

The Role of Genome Editing in Agriculture & Food Systems  
in South and Southeast Asia:  
*Speaker: Dr. Andrew Roberts*

Sponsored by:

The OECD Co-operative Research Programme:  
Sustainable Agricultural and Food Systems

# Disclaimer

- I have no conflicts of interests related to this presentation
- Agriculture & Food Systems Institute receives grants from organizations that may have an interest in gene editing and regulatory policy for genome editing, including
  - USDA
  - Bill & Melinda Gates Foundation
  - CropLife International

# Contents of the Presentation

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- Brief Introduction
  - Myself and my organization
- Why do South and Southeast Asia Matter?
- What are the developments in policy for Genome Editing in these regions?
- What does this mean for the world?



# Who am I?



- Ph.D. Cell and Developmental Biology
- Joined the USDA in 2005 as an AAAS Risk Policy Fellow
- Held various positions at USDA until Dec. 2009
  - Joined what is now AFSI
- Spent the last 15 years helping scientists and regulators think about risk assessment
- South Asia Biosafety Program Lead since 2011





## Agriculture & Food Systems Institute

- Not-for-profit scientific organization
- Mission to Foster a Better World Through Science
  - With a focus on innovation and regulation
- Five Current Mission Areas
  - Biosafety Capacity Building\*
  - Environmental Risk Assessment
  - Sustainable Nutrition Security
  - Food and Feed Safety Assessment
  - Plant Biologicals for Sustainable Agriculture
- <https://foodsystems.org>

# Why Does it Matter?

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Genome Editing Policy in South and Southeast Asia

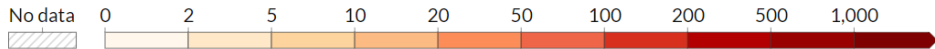
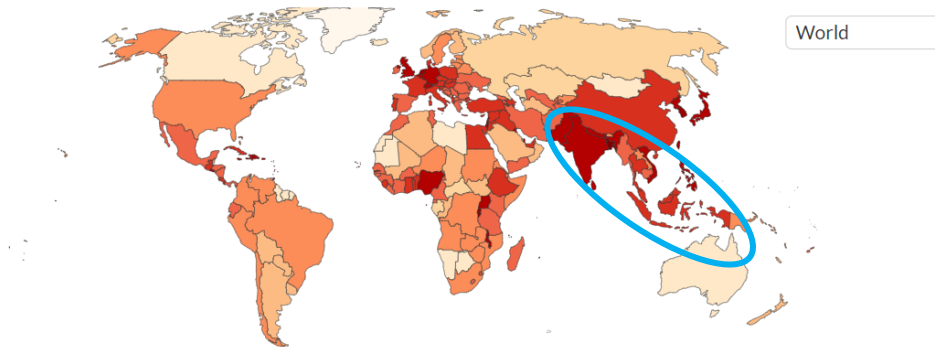


# Population density, 2022

The number of people per km<sup>2</sup> of land area

Our World  
in Data

World



Source: HYDE (2017); Gapminder (2022); UN WPP (2022); UN FAO (2022)  
OurWorldInData.org/world-population-growth • CC BY



# Lots of People



- South Asia has a population around 2 Billion
  - About 25% of the global population
- Southeast Asia has a population of around 670 Million
  - Roughly equivalent to the population of Europe (740 Million including Russia, 600 Million without)





# Lots of Agriculture

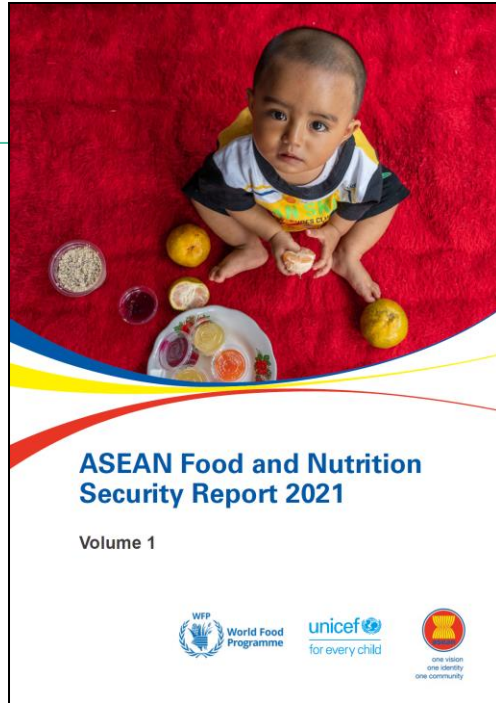


- Agriculture contributes significantly to GDP
  - 7-21% of GDP across the region
- India is the world's 2<sup>nd</sup> largest agricultural producer
  - Most food is produced by smallholder farmers and is consumed locally
- Benefitted from the Green Revolution
  - Many countries have achieved some level of staple self sufficiency
  - Many are regional exporters

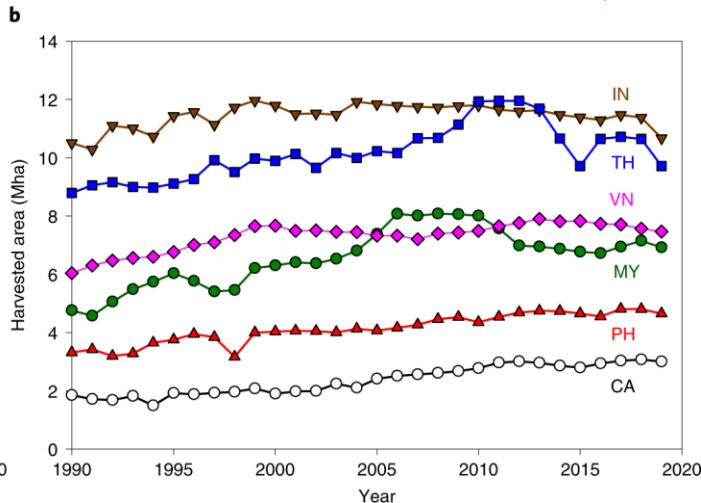
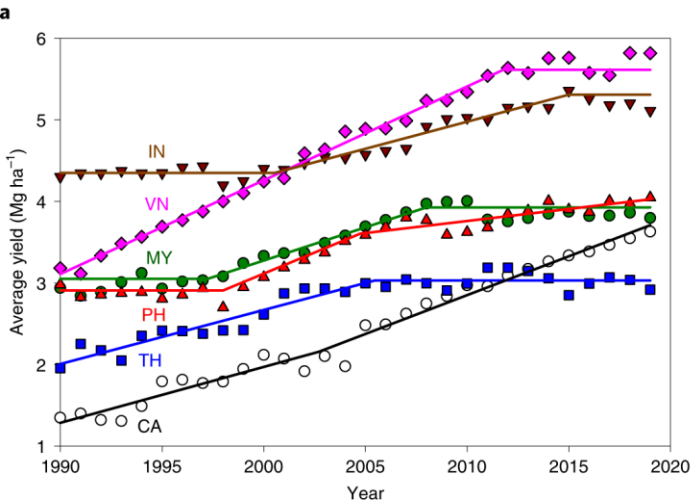


# Hunger Remains

- 18.6% of the population of ASEAN countries experience moderate to severe food insecurity
- 24% consume inadequate quantities of recommended nutrients
  - Vitamins, minerals and trace elements
- In South Asia, 21% of the population faces severe food insecurity



# Despite advancements in Agriculture\*



# Agricultural Biotechnology Cultivation



- Bt Cotton remains the only commercialized product in India and Pakistan
- Bangladesh has only Bt Brinjal
- Indonesia has one approved sugarcane variety
  - Although other products have food approvals
- The Philippines is the regional leader
  - Bt Maize approvals going back to the 1990s
  - Approved Bt Brinjal
  - Approved Golden Rice

# Climate Change Vulnerability



- Bangladesh consistently appears among the most vulnerable countries to the impacts of climate change
  - Low elevation
  - Economic insecurity
- Island and coastal populations centers throughout South and Southeast Asia
  - All of the factors influencing food insecurity also limit the ability to respond to climate change.

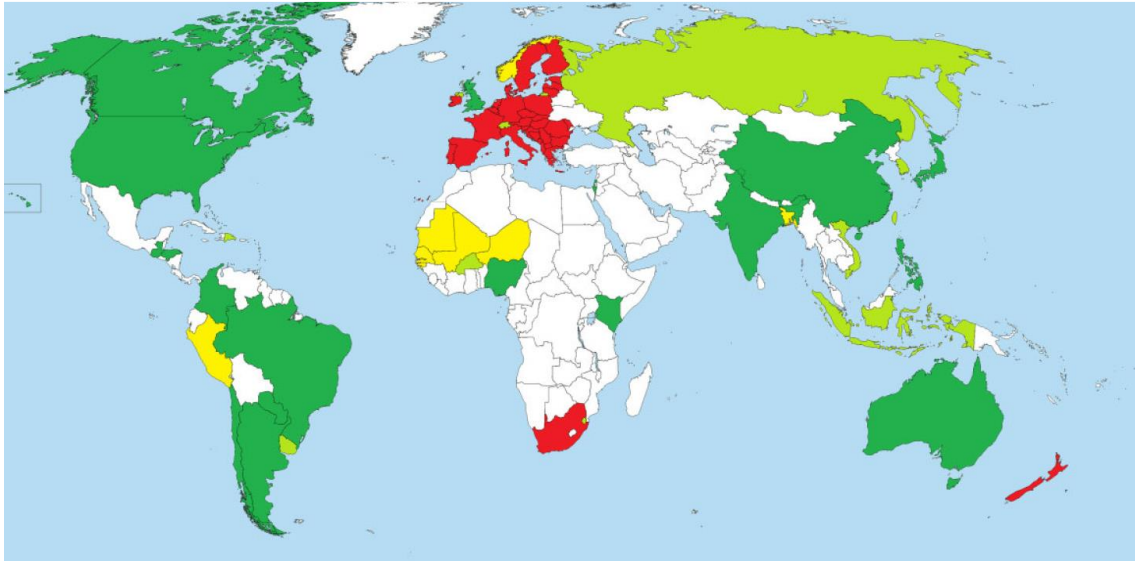
# What are the policy developments?

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Genome Editing Policy in South and Southeast Asia



# 30,000 Foot View



# Countries with Published Policies



- The Philippines
  - Products produced using genome editing that resemble those produced through conventional breeding are excluded from GMO regulations
  - Use a 20bp sequence threshold
  - One product so far excluded – delayed ripening banana
- India
  - Products of SDN1 and SDN2 mutagenesis are excluded from GMO regulation
  - Confirmation of the lack of exogenous DNA carried out by Institutional Biosafety Committees
    - Produced an SOP detailing how confirmation can be accomplished



# Countries with a record of “Discussion”

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- Bangladesh\*
  - Indonesia
  - Malaysia
  - Thailand
  - Vietnam
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- All of these discussion appear to recommend excluding genome edited products from GMO regulations



# Bangladesh timeline

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- December 2021 Bangladesh Academies of Science (BAS) approached the South Asia Biosafety Program (SABP) to organize a series of webinars in 2022
- This culminates in a face-to-face workshop in October, 2022
  - The Bangladesh Ministry of Agriculture invites BAS to prepare a report making recommendations on the future of genome editing in Bangladesh
- The report was submitted in January 2023
  - The Bangladesh Agricultural Research Council is actively working to develop a policy based on this report.



# What does this mean?

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Take home messages



# Regulatory Uncertainty

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- Uncertainty around the status of genome edited plants remains the rule in South and Southeast Asia
  - Although there is growing consensus among existing polices that genome editing will be excluded from GMO regulation
- Regulatory clarity is a prerequisite for use of genome edited plants in agriculture
  - But it isn't the only one!
  - IP issues
  - Research and development



# This technology matters



- Genome editing doesn't have the answers to every agricultural problem
  - But there's no question it can make a significant contribution
- Research is ongoing
  - Stress tolerance
  - Nutritional enhancement
  - Agronomic and food quality characteristics
  - Regional staples (rice) and underserved crops (banana, groundnut)
- The needs are great





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**Thank You**



[aroberts@foodsystems.org](mailto:aroberts@foodsystems.org)