

# COUNTRY REPORT (KOREA)

## ○ Status Of Agriculture in KOREA

### 1. Farm Population and Land

- 1) Over the past decade, there was 46.1% decrease in the farm population from 6.7 million of the 1990 survey.
- 2) The aging of the farming population became conspicuous. The proportion of elderly, 60 years and older, in the farming community increased twice from 17.8% in 1990 to 38.2% in 2002.
- 3) The proportion of household with more than 3ha of farmland has increased from 2.5% in 1990 to 6.1% in 2002, slightly expanding the farming scale.
- 4) However, 60.7% of the community farms have less than 1ha of farmland. The scale of farming is still far from huge expansion.

### 2. Farm Household by Crops

The portion of household for rice is larger than that of other crops. But the portion of rice is decreasing.

### 3. Change in International/Domestic Circumstances

- 1) Since 1990s, Korea has faced new challenges, differing from the past ones.
- 2) These international circumstances brought many changes such as; domestic problems, the consumer's concern on the quality and safety of food has heightened due to the outbreak of animal diseases, GMO...

### 4. Direction of Agricultural Research

- 1) These changes in the circumstance of agriculture, demand universities or institutions of agriculture to develop high technologies that would bring about competitiveness and sustainability.
- 2) In the rice production, it is necessary to develop the super high

yield varieties with better quality.

- 3) Technologies should be environment friendly.
- 4) Improve the safety and quality of agricultural products.
- 5) Biotechnology should be used in the agricultural research.
- 6) High technologies such as automation, robot, and nondestructive method should be used.

## ○ Agricultural Mechanization in KOREA

### 1. Progress of Agricultural Mechanization

- 1) In 70s, farm machinery was to reduce the human labor or animal powers.
- 2) In 80s, the agricultural mechanization was focused on the reducing the labor peak.
- 3) In 1988, set up all-out mechanization of rice production.
- 4) In 90s, agricultural mechanization was focused on the reducing the production costs.
- 5) At RPC, the grain drying, storing and processing goals are performed systematically in a plant.
- 6) In 2000s, agricultural mechanization was focused on the automation and robotization of farm operations and improving value-added agricultural products.

### 2. Present Status of Agricultural Mechanization

The number of major agricultural machinery has been increased up to 1997.

However, the number of agricultural machinery supplied dramatically dropped like this figures.

In 1997, Korea met the economic crisis such as IMF bailout.

### 3. Mechanization Rate of Rice Farming

- 1) In 2002, the mechanization rate was 99% for soil preparation (tillage), 98% for transplanting, 99% for harvesting, and 100% for spraying.

## ○ Research and Development of Agri. Machinery

1. Research Capability in Agricultural Machinery
  - 1) Departments related to agricultural machinery were established in a total of 16 colleges or universities nationwide in 1997.
  - 2) Systematic education and research for agricultural machinery major began at the graduate school level at SNU in 1965.
  - 3) The National Institute of Agricultural Engineering was established in 1962 as a Agricultural Engineering and Utilization Institute. It has 70 researchers.
  
2. Classification of KSAM papers by Crops
  - 1) Until the 1980s, most of the research focuses on rice. In the 1990s, researchers were interested in the various other agricultural products such as fruits, vegetables, livestock and special crops.
  
3. Classification of KSAM Papers by Research Topic
  - 1) Until the early of the 1990s, much research focuses on the rice production machinery.
  - 2) In the 1990s, research topics on seeding and tending, postharvesting of fruits and vegetables, mechatronics, nondestructive technology, and precision farming were accelerated and greater share of the KSAM papers.

## ○ National Institute of Agricultural Engineering

### 1. Functions

National Institute of Agricultural Engineering has two functions. The first is the research for promoting agricultural engineering and the second is the testing and evaluation of agricultural machinery.

The objectives of the research are:

Develop state-of-the-art technologies in the agricultural engineering.

Improve, develop and promote practical use of agricultural machinery.

Develop post harvest management technology and its related machines, equipments and facilities

The missions of the testing and evaluation are:

Inspect performance and safety of agricultural machinery

Testing and evaluation farm tractor by OECD test codes

## 2. Organization

There are four research divisions and one team. There are seventy researchers, six engineers, twenty-nine technicians and nine administrators.

## 3. Research Direction and Key Project of NIAE

1) NIAE is focusing on our research capabilities in engineering technologies such as;

- Environment-friendly farming operations
- Labor/energy-saving technologies
- Environment optimization of agricultural facilities
- Post harvest processing technologies

2) The key projects are:

- Farm-work automation and robot
- Sustainable precision farming technology
- Nondestructive quality/safety evaluation
- Factory-like vegetable production system
- Bio-sensor Technology

## 4. Farm-work Automation and Robot

Automation and robot will replace the labor and enhance the social welfare in countryside. For the automation and robot, several sensor technologies such as machine vision, artificial intelligence, robot dynamics and actuators are integrated.

Current projects are:

- Unmanned remote controlled tractor, tomato-picking robot
- Grafting robot for fruits and vegetables

## 5. Sustainable Precision Farming Technology

To maximize profitability and to minimize environmental impact of over or under application of agrochemicals, sustainable precision farming technology is being developing.

Among the sensing technology, next three topics are concerned:

- Location sensing
- Closing-range sensors
- Yield mapping sensing

Also variable rate technology is including data analysis/mapping, desired/actual application rate map and application rate processor.

## 6. Factory-like Vegetable Production System

To prepare the population growth and decrease of agricultural land and to produce high-quality, safety guaranteed products all the year round, factory like vegetable production system is being developing.

### **Current projects are**

- Germinating and greening equipment, sterilizers, row spacing
- Artificial lighting and solar lightening
- Environment measurement and control system

## 7. Nondestructive Quality/Safety Evaluation

The concerns of quality and safety of agricultural products are increasing.

For these concerns, we are developing the nondestructive quality and safety evaluation technologies.

The NIR spectroscopy technology is used for the nondestructive sweetness graders of apple, pear, peach, tangerine, watermelon, and melon. Also this technology is used for the rice taste analyzer, and Korean red ginseng grader.

## 8. Bio-sensor Technology

For the safety issues, we are developing biosensors. We are trying

several new technologies such as electronic nose, ISE, lab on a chip.

**Current projects ;**

- Biosensor for rapid assessment of bacterial contamination
- Immune-biosensor to detect salmonella
- Disposable ion-selective electrodes sensors (ISE) for hydroponics