 10 Inter Agro-Ecological Adaptation Breeding Crosses
- 11 West Africa Tropical (IITA), White Maize
- 12 Temperate BMR Donors
- 13 Specialty Corn: High Starch, High Fodder Quality, and Tropical and Temperate Sweet Corn Breeding Sources

**Asia-Adapted Diverse Global Maize Germplasm Sources Incorporated and Available through IMIC-Asia**



Germplasm which is Tailored fit for member-prioritized market segments



# Want to become IMIC-Asia member ?

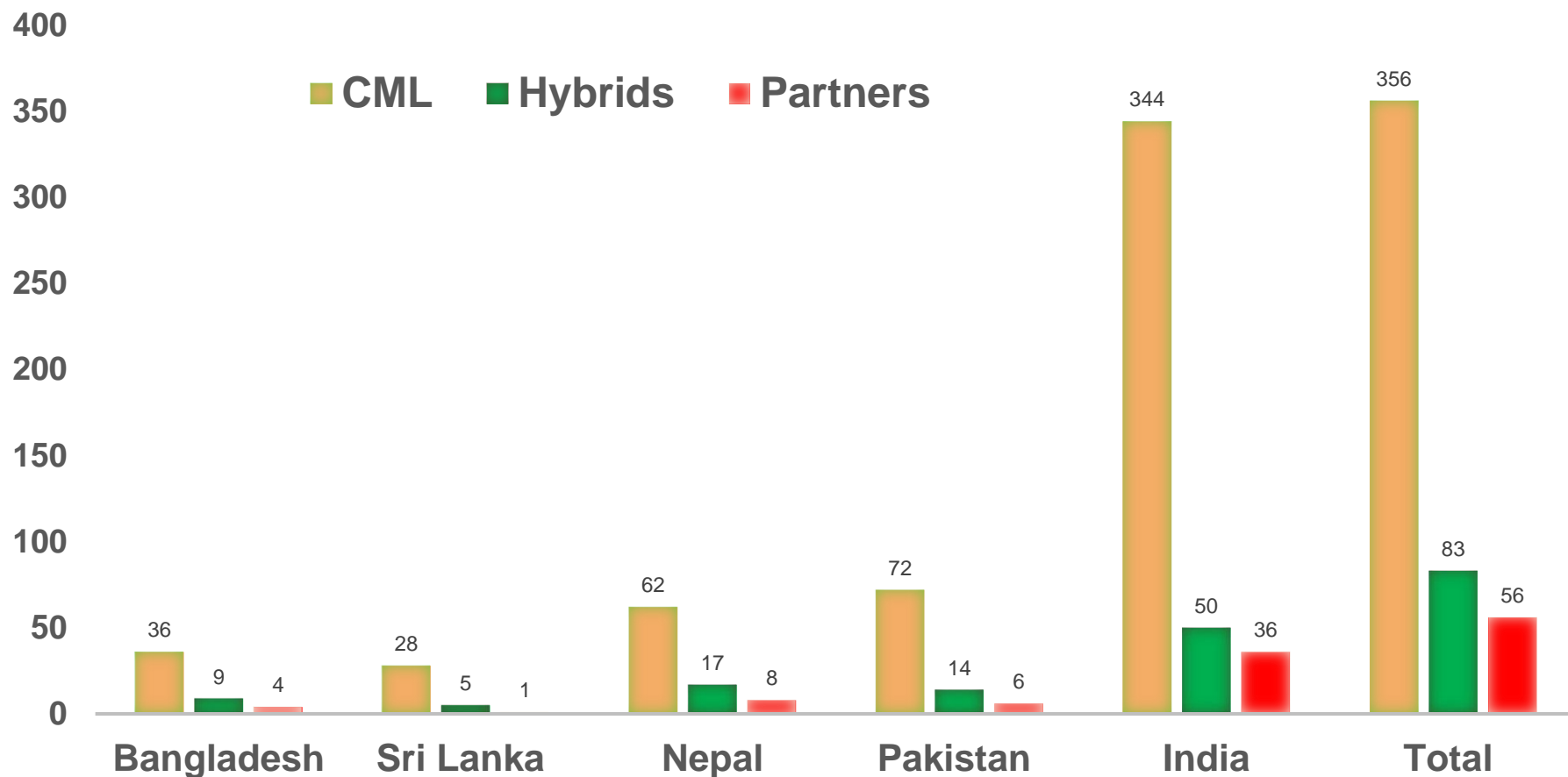
Please contact us for further details :

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- P. Nagesh, Senior Scientist, Global Maize Program, Hyderabad, India ([p.nagesh@cgiar.org](mailto:p.nagesh@cgiar.org))
- AbduRahman Beshir, Seed Systems Specialist, Asia, Global Maize Program, CIMMYT South Asia Regional Office, Kathmandu, Nepal ([a.issa@cgiar.org](mailto:a.issa@cgiar.org))



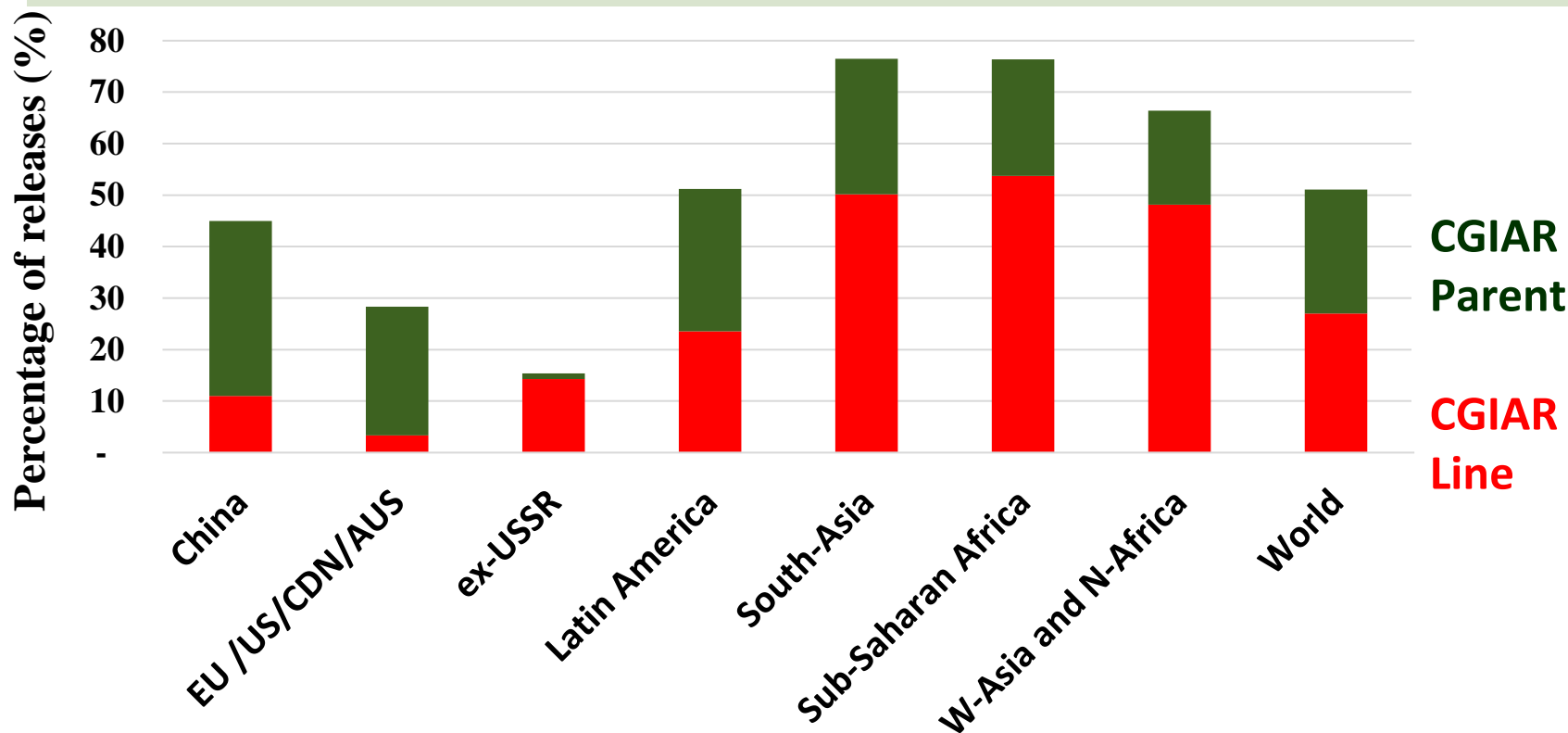


# MAIZE PRODUCTS DISTRIBUTION IN SOUTH ASIA (2019-2022)



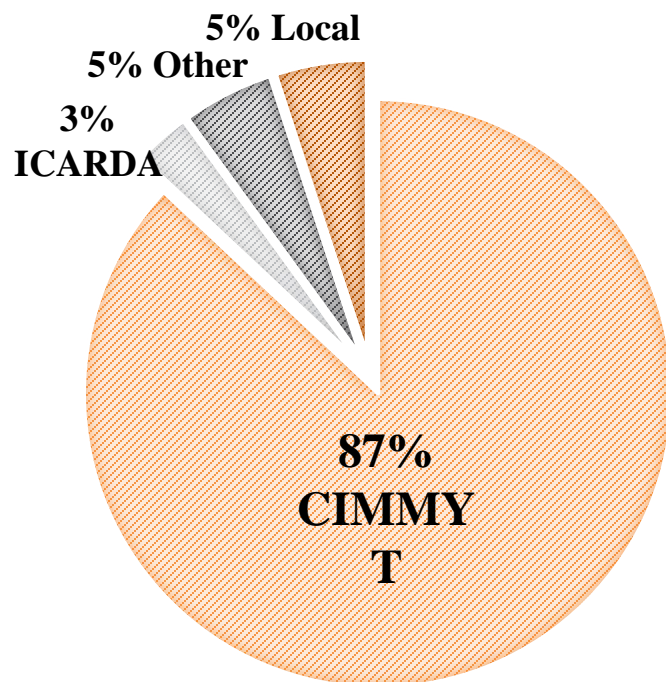
# Contribution of CGIAR wheat breeding in developing improved varieties for farmers

Percent of Spring bread wheat releases derived from CIMMYT and ICARDA by region and origin 1994-2014



# Adoption of CIMMYT wheat in Ethiopia

## Ethiopia DNA fingerprinting

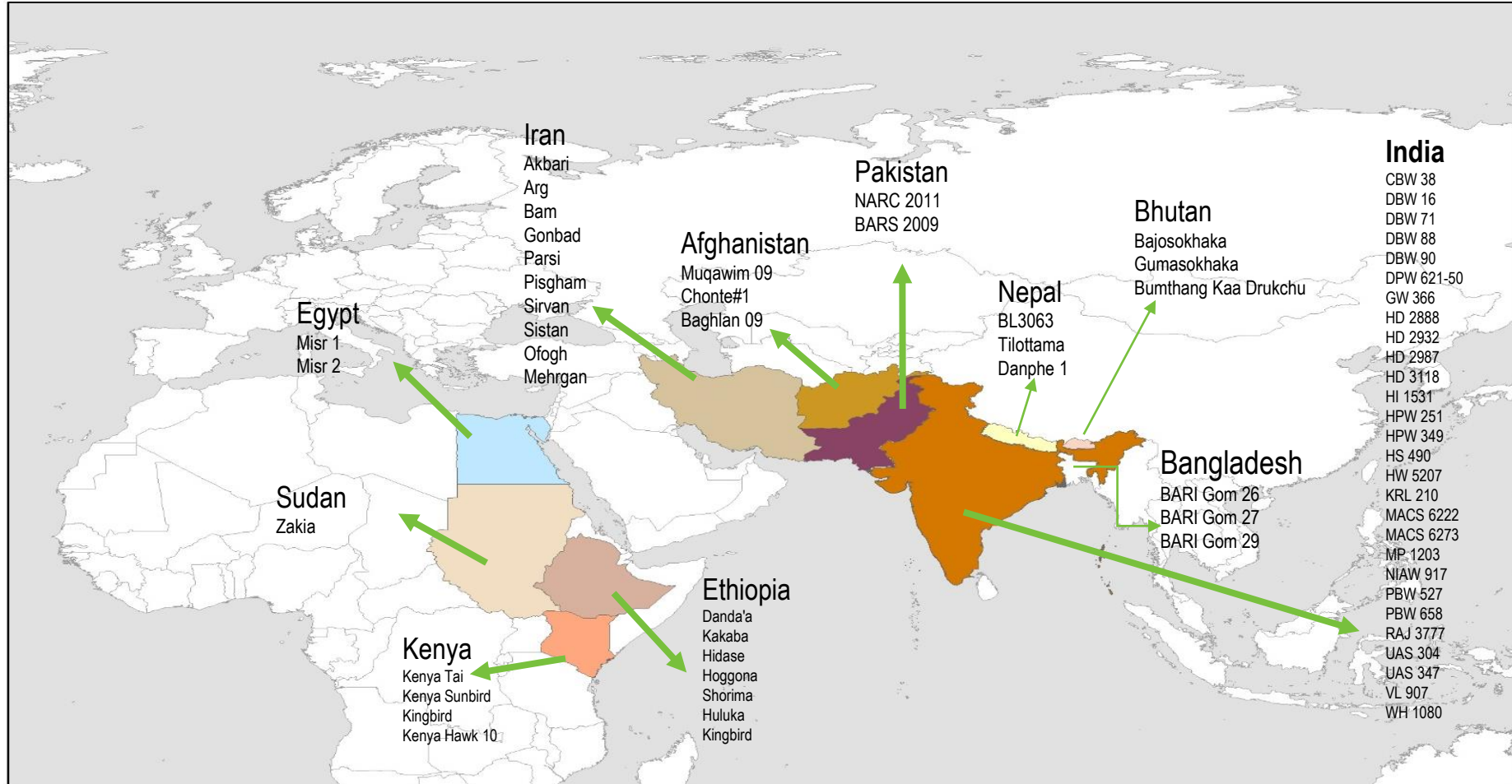


- Results based on 4000 samples from farmers field sampled in 2016-17 season.
- Ethiopia produces ~5 million tons/year
- In 2016/17:
  - Recently released varieties (post 2005) occupied 61% of the wheat area sampled.
  - 43% of the area sampled planted to varieties released since 2010.

Results based on 4000 samples from farmers field sampled in 2016-17 season.

Hodson *et al.* (2020) Scientific Reports 10: 18532 (Funded by BMGF)

# The regional collaboration on wheat blast is based on the fundamental model by which Ug99 was blocked by timely release of resistant varieties





# Managing wheat blast in S Asia

- This disease was reported for the first time in 2016 in Bangladesh
- South Asian countries have already released a dozen resistant varieties
- This could be possible through Fast-track release and dissemination



*Bari Gom 33: 1st blast-resistant wheat variety released in Bangladesh in 2017*

# Fast track seed and varietal diffusion through CBSP-examples from Pakistan

- Focusing on newly rereleased and climate resilient varieties
- Encouraging women farmers/groups to come forward for seed business
- Engaging private sector and linking them with source seed centers.

SN	Seed type	Vars	Production (t)	Institutions
1	Source seed (BNS, PBS and BS)	15	1083	7 Public
2	Certified and TLS*	5	1523	5 Private and Public (DoAE)

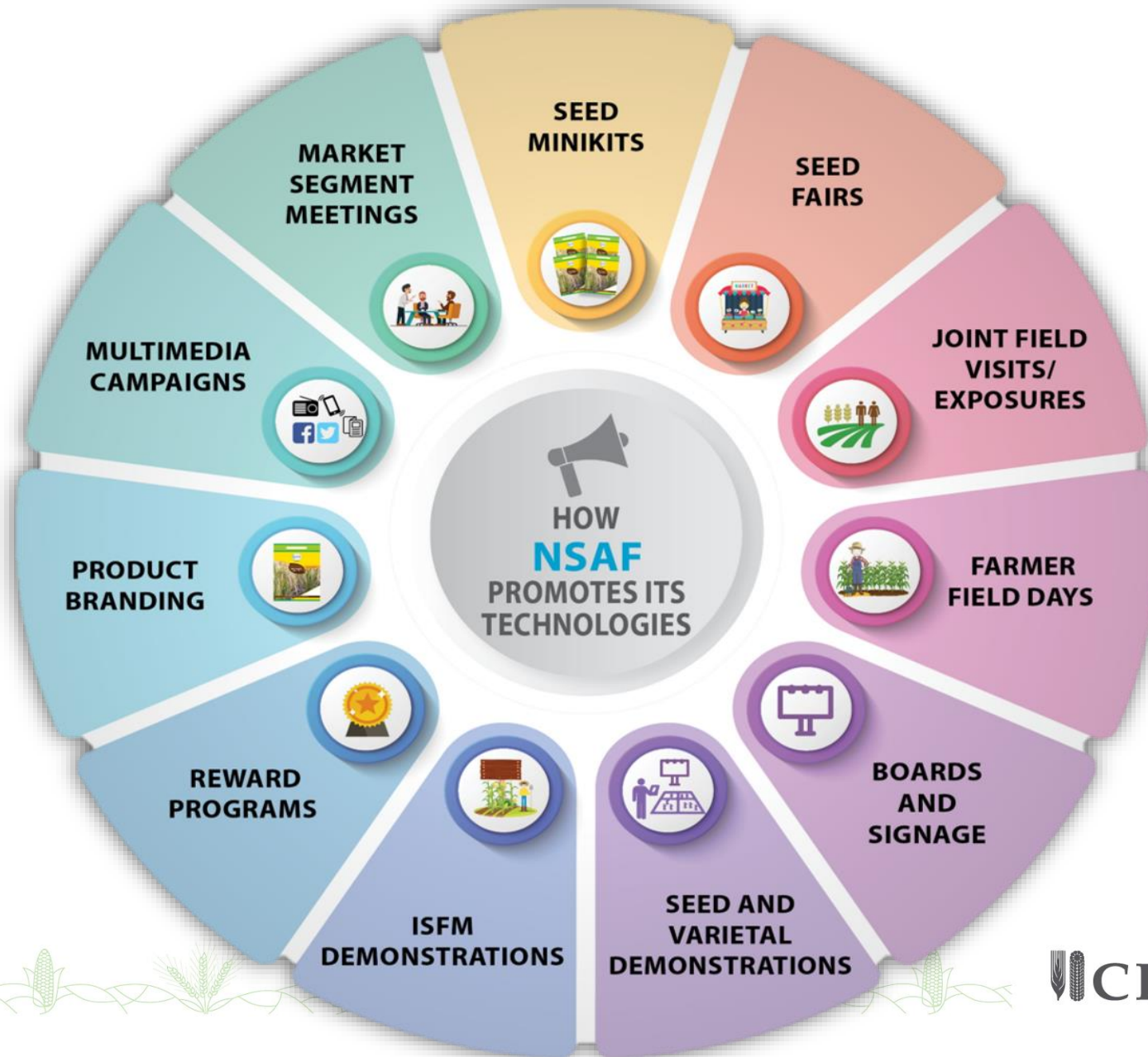


# Get your seed from CIMMYT gene bank

- For maize:
  - <https://mgb.cimmyt.org/gringlobal/search>
- For wheat
  - <https://wgb.cimmyt.org/gringlobal/search>
- Seed distributed with compliance of the [SMTA](#) terms and conditions ([FAQ](#)).



# Seed market systems interventions- case of NSAF





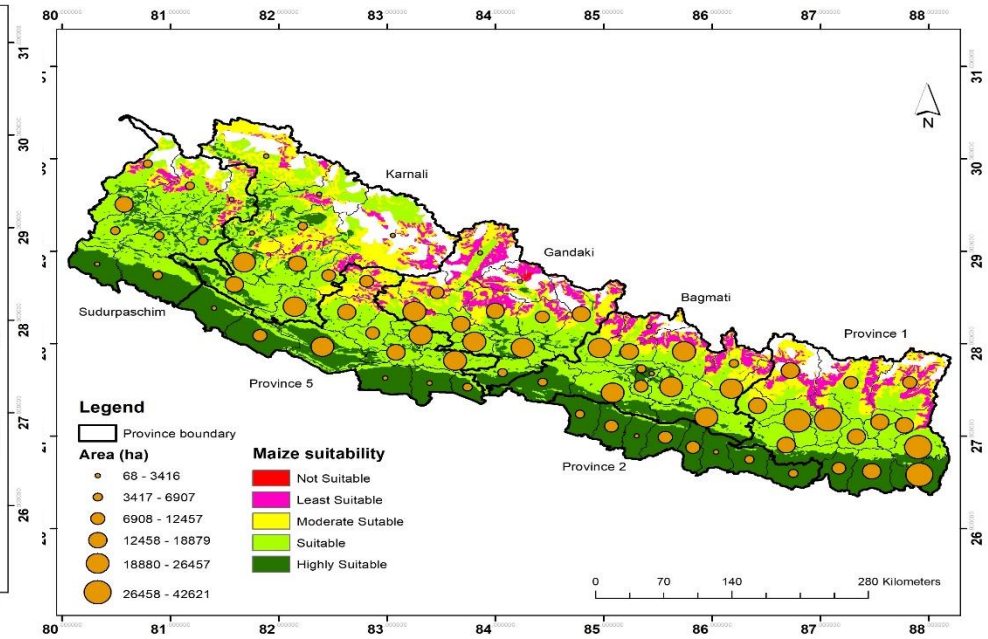
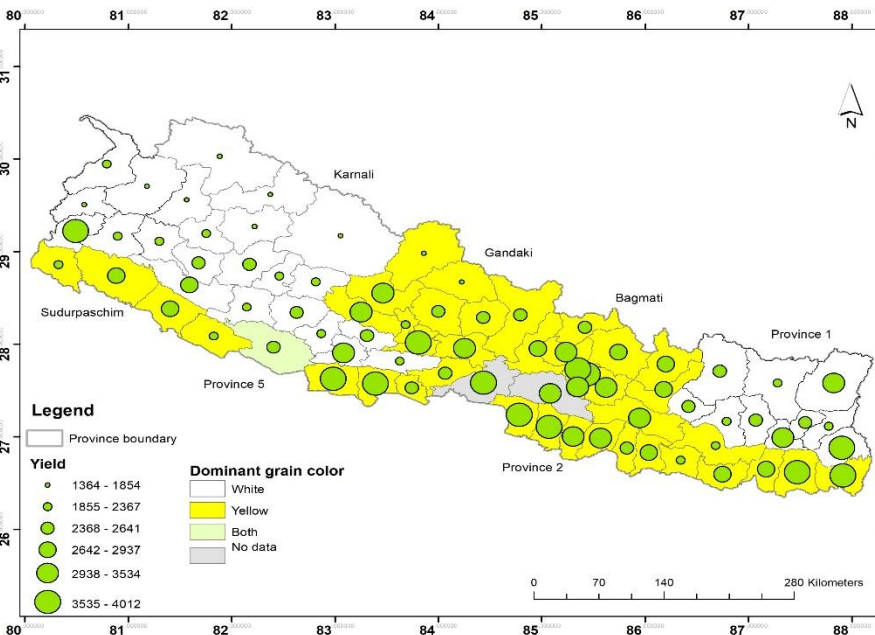
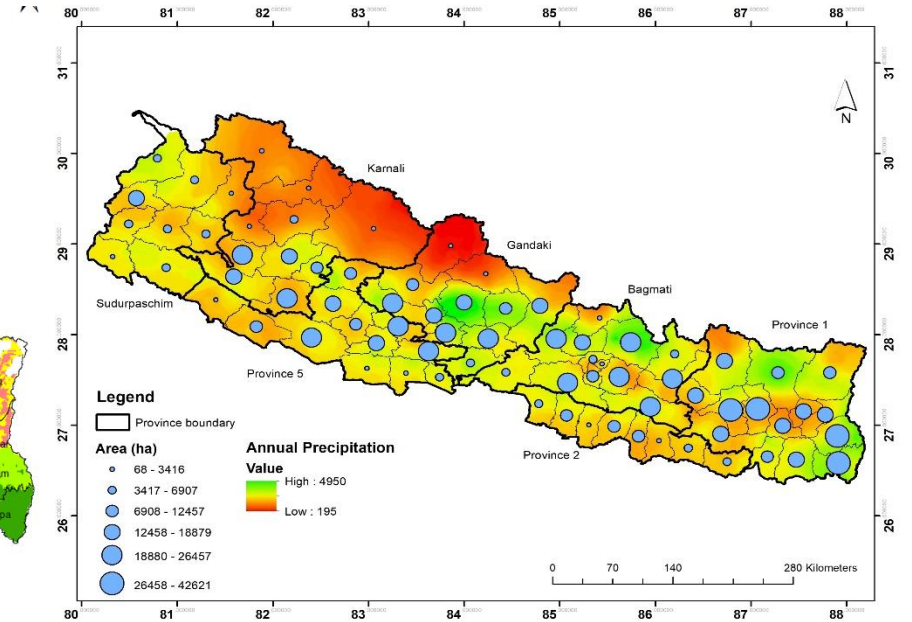
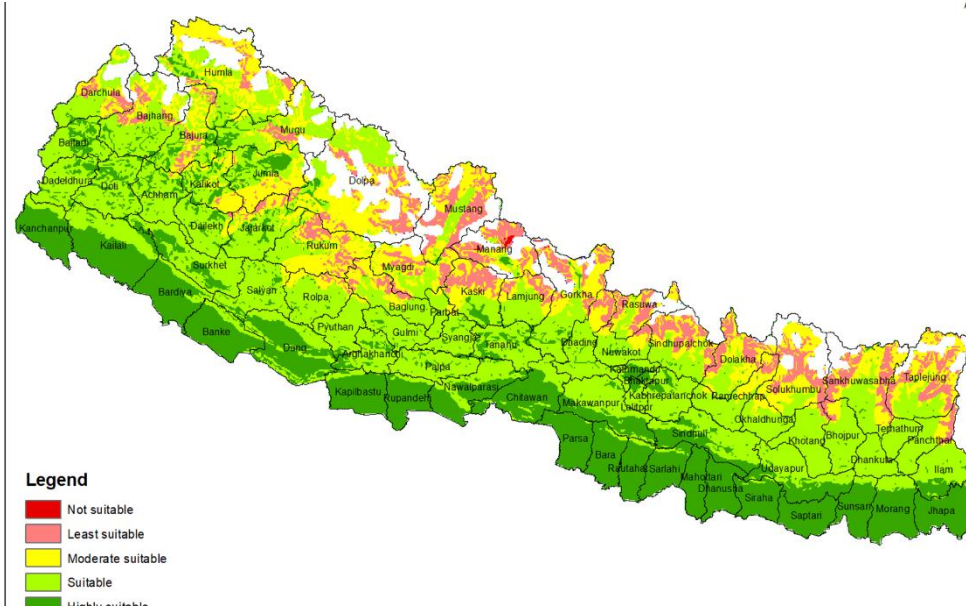
# Digitally Enabled Seed Information System- the case of Nepal

- Demand and supply management
- Seed information portal
- Seed quality monitoring and tracking
- Digital seed inspection and certification
- In Nepal
  - Digital seed balance sheet
  - Digital varietal catalogue
- Harmonization of seed laws or regulation, e.g COMESA

**USAID Supports Nepal's Seed Systems to Go Digital: Connecting Farmers and Seed Suppliers during and beyond the COVID-19 Crisis**

Bandana Pradhan </users/bandana-pradhan>  
Jun 15, 2020







# Capacity building across the maize seed value chain



Seed science and technology courses curriculum development  
for post and under grad students





# Regional hybrid seed production and seed business management workshops







**Learning by doing- hybrid maize seed inspectors training**



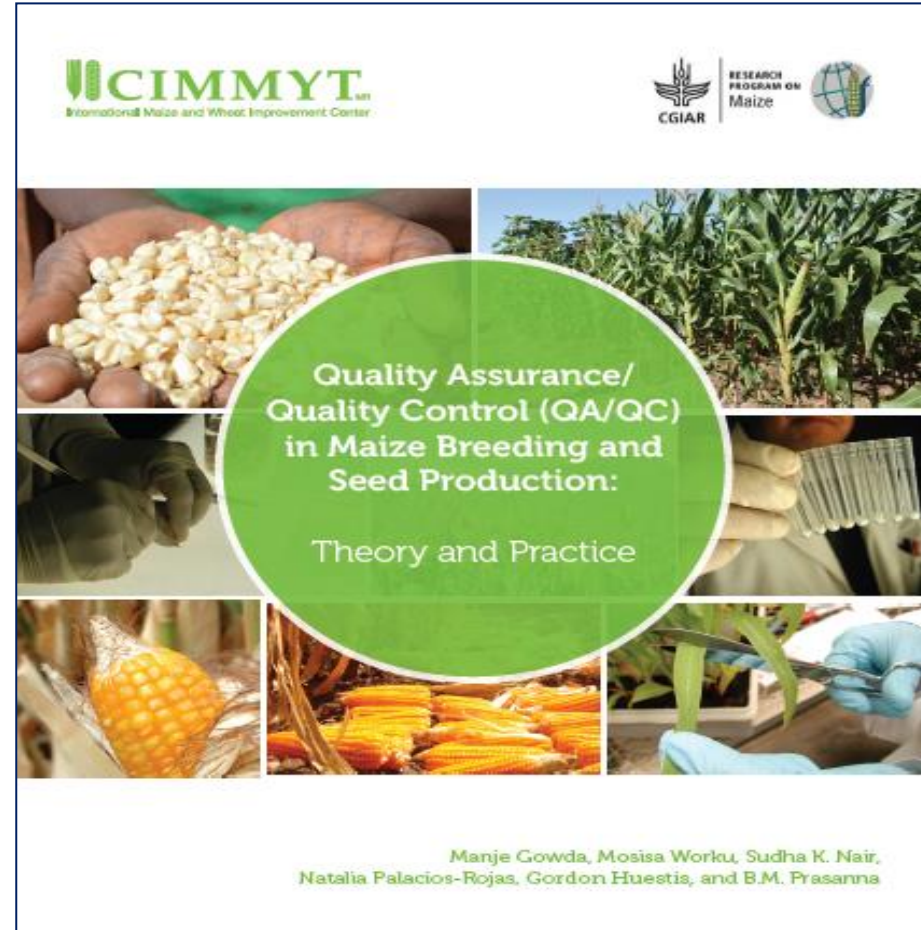
# DH lines handed over to partners in Pakistan and a new DH facility inaugurated in India



# QA/QC of Parental Lines using Molecular Markers



**Check periodically for genetic purity and identity of the parents of commercial hybrids**



**QA/QC manual**







**FEED THE FUTURE**  
The U.S. Government's Global Hunger & Food Security Initiative



परियोजना कार्यान्वयन इकाई, सिन्धुपाल्चोक

खाद्यान्न तथा तरकारी बालीहरूको गुणस्तरीय बीउ  
उत्पादन सम्बन्धी अगुवा महिला कृषकहरूको  
क्षमता अभिवृद्धि तालिम

**Promoting last mile and inclusive seed  
system-women seed growers' group**



## On farm demonstration of PVA hybrid maize hosted by women farmers





# Engaging the youth





# Fostering partnership

## (BSA and Nepal partners)





## In Summary...

- Asia's seed sector in general has made significant progress in the last two decades, but not all countries have progressed optimally.
- Need intensive efforts to strengthen the formal seed systems, and to create local capacities.
- Tremendous potential to drive genetic gains by replacing old/obsolete varieties with improved genetics, and by addressing bottlenecks in the seed value chains.
- Great opportunities for strengthening regional cooperation in the seed sector, across an array of crops.



# Lessons for Bangladesh

- **Local seed industry development** to reduce imports and build resilience and self reliance
- Establish **partnership** for product development, local seed production and business
- Access **elite germplasm** from CIMMYT and other CGIAR centers
- Building **effective tools and technologies** for breeding and products deployment
- Deploy technologies that will reduce production costs and maximize profits
- Incentives for **private sector engagement**
- Build **human resource capacity** across the seed value chain
- CIMMYT is there to collaborate with you!



# Useful links

- Maize hybrid & OPV licensing: <https://maizecatalog.cimmyt.org/>
- Maize Licensing portal:  
<https://cimmyt.inteum.com/cimmyt/agreementportal/>
- Maize product licensing principles/procedures:  
<https://www.cimmyt.org/content/uploads/2021/08/Acquisition-and-use-of-CIMMYT-maize-hybrids-and-OPVs-for-commercialization-v2021-08-19.pdf>
- CIMMYT service catalog: <https://www.cimmyt.org/services/>
- CIMMYT seed request page: <https://www.cimmyt.org/resources/seed-request/>
- Maize product announcements:  
<https://www.cimmyt.org/tag/allocations/>
- CIMMYT germplasm bank:
  - <http://mgb.cimmyt.org/gringlobal/search>
  - <https://wgb.cimmyt.org/gringlobal/search>
- CIMMYT Maize Lines (CMLs):  
<https://data.cimmyt.org/dataset.xhtml?persistentId=hdl:11529/10246>

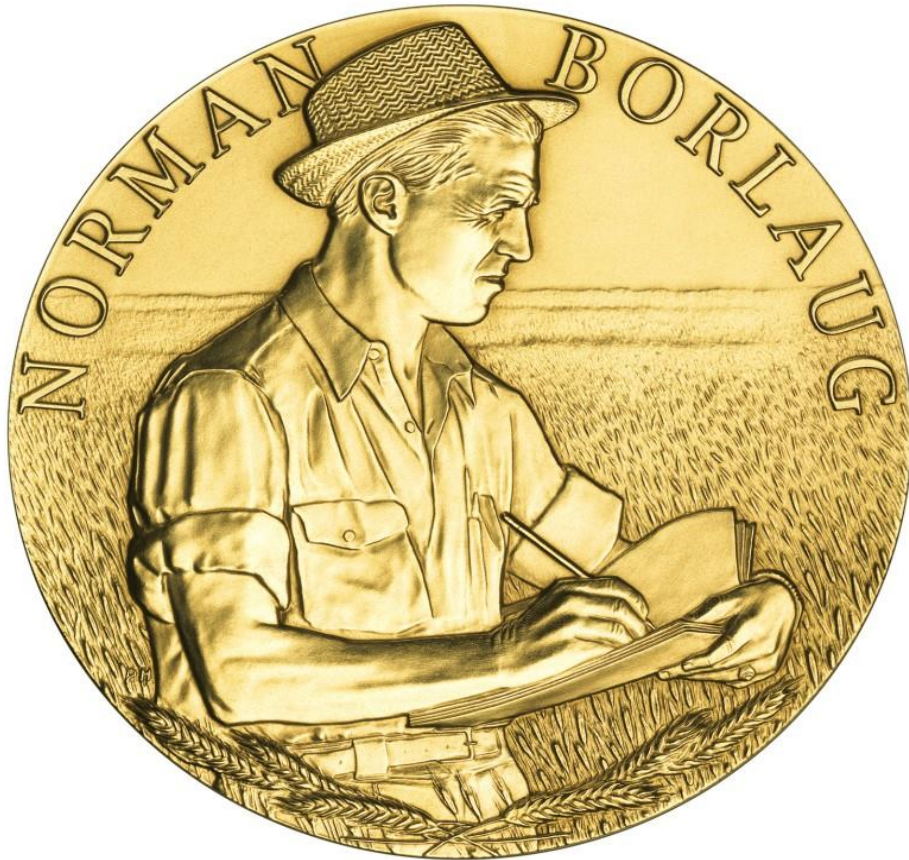


# Acknowledgments

- NARS and Seed companies in South Asia
- USAID's for the financial support of
  - Nepal Seed and Fertilizer Project
  - Agricultural Innovation Program for Pakistan
  - Heat stress tolerant maize for Asia
- IMIC-Asia team
- The director and colleagues of CIMMYT's Global Maize Program
- Seed systems colleagues from ICARDA
- Congress organizers





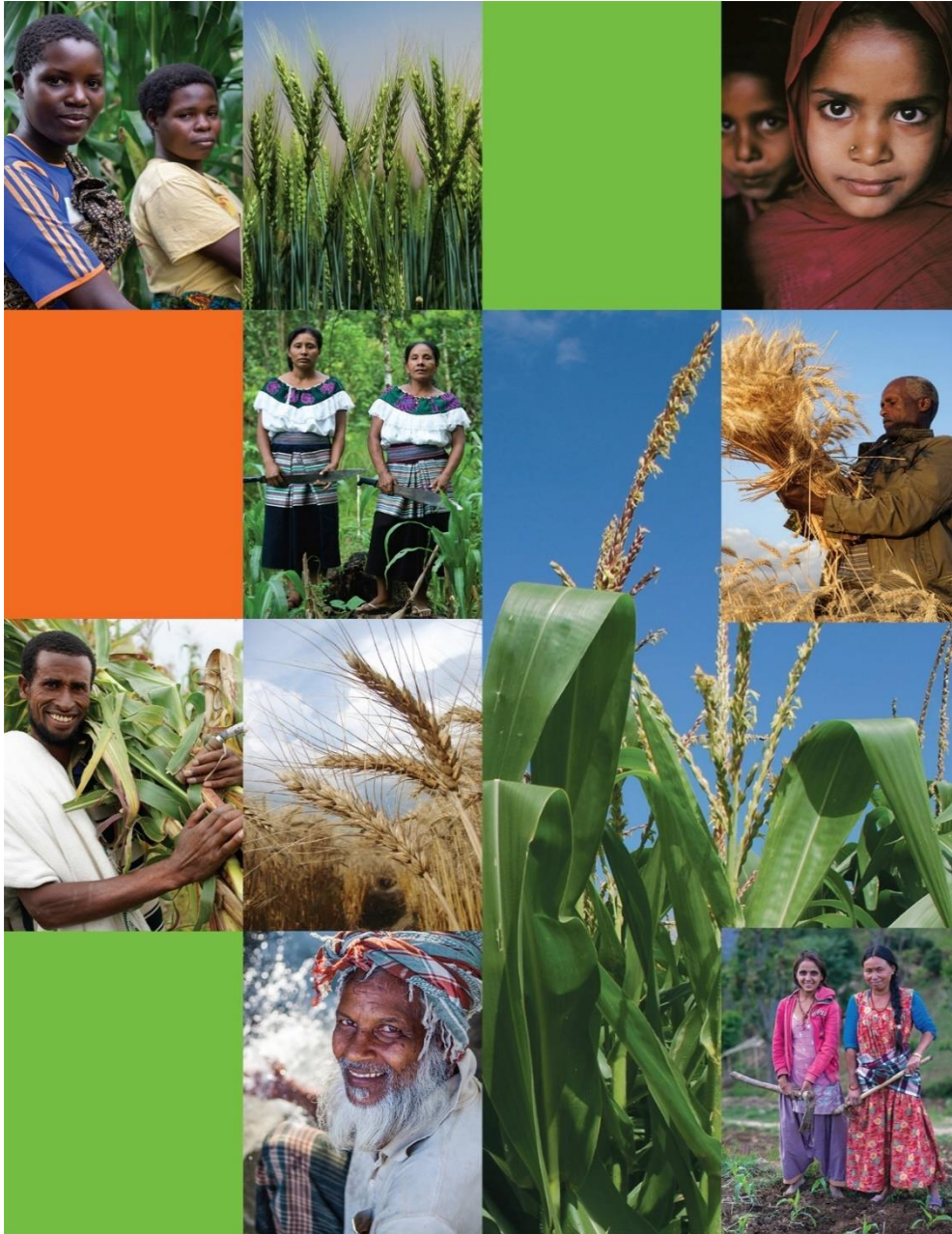


**“You Can’t Build Peace On Empty Stomachs”**

Mentioned by Norman Borlaug, 1970 Nobel Peace Prize Winner

**Seed Security for Food Security!**





**Thank you  
for your  
interest!**