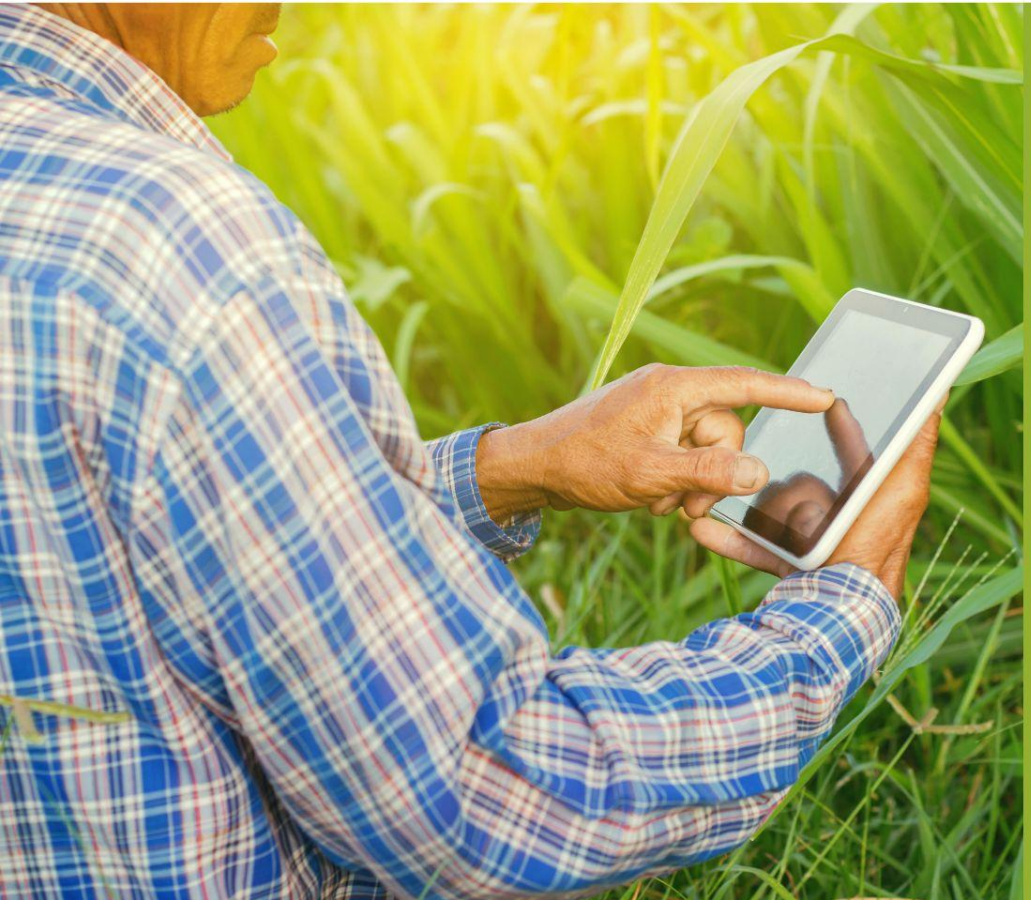
FOOD SYSTEMS SUMMIT 2021 DIALOGUES

Philippine Seed Industry Association, Inc.

CropLife PHILIPPINES

EAST-WEST SEED

PPSA
Philippines Partnership for Sustainable Agriculture



UN FOOD SYSTEMS SUMMIT-PHILIPPINES 2021 INDEPENDENT DIALOGUE

Multi-Stakeholder Dialogue on Innovation and Technology

- Precision Agriculture
- Precision Breeding

May 27, 2021 | 9:30 AM

House Rules

1. This webinar is recorded.
2. Kindly mute yourself when not speaking.
3. Should you want to speak, please use the RAISE HAND function and wait to be acknowledged.
4. For questions, kindly use the Q&A box for better tracking.
5. For technical assistance, use the CHAT box or email us at secretariat@ppsa-ph.org.

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UN Food Systems Summit 2021

Register of Attendance

Welcome Message

Dr. Mary Ann P. Sayoc

President,
Philippine Seed Industry Association

Private Sector Co-Chair,
Philippines Partnership for Sustainable Agriculture

Keynote Message

Dr. William D. Dar

Secretary,
Department of Agriculture

Public Sector Co-Chair,
Philippines Partnership for Sustainable Agriculture

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Keynote Message

Dr. Eufemio T. Rasco, Jr.

President

Coalition for Agriculture Modernization in the Philippines, Inc. (CAMP)

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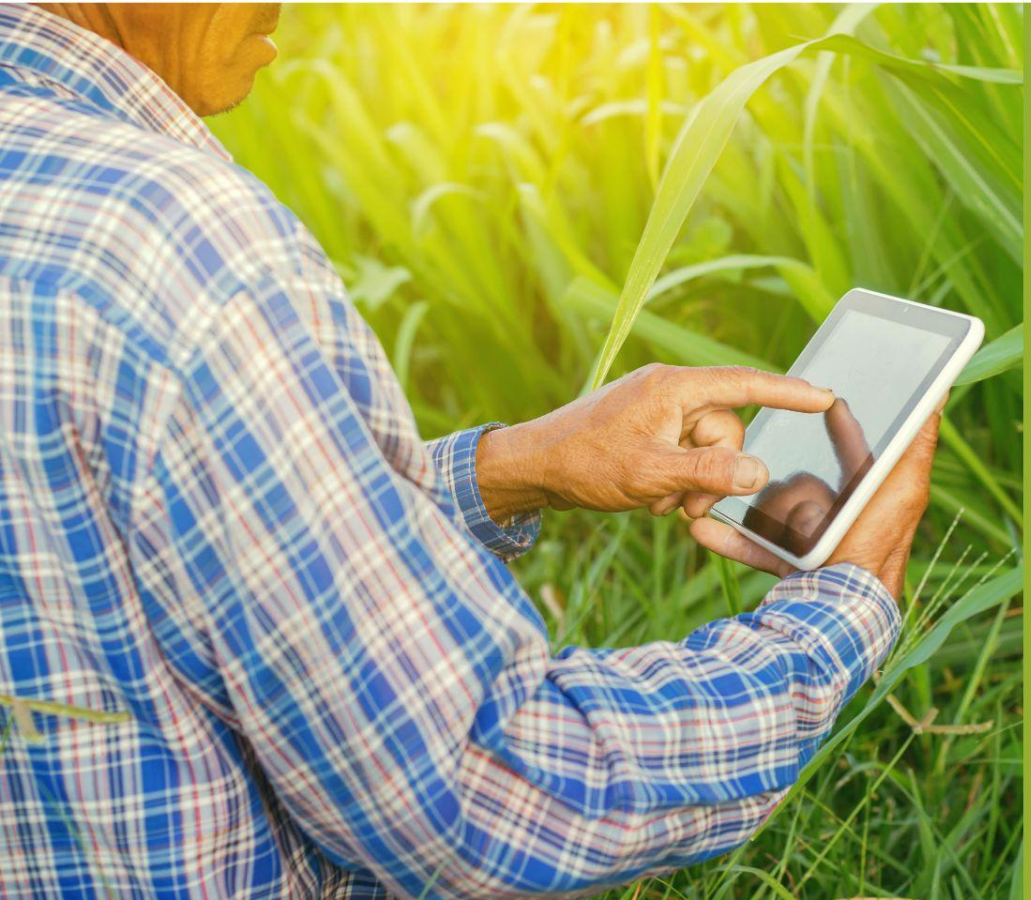

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Presentation of Challenges

Edilberto de Luna

Executive Director

CropLife Philippines

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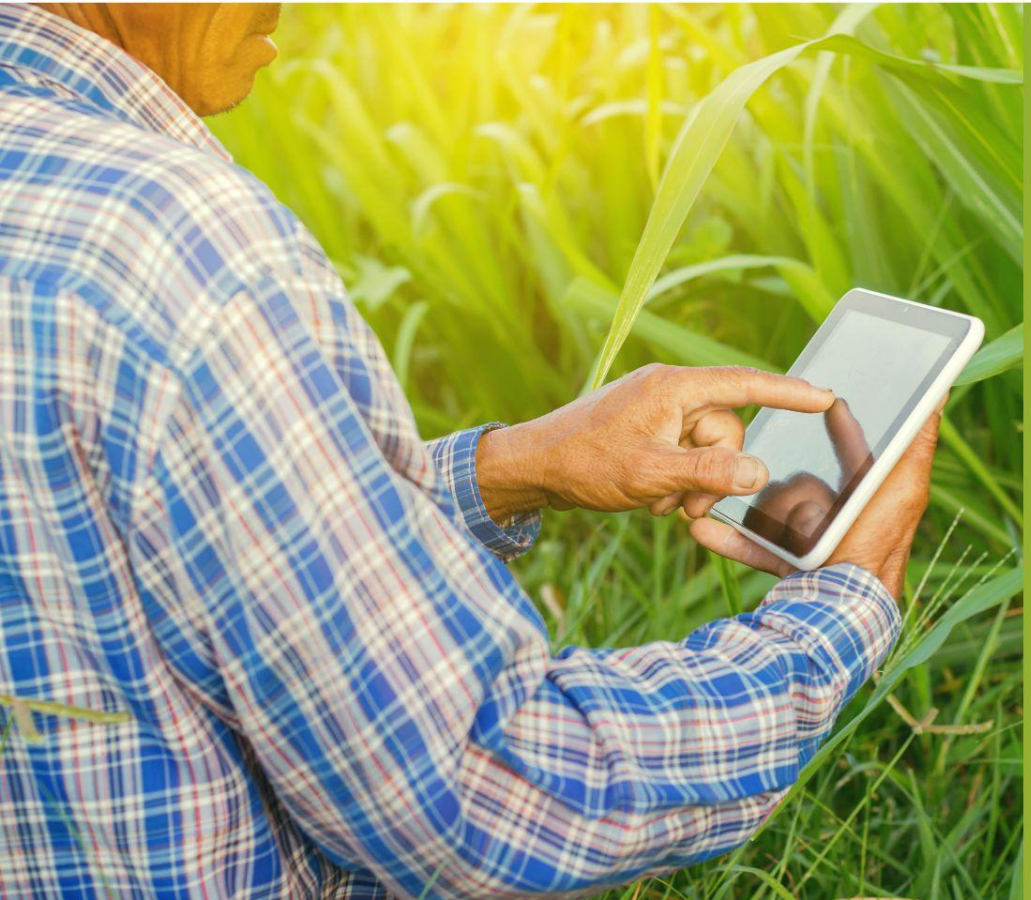

UN FOOD SYSTEMS SUMMIT-PHILIPPINES 2021 INDEPENDENT DIALOGUE

Multi-Stakeholder Dialogue on Innovation and Technology

BREAKOUT SESSION:
Precision Agriculture

Precision agriculture- approach to farm management that uses IT

Includes:

- ❑ Equipment Guidance
- ❑ Yield monitoring
- ❑ Input applications
- ❑ Remote sensing
- ❑ Section and row control on planters
- ❑ Sprayers
- ❑ Fertilizer applicators
- ❑ Data management systems

ADVANTAGES

- Increase efficiency and reduce costs
- Solution to shortage of farm laborers and workers
- Makes farming more accurate and controlled
- Modernized farming
- Precise application of inputs
- Makes farming easy and entices younger generations
- In the Philippine context - viable strategy to support modernization and farm clustering

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PRECISION AGRICULTURE: CHALLENGES

- Shift away from traditional farming culture & practices
- Standardizing Technology Across Platforms. ... Interoperability of different standards; The learning curve
- Connectivity Challenges. ... Connectivity in rural areas
- Data Management In Agriculture. ... Making sense from big data in agriculture
- Lack of scalability and configuration problems – land size
- Compliance with data privacy/protection laws
- Capital intensive (in the case of drones)

Thank you

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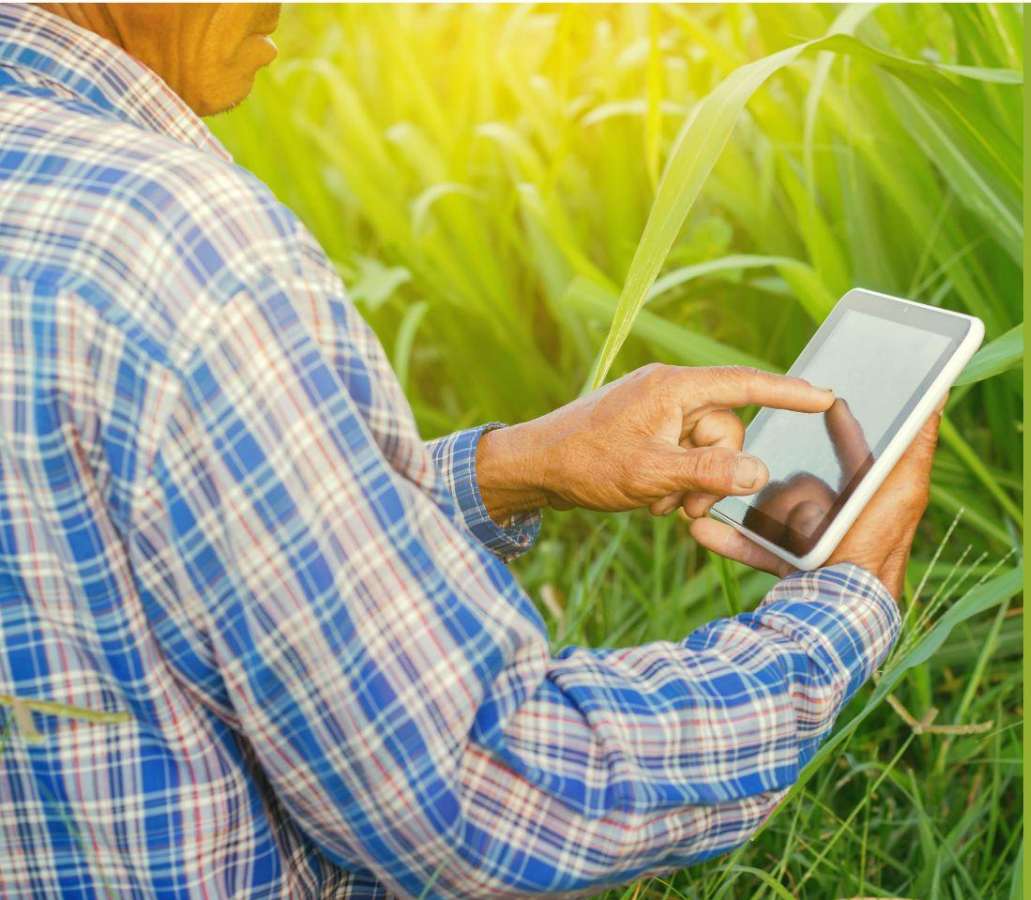

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A Briefer on Drones

Aaron Cano

New Business Activation Manager

Bayer CropScience, Inc.

Why drones?

- Saves Significant Time & Effort
- Cost-Efficient Precision
- Promotes Farm Consolidation/Organization
- Entice More People to Ag

10 Advantages of Drone Use

Operator safety	• Minimize exposure to chemicals
Reduced chemical loading	• Can use data from plots to compare variances and applicable conditions
Accurate & even dosing	• Fully automated & “Professionalized“ • Certifications (eg. CAAP, FPA)
Maximize yield potential	• Can be applied in difficult or dangerous terrain
Resource management	• Less water used, 20L to 48L needed per hectare
Address labor shortage	• Drones sprays 1 ha. rice field in 15-20 mins • Drone direct seeding 25-30 min per ha.
Ageing farmer population	• Drones can be easily operated by a younger, tech-oriented generation
Better farm records	• Data inputs in serviced areas, products applied including timing & volume
Data-based decisions	• Decision making using generated data (w/ surveys, multi-spectral cameras, sattelite data)
Equipment & maintenance	• Easier to maintain and store equipment

STRENGTHS

- Clear drone guidelines on operations (CAAP, CAB)
- DA support; established FPA registration guidelines

- Fast and efficient application – even in hilly areas
- Spray/sow seeds for 1 ha. rice in 15-30 mins

- Operator safety and better water resource mgt
- Operator protection vs wildlife, field debris

- Data-based farm decisions and better farm records
- Can be linked to digital farming tools

- Ease of operation, storage and maintenance
- Attractive to younger farming generations

WEAKNESS

- Cost of equipment ranging from P700k to more than P1.0mio

- Limited skilled and licensed operators; Inadequate service providers with complete documentations

- Challenge in securing necessary permits for for operators and service provider (CAAP, CAB)
- No centralized information on processes, limited options to secure permits outside NCR

OPPORTUNITIES

- Rapid tech development bring more affordable drones to market; high interest w/ stakeholders

- Support development and regulation of service providers with one-stop-shop for all Agri drone related license to operate, permits, information

- Ease of data gathering for research, experimentation and further innovation

THREATS

- Proliferation of unlicensed service providers and operators pose risk to stakeholders

Thank You

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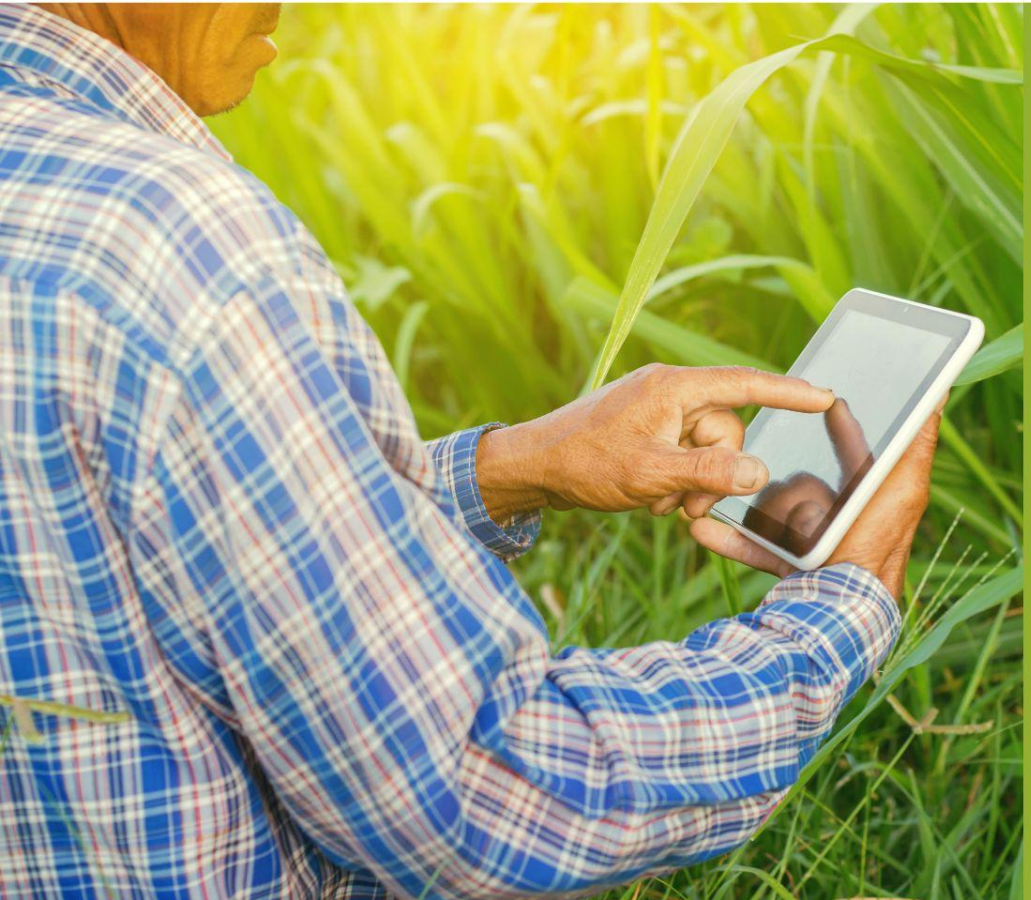

UN FOOD SYSTEMS SUMMIT-PHILIPPINES 2021 INDEPENDENT DIALOGUE

Multi-Stakeholder Dialogue on Innovation and Technology

BREAKOUT SESSION:
Precision Agriculture

Session Moderator

Dr. Benigno Peczon

President Emeritus,
Coalition for Agriculture Modernization in the Philippines, Inc.

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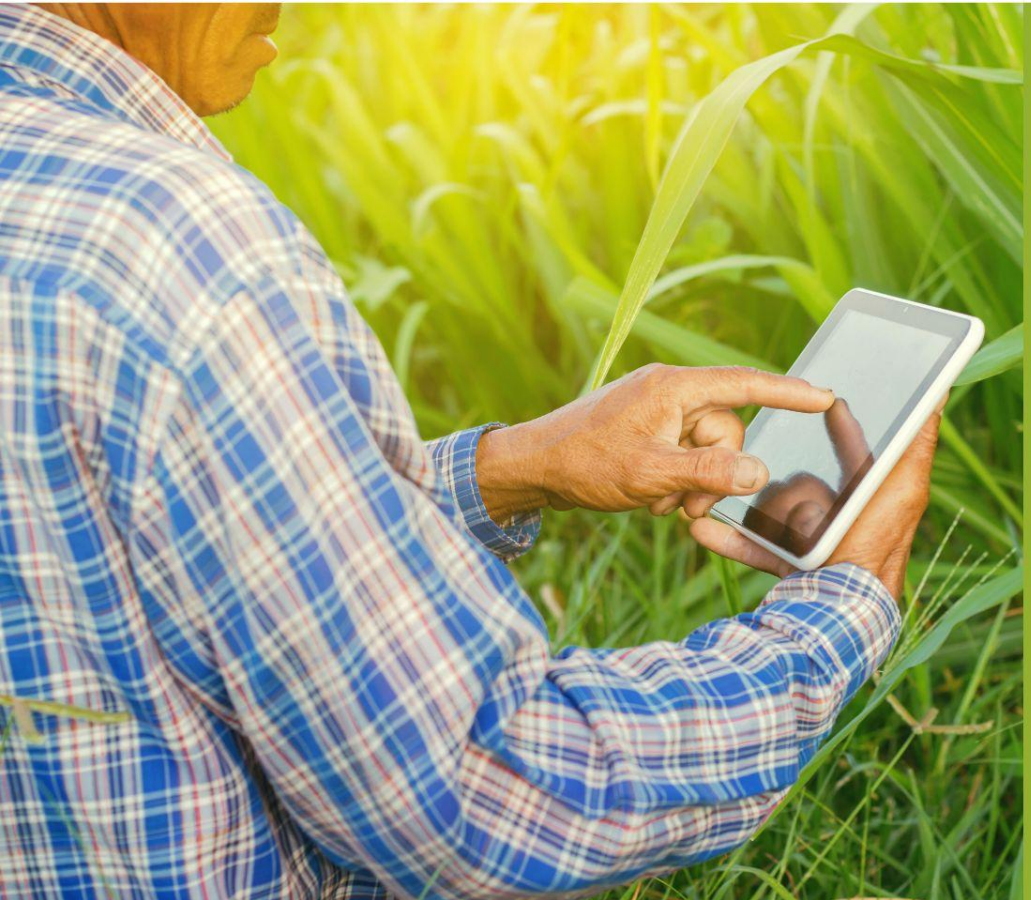

UN FOOD SYSTEMS SUMMIT-PHILIPPINES 2021 INDEPENDENT DIALOGUE

Multi-Stakeholder Dialogue on Innovation and Technology

BREAKOUT SESSION: Precision Breeding

Presentation of Challenges

Dr. Gabriel Romero

Executive Director

Philippine Seed Industry Association, Inc.

Precision Breeding in the Philippines

- Several strong conventional breeding institutions
- Strong biotech institutions – IRRI, IPB and PhiRice
- Moderate capacity on marker-aided breeding
- Functional biotech regulatory system

Few gene clones for transformation
Limited genetic engineering capability
Minimal collaboration with advance laboratories

Support from scientific community and farmer organizations
Support from Secretaries of Agriculture and Science & from Technology
Available facilities at Philippine Genome Center and DA-Crop Biotechnology Center
More efficient and accessible genome editing tools
Possible funding from BPO, BAR and PCAARRD

Public wary of safety of GM crops
Piracy of proprietary biotech and breeding products
Licensing restrictions on editing tools
Anti-biotech groups in the country
Anti-biotech ordinances and resolutions in some LGUs

Challenges

1. What are the **training needs** in the academe and research institutions?
2. What **crops, farming problems and consumer needs** should be prioritized?
3. How can we **mitigate or avoid the threats** to precision breeding?
4. What **types of collaborations** among which entities can promote precision breeding tools?
5. What **regulatory** approaches can facilitate adoption of **genome editing**?

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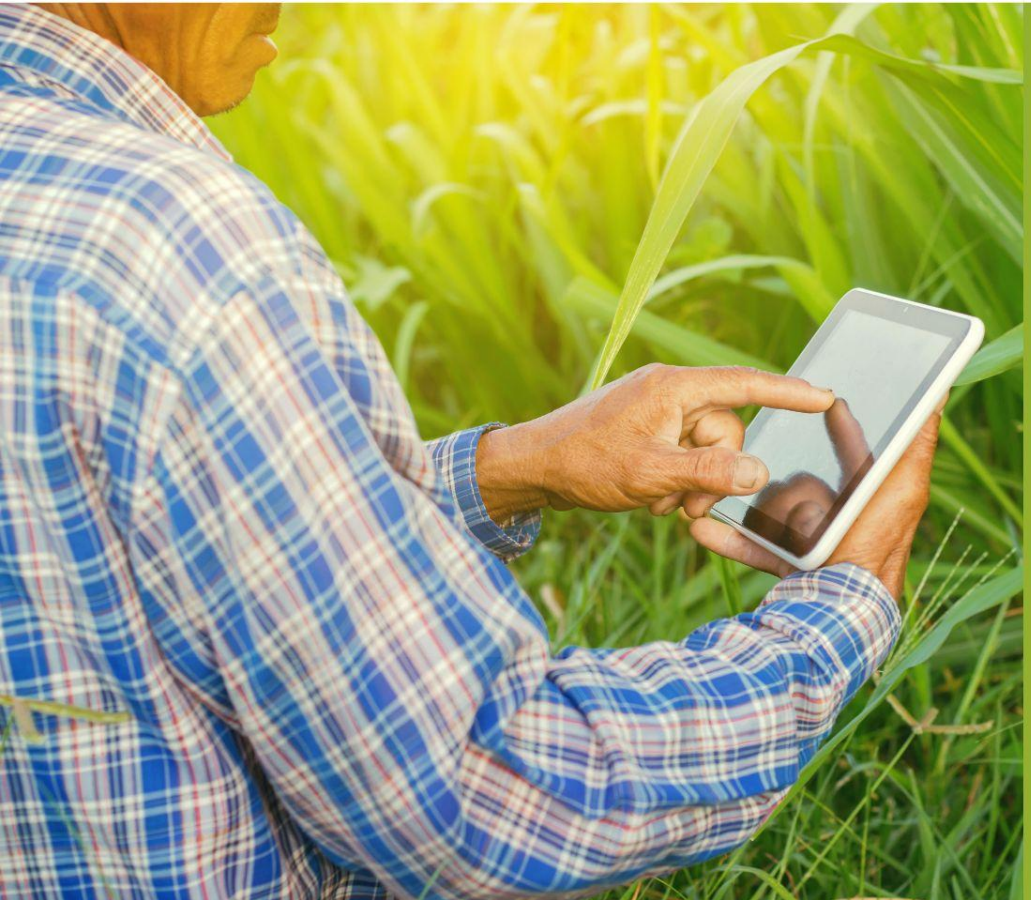

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BREAKOUT SESSION: Precision Breeding

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A Briefer on Precision Breeding

Dr. Conrado Balatero

Group Breeding Manager

East-West Seed

Transforming agricultural productivity through “precision breeding”

Conrado Balatero, Ph.D.
Group Breeding Manager
East West Seeds

Challenges

Technologies for precision breeding

Recommendations for adoption and scaling up

CHALLENGES

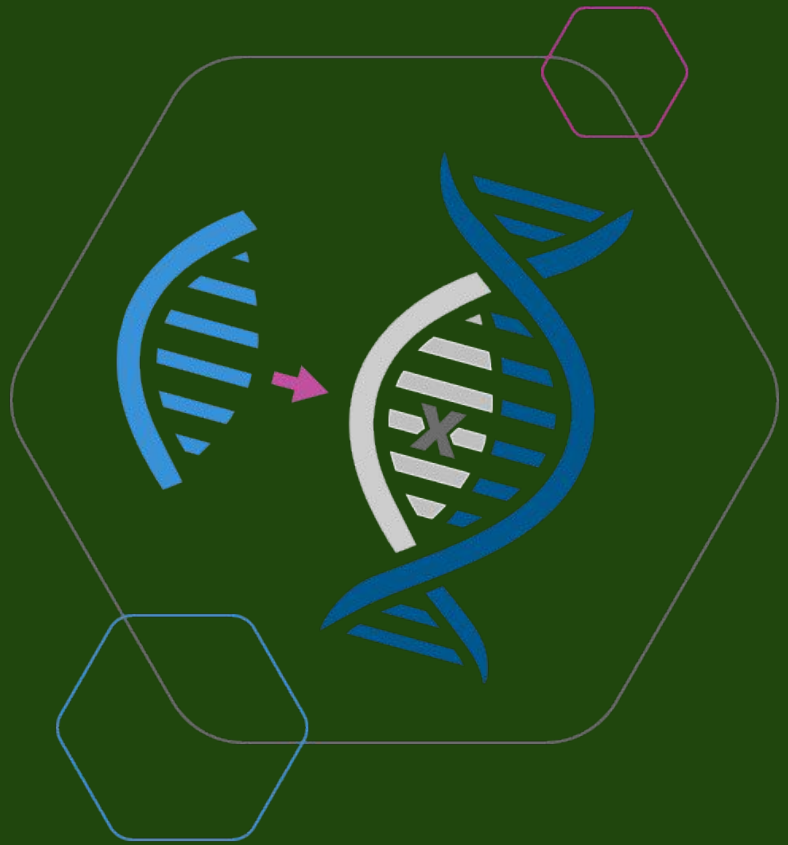
- Philippines is challenged with low agricultural productivity
- Climate change has aggravated the situation – threatening food security and impacting our economy

  - Biotic stress (insect pests and disease outbreaks)
  - Abiotic stress (drought, flooding, heat, salinity, etc)

- Breeding new improved varieties can mitigate the impact of climate change but conventional breeding approach has its own limitations

  - Takes many years (7-15 yrs depending on the crop)
  - Linkage drag
  - Crossability barriers/sexual incompatibility
  - Sometimes desired trait is not present within the cultivated species

Source:https://www.iberdrola.com/wcorp/gc/prod/en_US/comunicacion/adaptacion_cambio_climatico_key_res/Adaptacion_379x464_tag.jpg



INNOVATIVE TOOLS AND TECHNOLOGIES FOR PRECISION BREEDING

- **Rapid advances in plant biotechnology**
  - **Genomics-based breeding**
    - Marker-assisted breeding for simple traits
    - Genomic selection for complex traits
  - **Trait-marker associations (QTL mapping, GWAS)**
  - **Genetic engineering/transgenic technology**
  - **New mutagenesis approaches**
    - TILLING (**T**argeting **I**nduced **L**ocal **L**esions **IN** **G**enomes)
    - Genome editing/CRISPR (**C**lusters of **R**egularly **I**nterspaced **S**hort **P**alindromic **R**epeats) technology
  - **Next generation sequencing technologies**
    - Genome assembly (many crops)
    - Pangenome analysis
  - **Advances in plant molecular pathology**
    - Plant disease diagnostics

INNOVATIVE TOOLS AND TECHNOLOGIES FOR PRECISION BREEDING

- Rapid advances in phenotyping technologies ‘Phenomics’
  - Video tracking (e.g. insect resistance)
  - Flourescence imaging (insect/disease resistance)
  - Fully automated phenotyping systems using multispectral 3D sensors
  - Growth chambers for controlled phenotyping (e.g. disease bioassays)
  - Near-infrared spectrophotometry (NIRS)/ Microwave technology

Source: https://phenospex.com/wp-content/uploads/2020/03/FieldScan-Taiwan-Flooding-experiment-e1584359126152.png

Source: https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcRtaV-2lxuBpzQ

CHALLENGES: Technology Adoption/Scaling Up

- Lack of government funding to drive creativity and innovation
- Public-private partnerships to drive innovation and adoption on precision breeding technologies
- Limited application of new technologies for precision breeding (e.g. genomics-based breeding)
- Public perception on the safety issues of products derived from genetic engineering
- Uncertainty or lack of clarity in the regulation for CRISPR-derived products in the Philippines (process-based vs product-based regulation)
- High cost of licensing

Source: https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcQPx3KEanfxTPO_95z_L8G77ZK0H_hb7q4f3A&usqp=CAU

RECOMMENDATIONS FOR ADOPTION AND SCALING UP

- **Networking and partnerships is the key**
  - **Public-private partnerships (PPP)**
    e.g. Dutch PP projects is a good model
    - Funding: 50% gov't + 50% private sector (25% cash + 25% in-kind)
    - Criteria includes research topics or innovations with high potential for industry applications
  - **Consortium memberships (examples)**
    - APSA-Worldveg Breeding Consortium
    - Vegetable Breeding Institute (Cornell University + U of Wisconsin-Madison)

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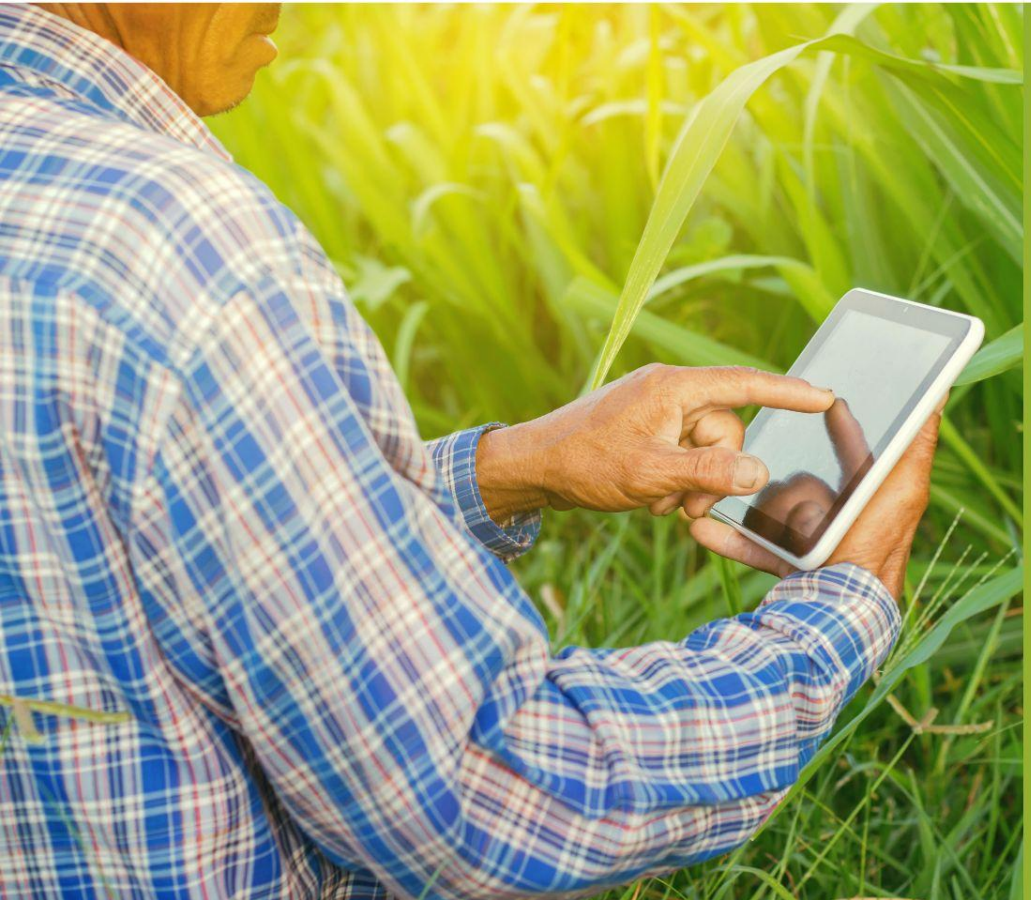

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Multi-Stakeholder Dialogue on Innovation and Technology

BREAKOUT SESSION: Precision Breeding

ENCOURAGING PUBLIC-PRIVATE PARTNERSHIPS ON PRECISION BREEDING TECHNOLOGIES

What's in it for the public sector?

- Opportunity to align R&D funds to support industry needs, thus ensuring industry utilization of research output
- Co-funding means lower cost, thus limited funds can support more projects
- Government funds can help support knowledge institutes (universities and research institutes) to develop high-caliber scientists (e.g. hiring of Ph.D. candidates or postdocs as primary researchers)

What's in it for the private sector?

- Upstream or fundamental research can be costly; co-funding means lower cost
- Opportunity to align government's R&D priorities to industry needs
- Provides opportunities for training of private companies' breeders and researchers in the knowledge institutes
- First access to direct results from the project – a lead time of 1-2 years before the work is published

Some Examples of PPPs on genomics, sequencing technologies and and CRISPR applications

WAGENINGEN UR
For quality of life

- **Knocking out S-genes in cucurbits using CRISPR**
  - EWS + 7 other companies
- **Durable resistance in tomato using CRISPR to knock-out plant S genes**
  - EWS + 11 other companies
- **On-site plant pathogen detection (using LAMP) and barcode sequencing (using nanopore sequencing technology)**
  - EWS + 7 other companies/ institutes

CSH Cold Spring Harbor Laboratory

- **Enhancing yield and heterosis in tomato by regulating flowering**

UCDAVIS

- **Developing mutants for inducing haploids in tomato**

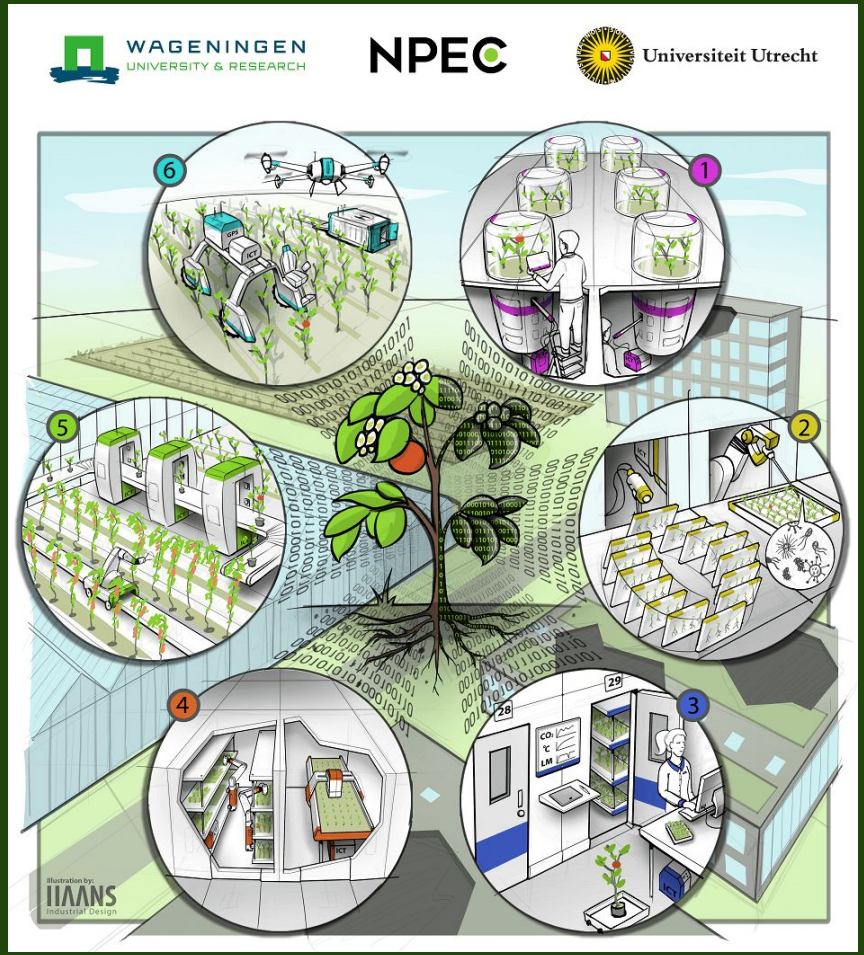
COLLABORATIVE PROJECTS ON HIGH THROUGHPUT PHENOTYPING

- High throughput phenotyping for disease resistance in plants

  Project Proponents: Wageningen Plant Research, EWS + 15 other companies/partners

- High throughput phenotyping for plant resistance to sucking pests

  Project Proponents: Plant Research International, EWS + 5 other companies/partners



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COLLABORATIVE PROJECTS VIA CONSORTIUM (SOME EXAMPLES)

- APSA-Worldveg: Multi-environment testing of Ty genes in tomato and sequence analysis of begomovirus and its whitefly vector
  Project Proponents: Worldveg, EWS + 22 other APSA member companies

- APSA-NSTDA (Thailand): Screening protocol development for TNRV and CaCV (tomato)
  Project Proponents: BIOTEC (Thailand), EWS + 9 other companies/partners

- New APSA-Worldveg project: High throughput phenotyping for heat tolerance (tomato and pepper)
  Project Proponents: Worldveg, EWS + 7 other companies/partners

APSA
THE ASIA & PACIFIC SEED ASSOCIATION

World Vegetable Center

NSTDA

Source:

RECOMMENDATIONS FOR ADOPTION AND SCALING UP

- **Establish innovation centers**
  - A place to develop a culture of creativity and innovation
  - Create, share and test ideas
- **Promote/strengthen IP protection**
  - Patents, PVP, trademarks, copyright, etc
  - Allows the inventor to protect his invention, earn recognition or derive financial benefit
  - Encourages creativity and innovation

EAST-WEST SEED

THANK YOU

Session Moderator

Dr. Vivencio Mamaril

Director

Department of Agriculture

Bureau of Agricultural Research

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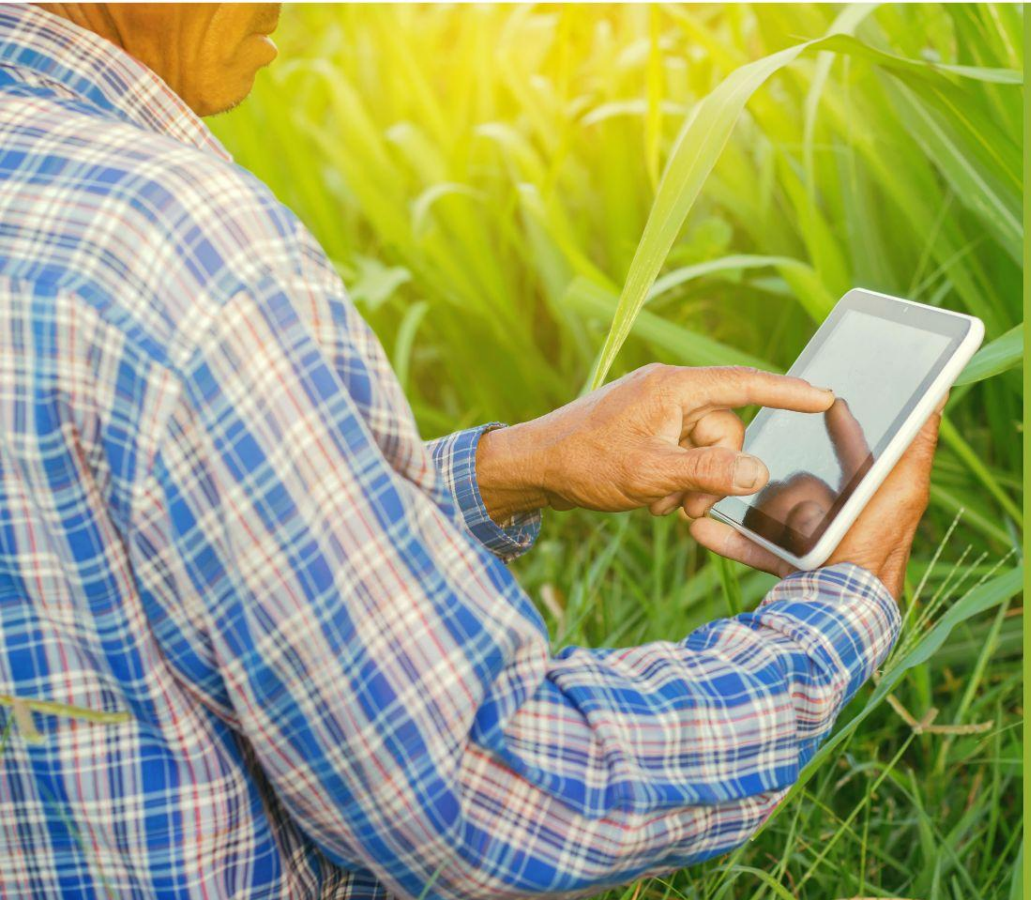

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Reporting of Breakout Session Outputs

Precision Agriculture

Dr. Benigno Peczon
President Emeritus,
Coalition for Agriculture
Modernization in the Philippines

Precision Breeding

Dr. Vivencio Mamaril
Director
Department of Agriculture -
Bureau of Agricultural Research

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CLOSING REMARKS

Edilberto de Luna

Executive Director

CropLife Philippines

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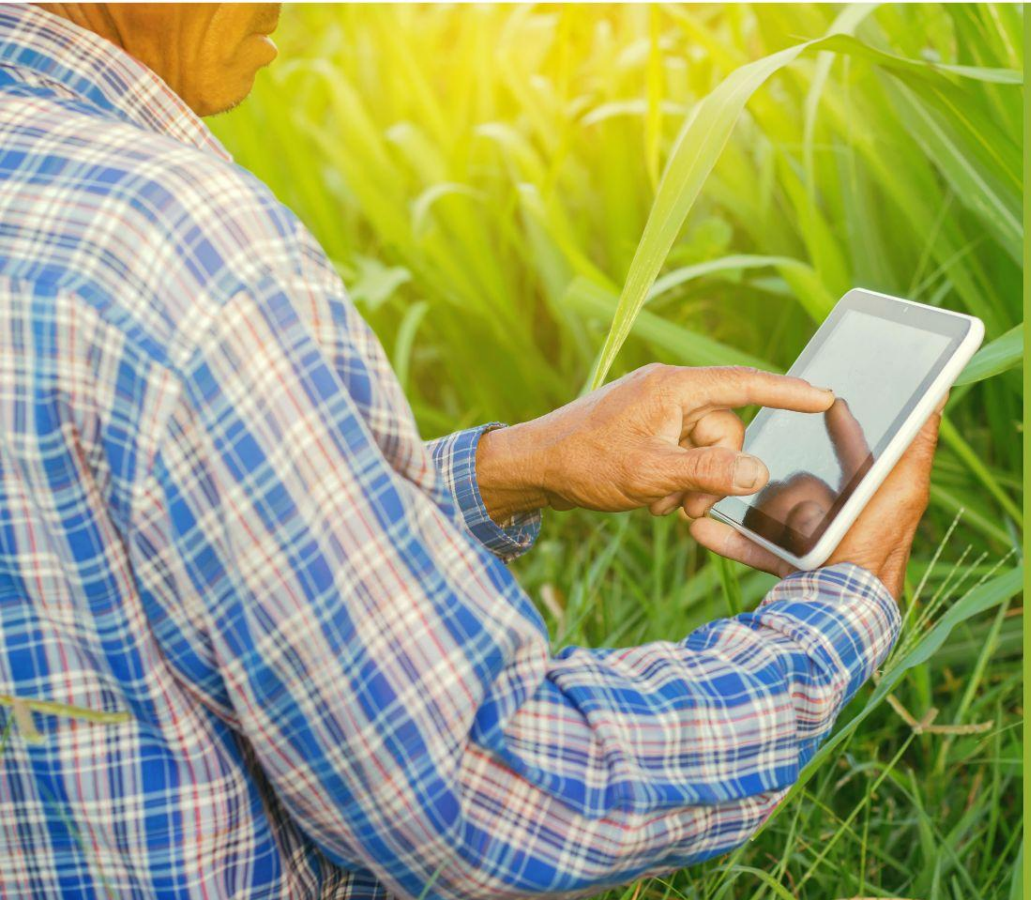

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