



# Organic farming and Co-existence with GMOs and Applications of GM technology in Provinces of Bohol and Negros Occidental

Saturnina C Halos, PhD

President and Chair, Board of Directors

Biotechnology Coalition of the Philippines



## Topics

Organic agriculture policies

GM crop policies

GM crops for Philippine agriculture

Co-existence of organic agriculture and GMOs

RA 10068 - Organic Agriculture Act 2010

RA 11511 – Amendments to RA 10068

Organic agriculture - all agricultural systems that promote the ecologically sound, socially acceptable, economically viable and technically feasible production of food and fibers.

Organic agriculture dramatically reduces external inputs; refrains from using chemical fertilizers, pesticides and pharmaceuticals

Covers areas such as, but not limited to, soil fertility management, varietal breeding and selection under chemical and pesticide-free conditions, use of biotechnology and other cultural practices consistent with the principles & policies of this Act, & enhance productivity without destroying the soil & harming farmers, consumers & the environment (IFOAM): Provided, That the biotechnology herein referred to shall not include genetically modified organisms or GMOs.

Organic agriculture is regulated through certification that production system standards have been met

RA 11511 – Amendments to RA 10068 provided for two types of certification:

Participatory guarantee system (PGS) – a locally focused quality assurance system developed and practiced by people engaged in organic farming; built on a foundation of trust, social network & knowledge exchange; used to certify farmers and producers; products to be traded only locally unless there is established a mutual recognition agreement

Third-party certification - defined as when the firm requires that its supplies meet a certain standard and requests an independent organization that is not involved in the business relationship to control the compliance of the suppliers. ~ 2,000 has certified organic (BAFPS, 2020)

RA11511 - Provided for organic production zones

Philippine practice of organic agriculture prescribed by  
Philippine National Standards for Organic Agriculture - PNS/BAFS 07:2016

Minimum standards for

- (a) conversion;
- (b) crop production;
- (c) animal production;
- (d) beekeeping;
- (e) processing;
- (f) special products;
- (g) labeling and consumer information;
- (h) traceability; and
- (i) requirements for the inclusion of substances for organic production

Standards and certification processes conforms with IFOAM standards and procedures

GMOs or genetically modified organisms regulated per EO514 ser 2006

"Genetically modified organism" [EO514 ser 2006] - also refers to "living modified organism" under the Cartagena Protocol on Biosafety and refers to any living organism that possesses a novel combination of genetic material obtained through the use of modern biotechnology

Modern biotechnology - the application of:

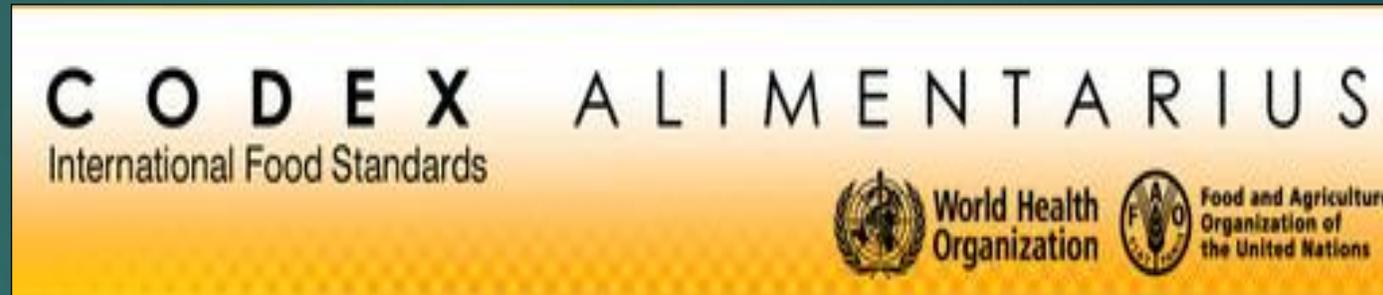
a. In vitro nucleic acid techniques, including recombinant deoxyribonucleic acid (DNA) and direct injection of nucleic acid into cells or organelles, or

b. Fusion of cells beyond the taxonomic family, that overcome natural physiological reproductive or recombination barriers and that are not techniques used in traditional breeding and selection

GM crops regulated per JDC 1 ser 2022

Regulation based on food and environmental safety assessments

Safety assessments conform with standards set by international bodies



**Cartagena  
Protocol on  
Biosafety**

Regulatory differences:

Organic agriculture – production system regulated, farm level

GMOs – specific product regulation, once approved, can be planted where crop is allowed or used to be planted

Organic agriculture – regulated to ensure production standards are met

GM crops – regulated to ensure food and environmental safety of specific product

US food recalls

Recall of organic foods – deaths and illnesses due to bacterial contamination

Recall of biotech events – regulatory non-compliance

## Rates of adoption (2017)

	<b>GM crop farming</b>	<b>Organic agriculture</b>
Year introduced	1996	1920
No of hectares planted	189.8 million hectares	70 million hectares planted
No of countries planting	24 countries	181 countries
No. of farmers planting	17 million farmers	2.9 million organic producers
Intellectual property protection	Yes	none
Number of crops planted	17	many
Mode of spread of technology	by large multinational corporations (4) Worldwide, farmer to farmer	by individuals, small groups, supported by consumers with similar philosophies, NGOs, currently promoted by FAO and governments ( RA 10068, RA 11511 PHL)

## GMOs in Philippine agriculture

GM corn – Insect resistant, herbicide tolerant ( Bt/RR Corn)

500 - 800,000 has/yr, yields - 4-17 tons/ha

Aug 2019 – July 2020 – 805,309

Aug 2020-July 2021 – 506,439

Main ingredient in feeds

GM rice – pro-vitamin A in grain,

Imported GM soybean in feeds and food

Enzyme in feeds produced by GM microbes

GM sugarcane in other countries

Drought tolerant sugarcane – Indonesia (pilot scale)

Stem borer resistant sugarcane ( Bt sugarcane) – Brazil (commercial)

Other traits being transferred – disease resistance ( virus, bacteria, fungus)  
herbicide tolerance, industrial traits to increase saccharification efficiency,  
production of bioplastics (Budeguer et al 2021)

DA target for organic agriculture conversion – 5.0% of agriculture area  
95% for non-organic, includes  
GM corn areas

As of today, third party certified organic areas < 2,000 has of 9.67 Million has of  
PHL agricultural land

Some challenges to adoption of organic farming –

Certification – addressed by RA 11511

Conversion – required 2 years incurs loss in income

Farm level certification

Lower yields hence the need for niche marketing  
to attain higher incomes

GM corn –

Approved for commercial planting in 2002

Since 2010 range in area planted per year - 500-800,000 hectares

Planted in all regions except Reg VII

Planted by >400,000 small farmers

Why the high rate of adoption? – GM corn farmers have increased yields and incomes

~ P6 Billion /year additional incomes ( DA, 2014)

How much increase in yield?

Compared with OPVs - >100%

Compared with non-GM hybrids - ~20%

How much increase in income?

Less cost due to less use of pesticide, less labor, increased yields

Depends on farm gate price – net P100,000 ++/ha per season

Impact on the economy ( Alvarez, et al, 2021) –

Productivity growth of corn industry increased by 11.45%  
due to GM corn adoption

Corn imports decreased by 5.4%

Benefits from GM corn accrue to all planters – small-holders,  
large landholdings

Impact on environment –

GM crops promotes arthropod biodiversity – Reyes, 2002 PHL

GM crops (herbicide tolerant crops) allows farm plant  
biodiversity – BPI ( Continuing monitoring)

GM crops do not become invasive – Crawley et al 2001 EU

Impact on human health -

Farmers – healthier, less exposed to farm chemicals

Consumers – same as with non-GM foods

## Other environmental impacts of GM crops in the Philippines (Gonzales,2014)

Land use efficiency – 15% less land to produce 1MT  
w/ GM corn compared with non-GM corn: **prevents  
conversion of virgin land to agriculture**

Fertilizer use efficiency – GM corn farmers 9% more  
efficient than non-GM corn farmers:  
**reduce carbon emission**

Labor use efficiency – GM corn farmers more  
efficient by 26% than non-GM corn farmers

Pesticide use efficiency – 54% less pesticide use w/  
GM corn compared with non-GM corn



Co-existence – respects the right of farmers to choose their production system as provided for in AFMA

RA 11511 – provides for the establishment of organic farming zones

Co-existence means practicing in the same general area, town or province both organic agriculture and GM crop production by designating certain areas as exclusive organic agriculture areas in collaboration with farm owners

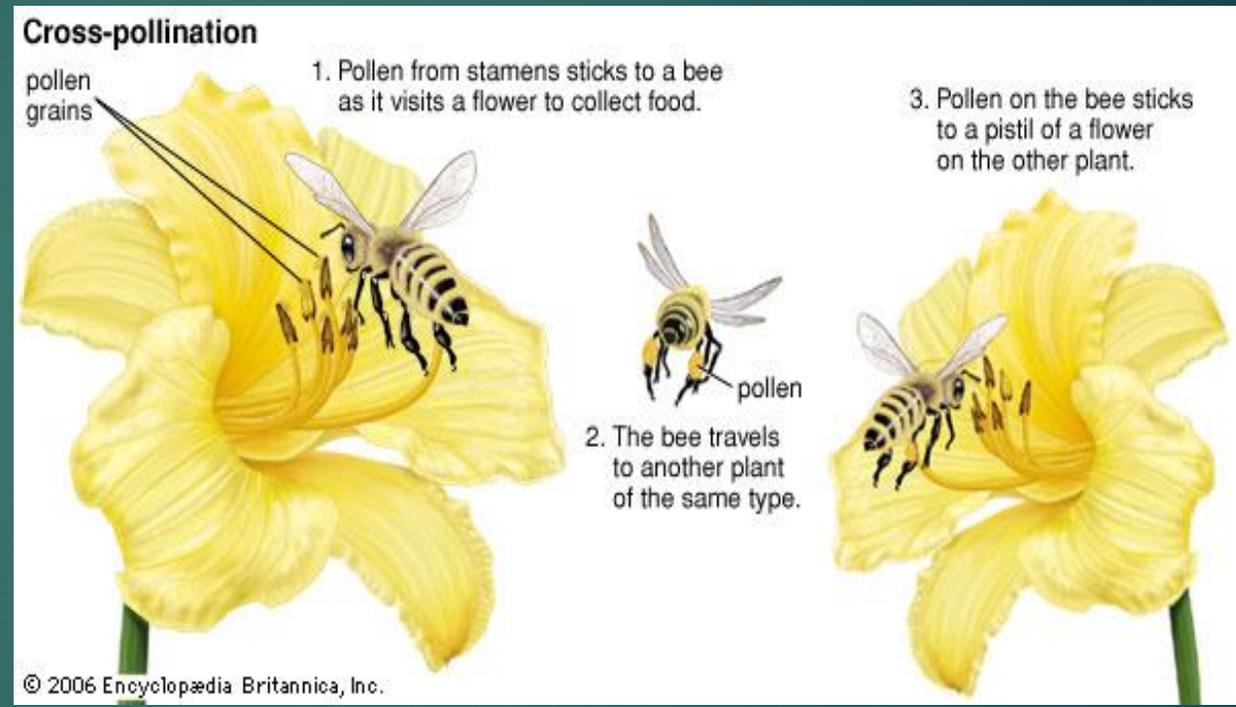
# Organic banana, coconut, GM rice co-existence



Co-existence –

Risk: Possible cross pollination between GM variety and non-GM variety of the same species in organic farms

Cross pollination only within the same species or closely related species



Depends on distance between farms, species (cross-pollinated vs. self-pollinated), use of common harvesting and post-harvest equipment and level of intrusion

# Strategies to prevent cross pollination between GM crop and non-GM variety in organic farms

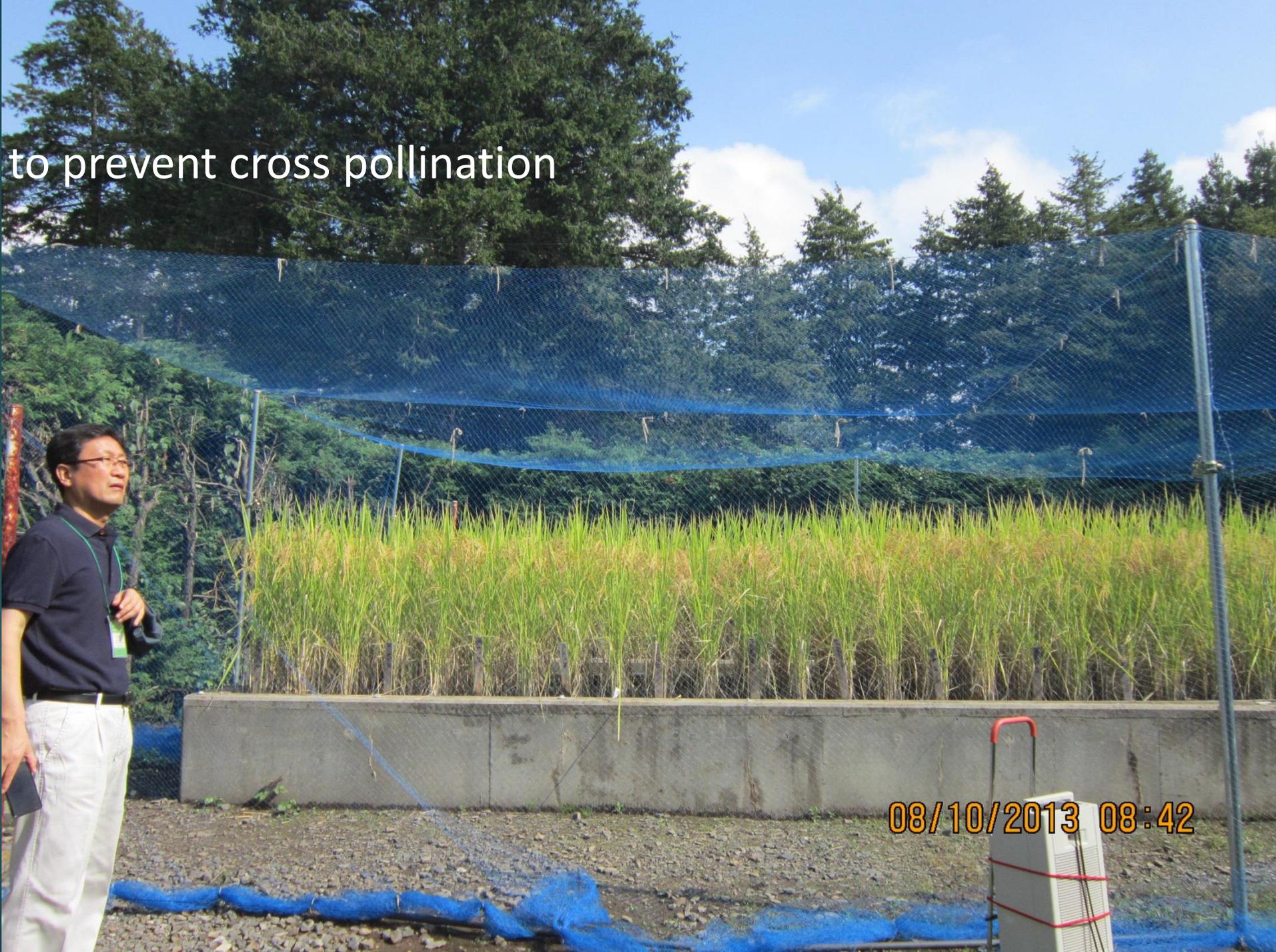
Adopt measures used for producing foundation/breeders/registered seeds

1. Planting at different times
2. Planting a tall, thick hedge between the two fields
3. Use nets to prevent insect pollinators
4. Planting away from each other: Planting distance  
~ 200-500 meters for cross pollinating species  
~10 meters for self- pollinating species

# Hedge row protection from cross pollination



# Netting to prevent cross pollination



## Co-existence - major GM crop producers, also major organic food producers (2009)

Producer	GM crops (has)	Organic agriculture (has)
Argentina	21.3 million	4 million
Australia	200,000	12 million
Brazil	21.4 million	1.8 million
Canada	8.2 million	628,556
China	3.7 million	1.8 million
India	8.4 million	1.0 million
Mexico	100,000	332, 485
USA	64 M	1.9 million
Uruguay	800,000	930,965

Thank you for  
your kind  
attention

