WORLD BANK GROUP | KOREA GREEN GROWTH TRUST FUND | Ministry of Economy and Finance

KGID 2025 Green Growth: The Path to Sustainable Jobs

Session 3-1. Climate-Smart Agriculture: Technology, Resilience, and Low-Carbon Growth

# Toward Net-Zero and Smart Faming in Agriculture

Dr. Sun Tay Choi,
RDA-ARS Project Coordinator,
Rural Development Administration (RDA), Korea

# 1. What RDA is doing

✓ ***The RDA is Korea's central government agricultural research institute with three main domains***

**RDA : HQ + 4 Research Institutes**

✓ **Personnel : 1,903 (researcher 1,209, 64%)**

- **NAS** : National Academy of **Agricultural Sciences** (406 scientists / 524)
- **NICS** : National Institute of **Crop and Food Science** (247 scientists / 341)
- **NIHHS** : National Institute of **Horticultural Herbal Science** (241 scientists / 334)
- **NIAS** : National Institute of **Animal Science** (169 Scientists / 324)

**1. Research & Development**

**3. International Cooperation**

**(R&D + Dissemination)**

**2. Technology Dissemination**

**(156 Agricultural Technology Centers)**

❖ **International Cooperation Program based on R&D**

KOPIA

**(22 Countries )**

Bilateral R&D, Extension

3FACIs

**(14 Countries)**

ASIA

AFACI

LATIN **(14)**

AFRICA **(37)**

KoLFACI

KAFACI

Multilateral R&D on Common issues, Reducing technology gaps

# ❖ R&D Strategy Plan

✓ ***Strategic Priorities for Agricultural Research and Development (2023–2032)***

### 1. Digital Transformation

- **Smart Agriculture (Precision. AI)**
- Automation and Intelligence
- Mechanization of Upland farm

### 2. Green Bio & Convergence

- Germplasm Conservation
- Digital Breeding
- Food Nutrition, Upcycling

### 3. Climate & Carbon Neutral

- Climate Monitoring & Response
- **Low-Carbon Production**
- Climate-Adaptive Food Systems

### 4. Food Security & Safety

- Food Productivity & Quality
- Controlling Unexpected Pests
- Food Safety, Postharvest Tech.,

### 5. Farmer Welfare

- Rural Functions. Specialized Crops, Care Farm, Pets
- Farm Safety, Farm Marketing

### 6. K-Agriculture & K-Food

- K-Agriculture Competitiveness
- Global Technology Transfer
- Fostering Export Agriculture

**R&D Innovation Strategy**

**Public Value**

Strengthening **Public Value** of National Agricultural R&D

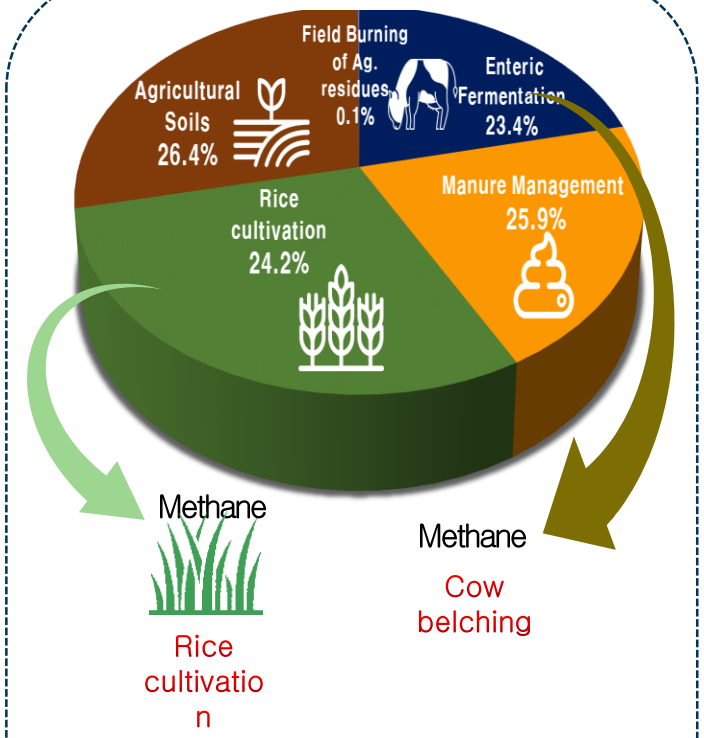
**Field Orientation**

Generating **Practice-Oriented** Research Outputs

**Innovation**

Building the Foundation for **Future Agri-Innovation**

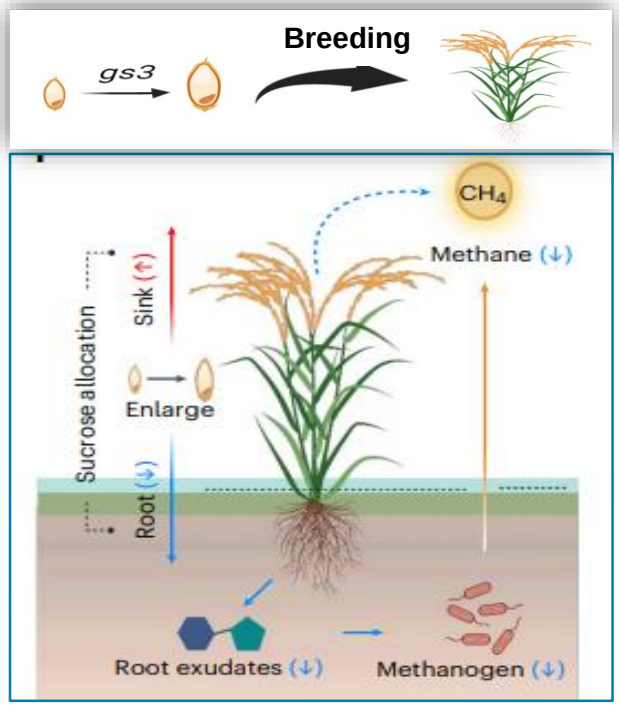
# 2. Key achievement for Net-Zero



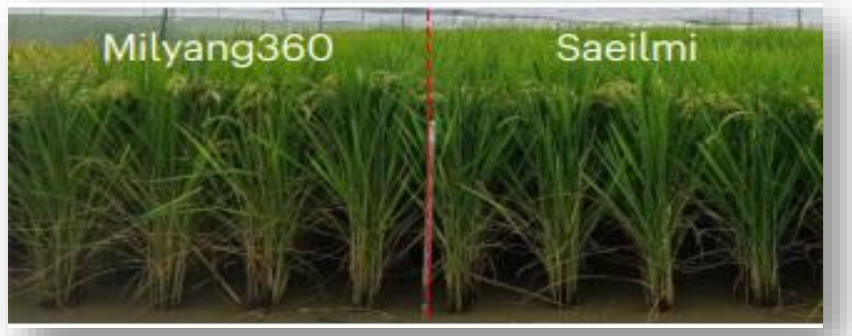

**Rice cultivation** and **Cow belching** emit the most Greenhouse gas(Methane) in agricultural sector(as of 2022)

## ❖ Development of the low-carbon rice "Milyang 360"

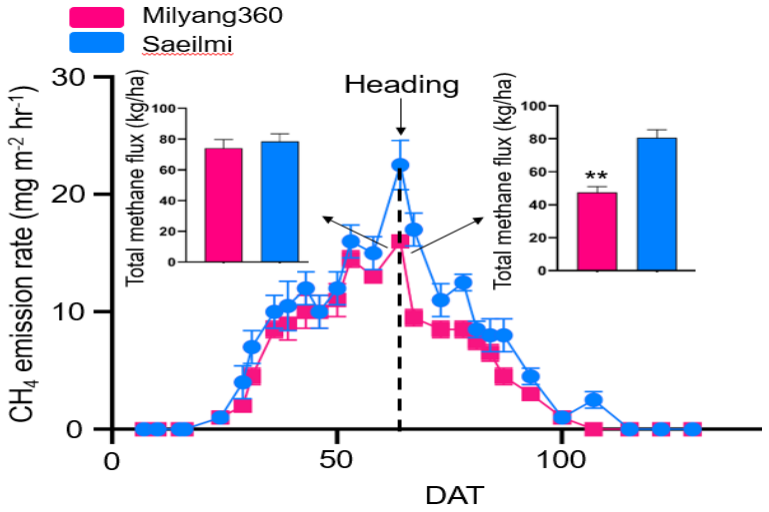
Development of **methane-reducing rice cultivar** with the *gs3* gene introduced




**Nitrogen chemical fertilizers was reduced by 50%** than previous when cultivating "Milyang 360" and result shows maintained productivity and **additional 9.7% reduction in Methane emission**.




Methane emission reduced by **23.9% compared to "Saeilmi"**

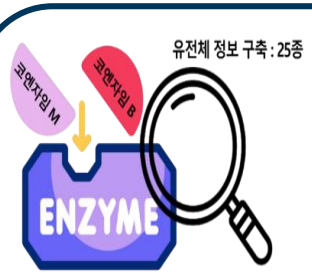



First time identification of the methane gas reduction principle of rice gene(*gs3*).

* Suppresses methanogens by reducing rhizosphere exudates

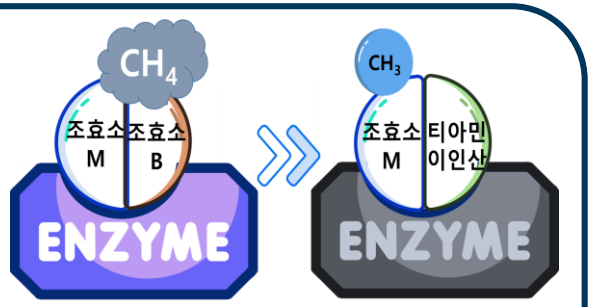
→ **16% reduction in methane emission** **** Kwon et al. 2023 Nature climate change***

# ❖ Development of methane-mitigating feed additives for ruminants

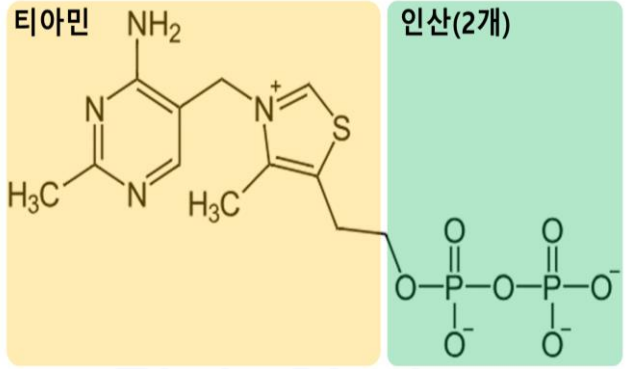




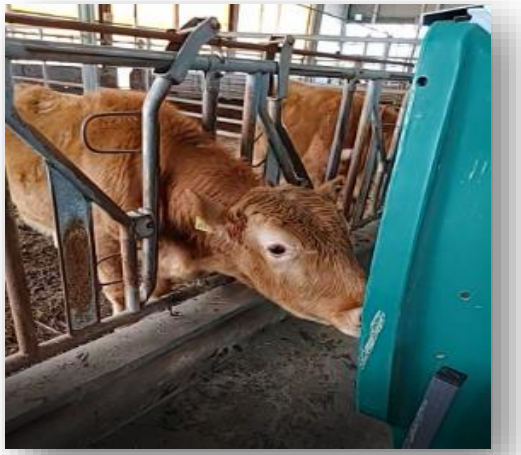
In silico screening for novel inhibitors of ruminant enteric methanogenesis



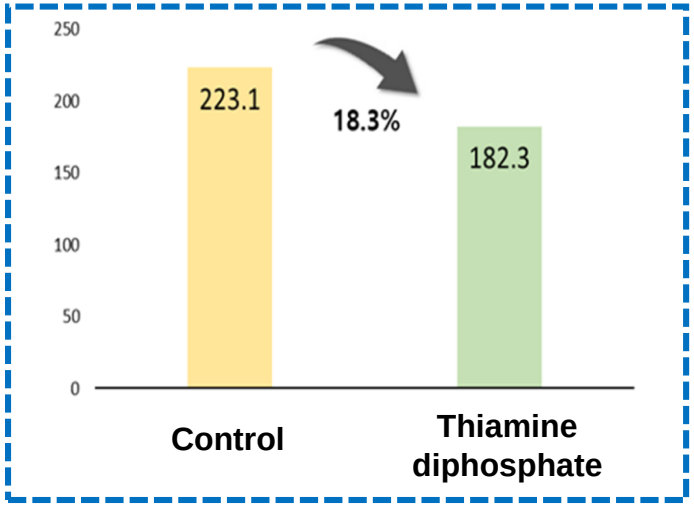

Screening for inhibitors of enzyme-coenzyme complex formation




Thiamine diphosphate



Assessment of enteric methane emissions in ruminants by GreenFeed system(Cirak, USA)



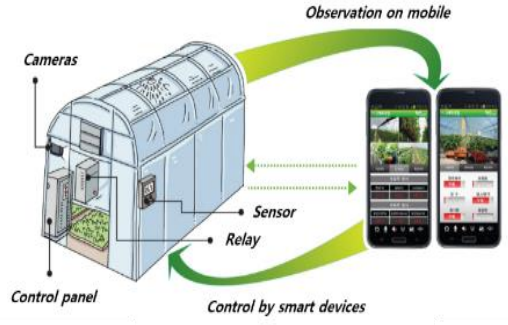

Reduction of methane emission by 18.3% (g/kg)


Development of methane-mitigating feed additive(May,2025)

# 3. Practical Technologies for Smart Farming

## ❖ Intelligent diagnosis system

- '**Farm Voice**' which can control various functions with voice to check the growth status of the crops **(pest diagnosis)** and then **operate the air conditioning systems (air conditioner, ventilation fan, etc.)** inside greenhouse





## ❖ Image-based disease diagnosis

- A crop showing symptoms of disease, take a picture, **send it to the cloud, then provide feedback with the name of disease and its treatment**

## ❖ Smart Farm Optimal Environment Settings Guidance Service

- **Big-data analysis and its effect on smart farming**

✓ Growth/environmental data measurement → **Consulting** →

**Precise growth management** → **Better performance** **(Yield ↑, Energy ↓)**

✓ Target crops: Tomatoes, Strawberries, and Paprika

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# Thank you for your attention.

Dr. Sun Tay Choi
(E-mail : cst0220@korea.kr)