

# Agricultural R&D in Korea: Status, Plans and Programs



# Contents

**I**

**Challenges in Korean Agriculture**

**II**

**Introduction on RDA**

**III**

**Major Achievements**

**IV**

**International Technology Cooperation**



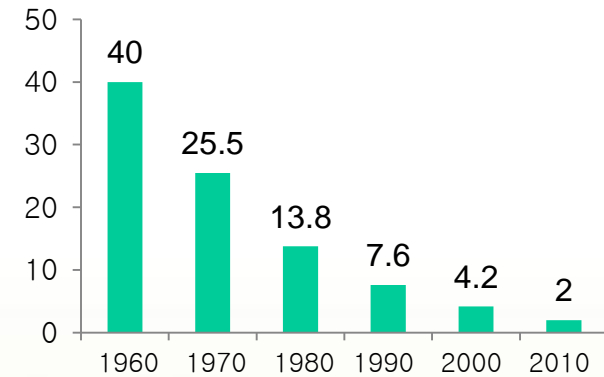
I

# Challenges in Korean Agriculture



- Limitation of growth in Korean agriculture
  - Small farm (< 1.0 ha) 65% of total ('10)
  - Land area per farmhouse 1.46 ha ('10)
  - Poor quality of labor in rural area

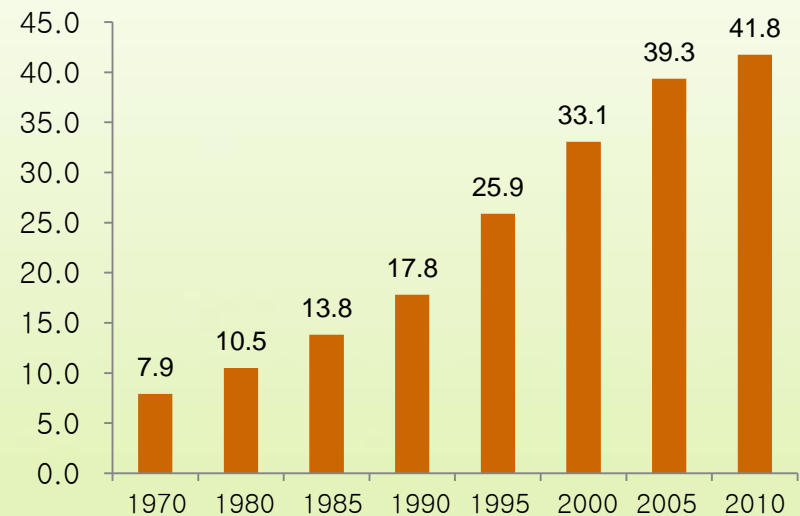
**% Agriculture in GDP**



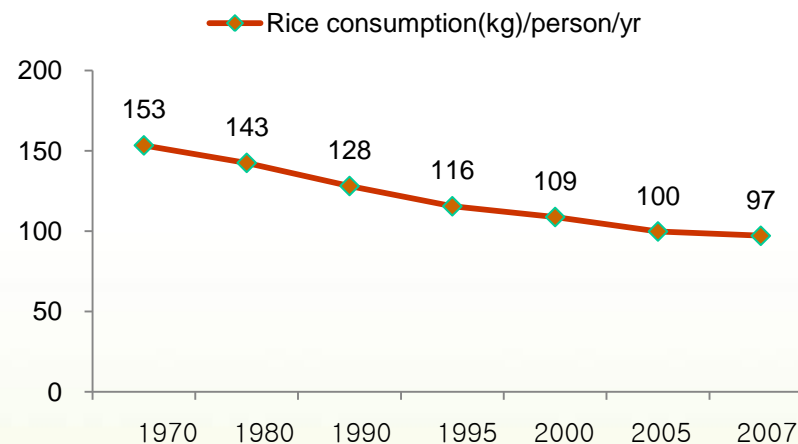
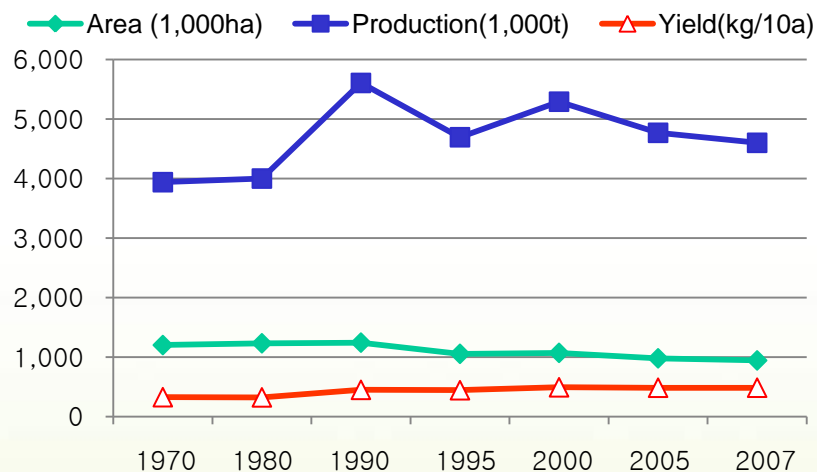
**Rural population (mill.)**



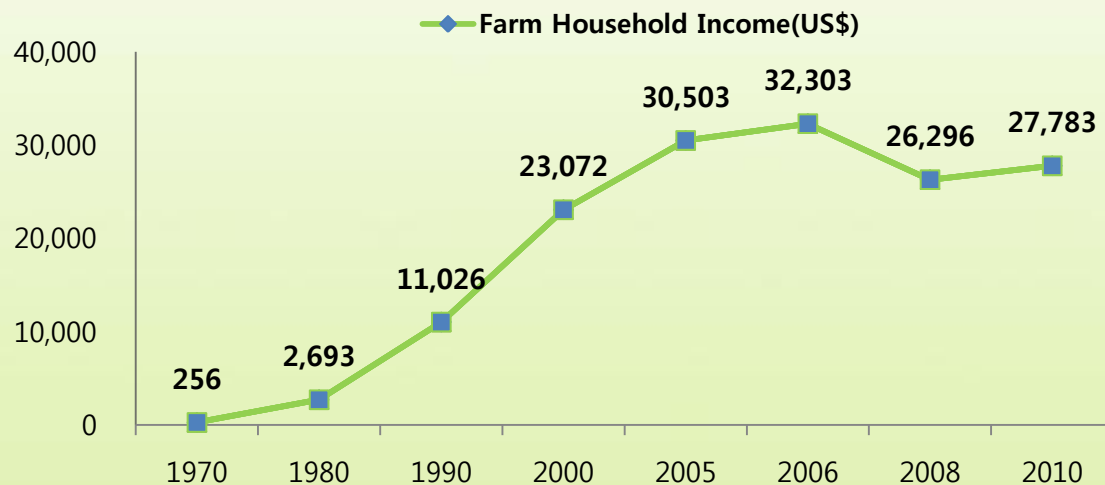
**% of rural population (≥ 60 yrs old)**



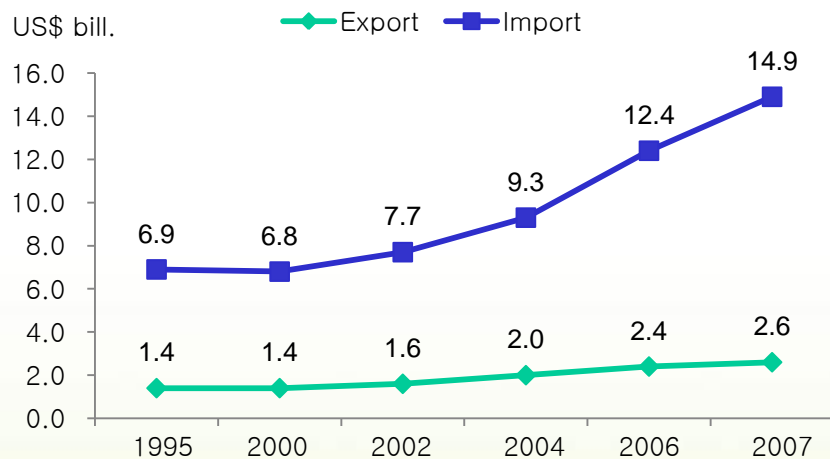
Change of the areas, yield, total production and consumption of rice in Korea



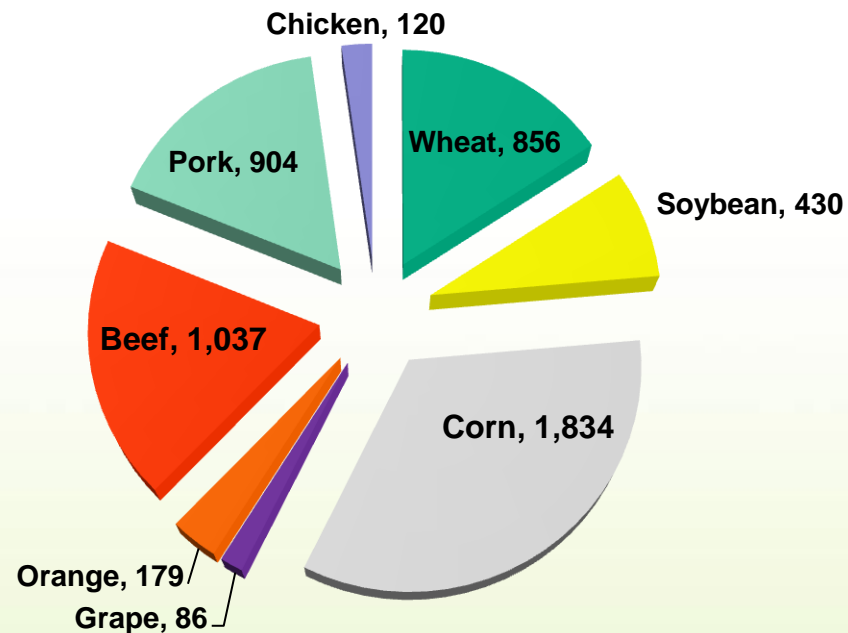
Change of annual income of a farm household in Korea



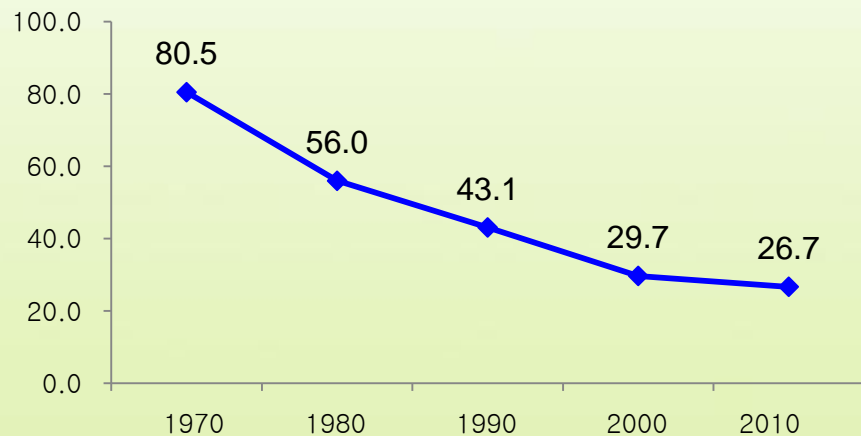
### Export & Import of Korean agriculture



### Import in 2007 (US \$ mill.)

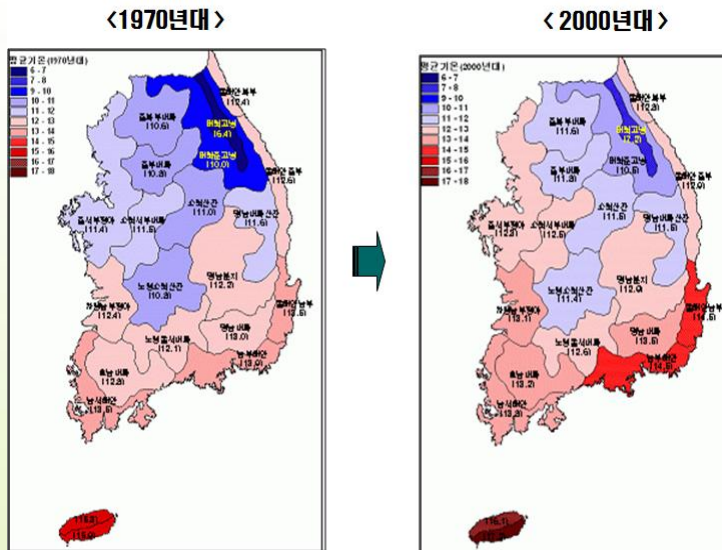


### Self-sufficiency rate (grain, %)

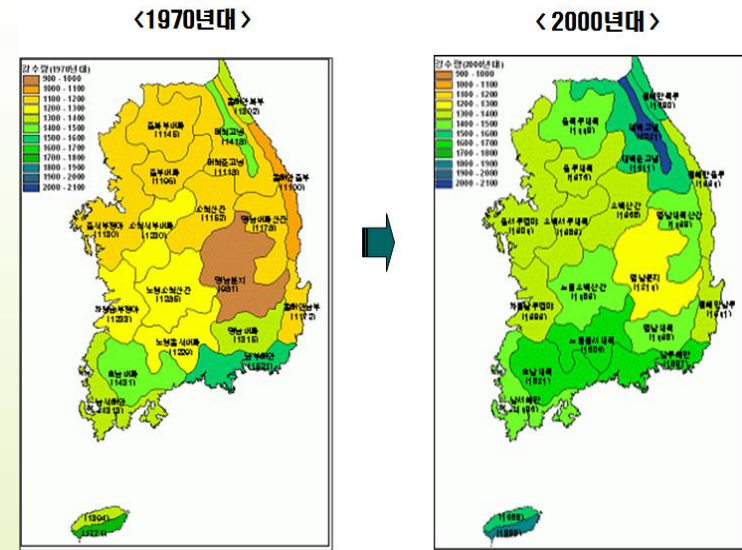


■ Global warming → Climate change → Threat to sustainable agriculture

- Temperature : 12.1 °C (1970s) → 12.8 °C (2000s), **0.7 °C ↑**
- Precipitation : 1,248mm (1970s) → 1,392 mm (2000s), **144mm ↑**



Change of annual temperature



Change of annual precipitation

☞ Unstable balance of supply & demand of agricultural product

☞ Damage by natural disaster in Korea : US \$ 480 mill./yr in the period of 1980 - 2010



- Food safety
- FTA
- Agricultural export
- Environment







# Introduction on RDA



# RDA is...



**RDA is the central government organization responsible for agricultural research and extension services in Korea**

- 1906 – Founded as **Agricultural Demonstration Station**
- 1962 – Reorganized as:

**Rural Development Administration (RDA)**

**\* 100-year history**

# MISSIONS

**Agricultural research & technology development**

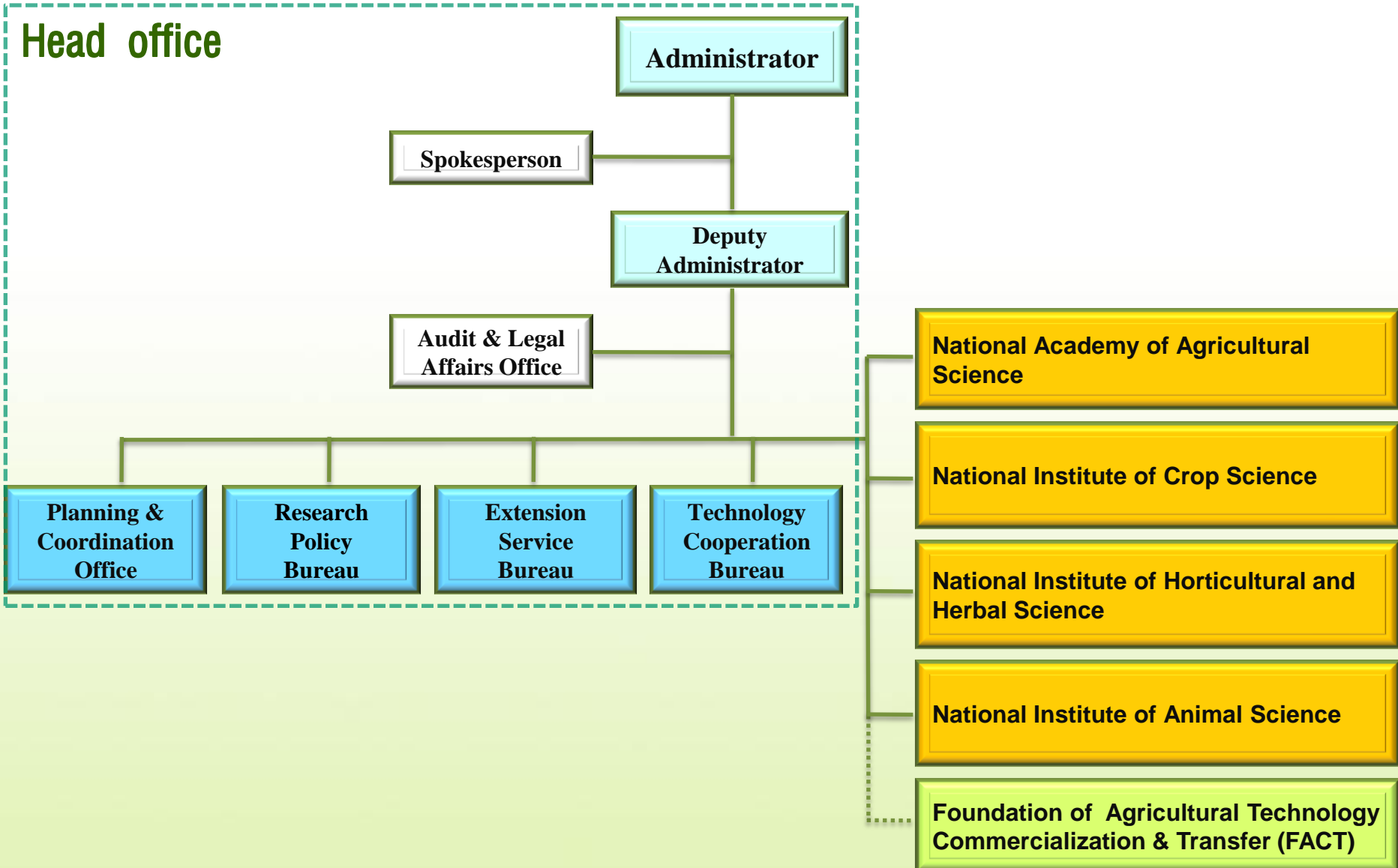
**Technology dissemination & extension services**

**Guidance & training for rural development**

**Global technology cooperation**

# ORGANIZATION

## Head office



# PERSONNEL

	Scientists	Extension specialists	Administration & Technician	Total
Head office	108	70	166	344
4 R&D Institutions	1,053	18	428	1,499
Total	1,161	88	594	1,843

\* January 2012

# BUDGET

 Total  
 R&D

Unit : US \$ mill.



## 1 Building Competitiveness in Agriculture

- Platform technology & long-term capabilities
- Strengthening competitiveness and values of local products for international markets
- Postharvest, processing, packaging & marketing for value-added products

## 2 Capacity building and Rural development

- Technological assistance for “Small but mighty farmers”
- Development of structure and agri-business for high income in rural area

## 3 Technological support for Agricultural policy

- Monitoring and Management of Pest and Natural disasters
- GAP and Food safety                      - National food security

## 4 Creation of new growth engine for future

- Practical application of agro-biotechnology for commercialization
- Development of alternative energy resources
- Technology intensive automated production system

## 5 International Technology Cooperation

- Global networking for technology transfer and solution (KOPIA, AFACI, KAFACI)

# RDA R&D Agenda

## Basic science in agricultural technology

- Environmental & conservation for sustainable agriculture
- Commercialization of agro-biological resources
- Safety management of agricultural products
- Production automation, energy saving, and farm safety
- Plant biotechnology
- Agro-food development and added-value enhancement
- Collection/preservation/utilization of genetic resources

## Stable supply of food and value enhancement

- Stable production of rice
- Increase self-sufficiency of upland crops
- Food functionality and added-value enhancement
- Farmland use efficiency and environment-friendly crop production

## Quality and value enhancement of horticultural and herbal crops

- Development of horticultural varieties and productivity increase
- Stable production of ginseng and added-value enhancement
- Production environment and commercialization of horticultural and herbal crops

## Quality and productivity enhancement of livestock

- Collection and improvement of animal genetic resources
- Enhancement of livestock productivity
- Environment-friendly production of safe livestock products

## Core technology development strategies

- Collaborative research on bioengineering commercialization
- Collaborative research on climate change adaptation technology

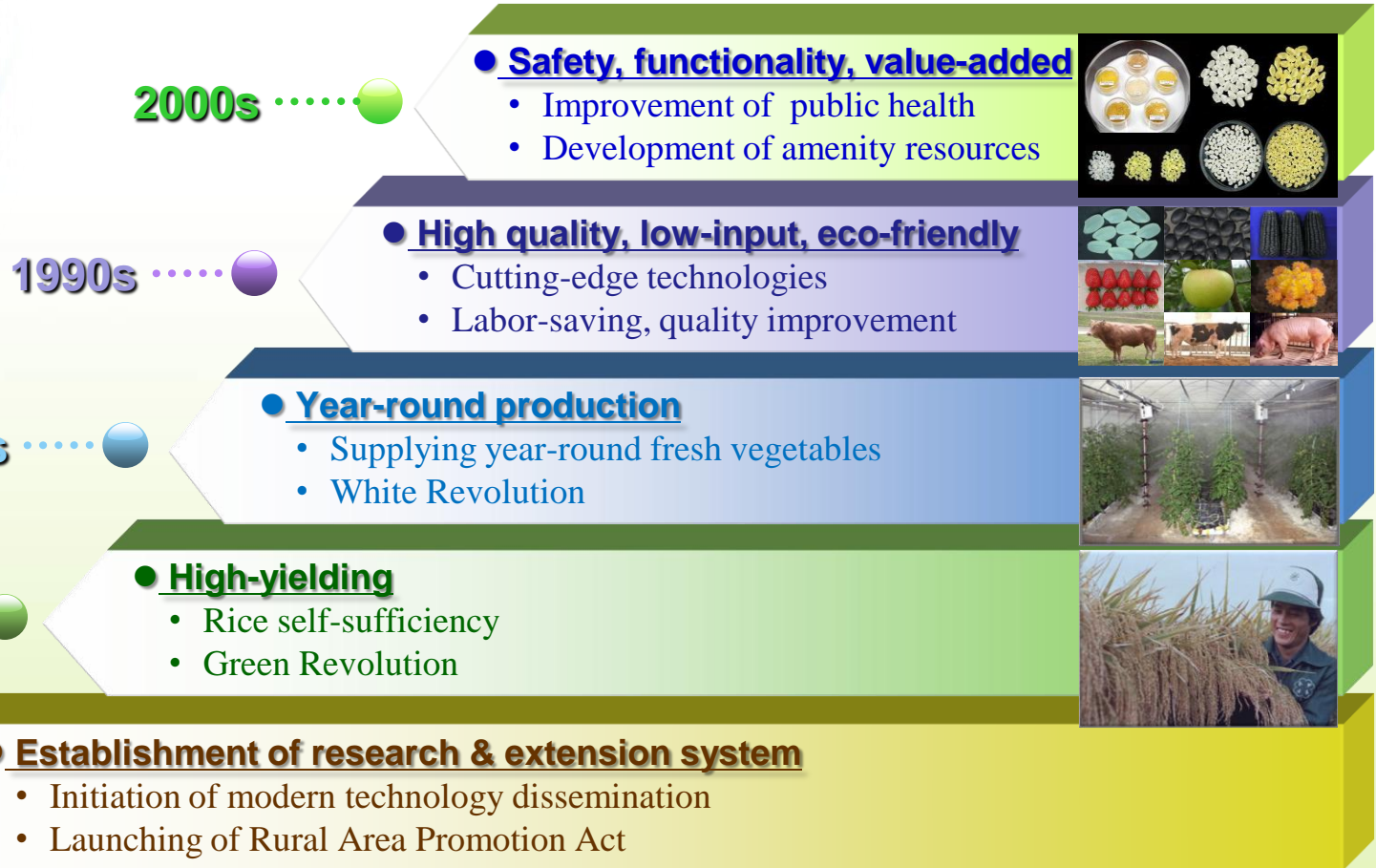




# Major Achievements



# Trends in Agricultural R & D



1

## Mitigation and Adaptation to Climate Change

### ❖ Lowering the risks of climate change

- Scenarios of climate change to estimate yields & food supply, outbreak of pests
- Climate change mitigation measures to control greenhouse gases

### ❖ Improvement of genetic resources adapted to climate change

- Development of new varieties tolerant to abiotic stresses
  - \* Rice (Hopum), Apple (Hwangok)
- Introduction of high-valued sub-tropical germplasm
  - \* Fruits (Mango, Dragon fruit), Vegetables (Artichoke, Okra)



<Hwangok>



<Dragon fruit>



<Artichoke>

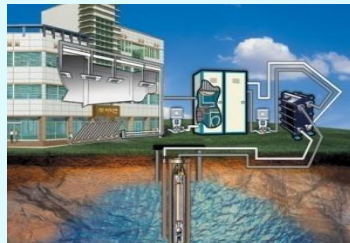
2

## Eco-friendly and Sustainable Agriculture

- ❖ Resource recycling and Energy-saving technology for low-cost farming
  - Application of livestock manure for liquid fertilizer production
    - \* Distribution of SCB(Slurry Composting & Biofiltration) facility
  - Geothermal heat pump system and LED light technology for greenhouse
  - Development of plant resources for bio-fuel production
- ❖ Environment-friendly technologies for organic farming
  - Substitutes for agro-chemicals : Fertilizer by using green manure crops, Biological control by using natural enemy & microorganism



<SCB>



<Geothermal heat pump>



<LED greenhouse>



<Natural enemy>

## 3

### Improvement of Quality and Market Competitiveness

#### ❖ Improvement of export competitiveness for global market

- High-quality Technology of Korean beef and horticulture products
- Food safety-related quarantine and market access of agro-products
- Production chain with low cost and high efficiency

#### ❖ Promotion of value-added Korean agricultural products

- Brand royalty and license for export to global market

\* strawberry, chrysanthemum, orchid, rose and kiwi



<Hanwoo beef >



<Hydroponic ginseng>



<Baekma>



<Halla Gold>

4

## New Growth Engine and Future Agricultural Technology

- ❖ Development of new bio-materials for medication and health care
  - Artificial eardrum and bone using silk protein of silkworm
  - Natural antibiotics made from bee venom
  - Bio-reactors by using transgenic animal/plants for medicine
- ❖ Crop nutrition and functional food
  - Rice rich in dietary fiber, essential amino acids, etc.
  - Colored potato with anti-aging and skin brightening effect
- ❖ Automation for efficient production of crops
  - \* Grafting robot, planting machine, weeding robot, plant factory, etc.



<Bee venom injection to cure mastitis>



<Transgenic chicken>



<Golden Rice>



<Grafting robot>

## 5

### Local demand-driven R&D and Enhancing extension service

#### ❖ Innovation of consumer-driven R&D and its application

- Apply R&D outcomes to rural community and agri-business industry to cope with the changing needs of farmers and consumers
- Foster the extension specialists for “small but strong farmers” by improving the capacity of extension in production technology, education and marketing

#### ❖ Capacity building of agricultural business

- RDA offers education and consulting service to farmers
  - ex) programs of agri-business capacity building, e-Business mentoring
- Specialized education for new and returning farmers and urban residents

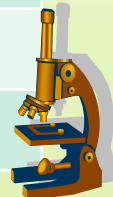




## Eleven R&D Achievements selected from RDA, in “100 Best Performance of National R&D, 2010”

### Best Performance of National R&D in 2010 from RDA

- Development of Rural Amenity Resources Investigation and Information System
- Information System for Globalization of Traditional Korean Food
- Establishment of National Agricultural R&D Total Management System, ATIS
- Environment-friendly Portable Carcass Disposal System
- Artificial Eardrum using Silk Protein
- Chinese Cabbage Genome Sequencing and Information Database Establishment
- Molecular Marker and Genetic Method for Detection of Albino in Hanwoo
- Field Diagnosis Kit for Horticultural Crop Virus
- Natural Antibiotics and Cosmetics Using Bee Venom
- Development of Medi-Rice for Preventing Adult Diseases
- Utilization Technique of LED in Agriculture





**IV**

# International Technology Cooperation



## ✓ Scientific cooperation

- Bilateral or Multilateral cooperation
- Establishment of overseas labs (RAVL) and dispatching seconded scientists
  - **5 National organizations** : USA (ARS), Japan(NARO), China (CAAS), Nethelands (Wageningen UR), Brazil (Embrapa)
    - \* RAVL : RDA-Abroad Virutual Laboratory
  - **6 International Research institutions of CGIAR** : IRRI, CIMMYT, AVRDC, CIP, BI, ILRI
- Joint projects in 2012: 20 Countries, 116 Projects



## ✓ Technical cooperation

- **KOPIA (Korea Project on International Agriculture) program**
  - Development of customized agricultural technology & resources, and cooperative researches
  
- **Regional Cooperation Initiatives of AFACI & KAFACI**
  - Sharing experience and technology for agriculture and food production in regions
    - \* AFACI : Asian Food and Agriculture Cooperation Initiative
    - \* KAFACI : Korea-Africa Food and Agriculture Cooperation Initiative
  
- **Technology training program** \* RDA Alumni
  - Capacity building and global extension service





- KOPIA is a bilateral cooperation program aiming to share Korea’s knowledge and experience on the development of agricultural technology and extension
- Establishment of **KOPIA center**
- Development of locally-adaptable technology through demo-farm projects, genetic resources
- Exchange scientists and experts in the fields of common interest
- No of partner countries : 15

Year	Asia	Africa	Latin-South America
2009	Vietnam (vegetable, cassava) Myanmar (legume) Uzbekistan (vegetable, feed)	Kenya (potato, livestock)	Brazil (mushroom, strawberry) Paraguay (vegetable, potato)
2010	Philippines (rice) Cambodia (maize)	DR Congo (rice, cassava) Algeria (potato, wheat)	
2011	Thailand (tissue culture) Sri Lanka (legume, vegetable)	Ethiopia (livestock, vegetable)	Bolivia (potato) Ecuador (vegetable)

\* 2012 MOU signing with Peru



# Regional cooperation initiatives

- **AFACI (2009) and KAFACI (2010)**
- Inter-governmental and multilateral cooperation body aiming to improve food production, achieve sustainable agriculture and enhance extension service by sharing knowledge and information on agricultural technology
- Member countries
  - **AFACI (11)** : Korea, Bangladesh, Cambodia, Indonesia, Laos, Mongolia, Nepal, Philippines, Sri Lanka, Thailand, Vietnam
  - **KAFACI (18)** : Korea, Angola, Cameroon, DR Congo, Cote d'Ivoire, Ethiopia, Gabon, Ghana, Kenya, Malawi, Morocco, Nigeria, Senegal, Sudan, Tunisia, Uganda, Zimbabwe, Comoros
- Technical workshops for PAN-Asian or PAN-African projects, Regional projects
- Networking of member countries on common issues
- Country projects and exchange of experts, training for capacity building





# International Training

## ● International Training Program

- RDA trained 3,994 persons from 116 countries in the period of 1972-2011
- 36 countries, 240 trainees in 2012

## ● RDA Alumni Association

- Improvement of post training effectiveness and impact on trainee countries
- To develop global network and future collaborative project
- Supporting 9 Demo-farm Projects in 7 countries in 2012
  - Cambodia, Indonesia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam



<International Training>



<RDA Alumni in Thailand>



<Convention meeting of RDA Alumni in Philippines>

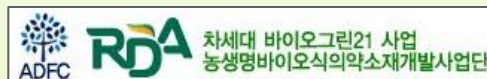
## Linkage among Different Agricultural Sectors



Exchange with opinion leaders

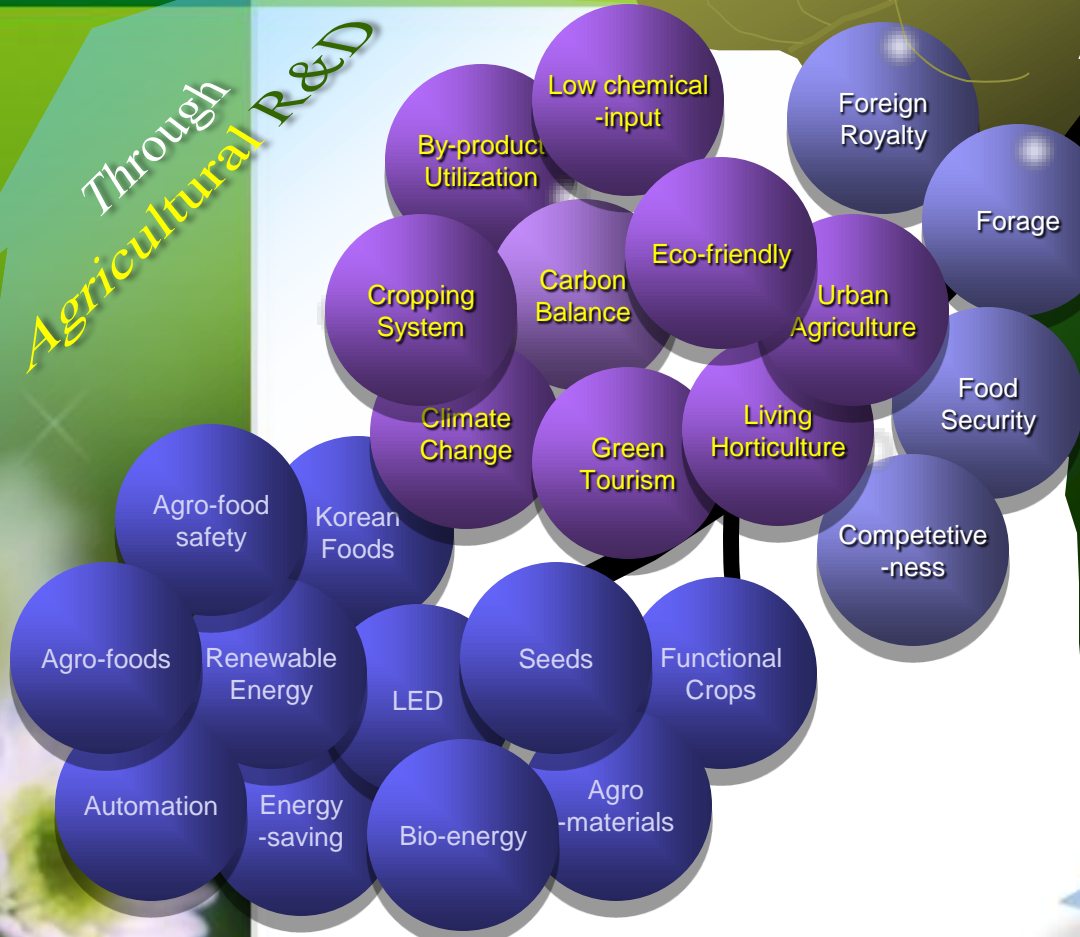
Cooperation with central & local government, and agencies

Cooperation with private sectors & academia



Improvement of national agriculture & economy

Through Agricultural R&D



Agricultural foundation, Competitiveness





**THANK YOU !!!**