

# **Registration & Management Policy of Pesticide in Korea**

**Su-Myeong, Hong**

National Institute of Agricultural Science, RDA

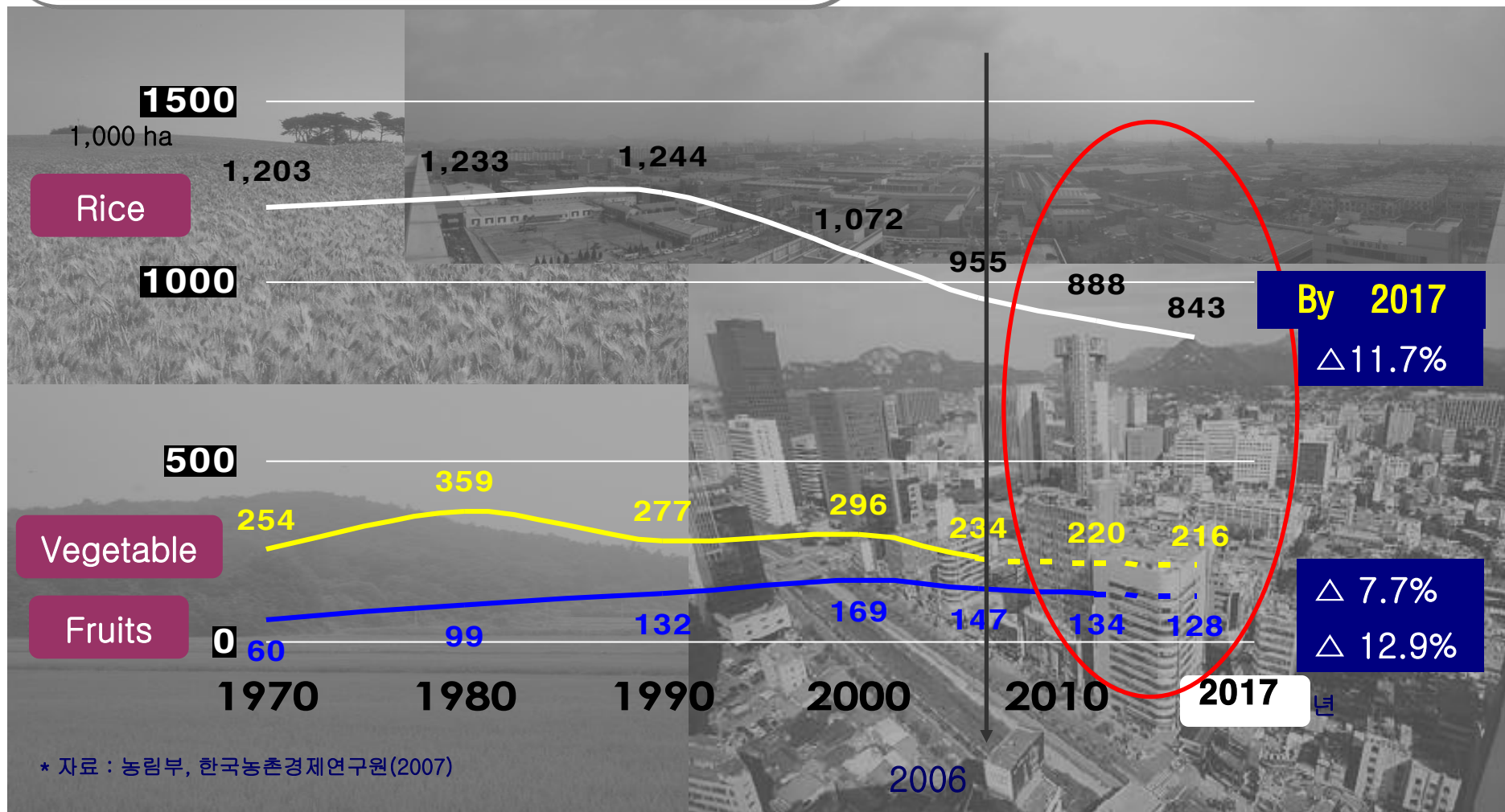
**1**

## **Agriculture situation in Korea**

## Change in Agricultural Conditions

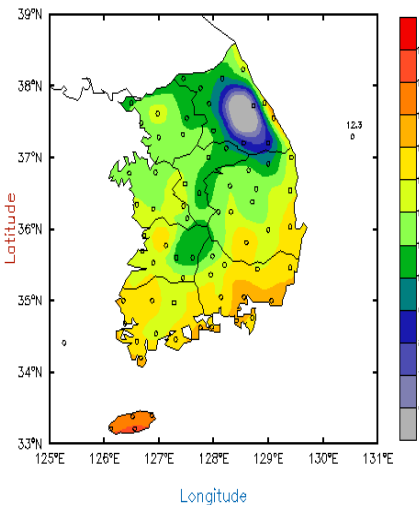
- ✓ **Reduction of Agricultural Importance by Changes to Industrial Nation**
  - Small Portion in GDP : 1.9% (2016)
  - Farmers Population : 5.0%, 38.4% Older than 65 years(2016)
- ✓ **Agricultural income being reduced**
  - Annual Income of Farming family :  
32,121k won('10) → 37,215k won('15)
- ✓ **Change in Life Pattern, Increasing Demand for Organic Food**

# Future in Cultivation Area



# Climate Change

**Future Climate Change : About 1°C Increase over 1904 to 2000 :  
Expect 0.15°C ~ 0.45°C increase every 10 years**



## Change in Crops

- Variety of Crops
- Spring comes earlier
- Transplanting ▷ Direct sowing
- Cultivation area being changed
- Southern part : Subtropical

## Change in Pest

- Various pest outbreaks
- Subtropical pest and weeds
- Survival of pests in winters
- Virus disease in cold area

○ Cultivation of Blueberry, Mango, Banana et al

○ 60–80% of several tropical fruits in Department Store : Domestics

**2**

## **Pesticides Registration**

## Pathogenic diseases, insect pests and weeds

Classification	Total	Disease	Pest	Weed
Recorded	4,618	1,539	2,618	461
Outbroken in crop	1,537	574	625	338
To be controlled	100	36	42	22
Exotic	273	22	33	218

## Change of Social Recognition

- Importance in agricultural production increase
- Stable supply of effective pesticides.

- Safe pesticide with low toxicity and residue.

- Eco-friendly pesticides for health and environment.



## Pesticide Industry

- Multinational company joined to domestic market after WTO
  - Market share : ('15) 45 %
- Tendency to convert **volume**–directed to **profit**–directed management
- Negative reputation of pesticide & organic farming expanded due to agro–product food safety
  - Market disruption by imitated Bio–control Agents
- Growth of pesticide industry slowed though manufacturing capacity surplus

# Change in Pesticide Management Act

- 📁 Promulgated PMA in 1957 for the first time.
- 📄 Since then, revised and re-enforced 11 times.

## Commodity Permission

*August 28, 1957*

- Tested & assessed by NAMIO, Registered by MAFF



## Commodity Notification

*December 31, 1980*

- Tested & assessed by NIPR, Notified and registered by MAFF
- ✳ Any company can register the notified pesticides with the supply certificate of technical grade a.i. and formulation recipes.



## Full – Registration

*December 7, 1996*

- Tested & assessed by NAS, Registered by RDA

*MAFF : Ministry of Agriculture, Forestry and Fishery,*

*RDA : Rural Development Administration*

*NIPR : National Institute of Pesticide Research*

*NAMIO : National Agricultural Material Inspection Office*

## Requirements for pesticide business license

<b>Category</b>	<b>Manufacturing</b>	<b>TGAIS</b>	<b>Importing</b>
<b>Man-power</b>	Highly educated & qualified	Same as M	Same as M
<b>Facilities &amp; Equipment</b>	Lab : Chemical & Biological Store house : > 165 sq. m (Leasable) Experimental field : over 1 ha Formulation facilities -EC, SL -SC -DP, WP, SP -GR Extruding -GR Impregnating Coating -Non-selective herbicides -Other	Same as M Same as M Same as M Unnecessary TGAIs facilities - Reactors or Fermentors -Drying -Packing etc.	Same as M Same as M Same as M (Leasable for TGAIs only)

***TGAIS : Technical grade of the active ingredient substance***

# **Roles of RDA**



## **Pesticide Registration**

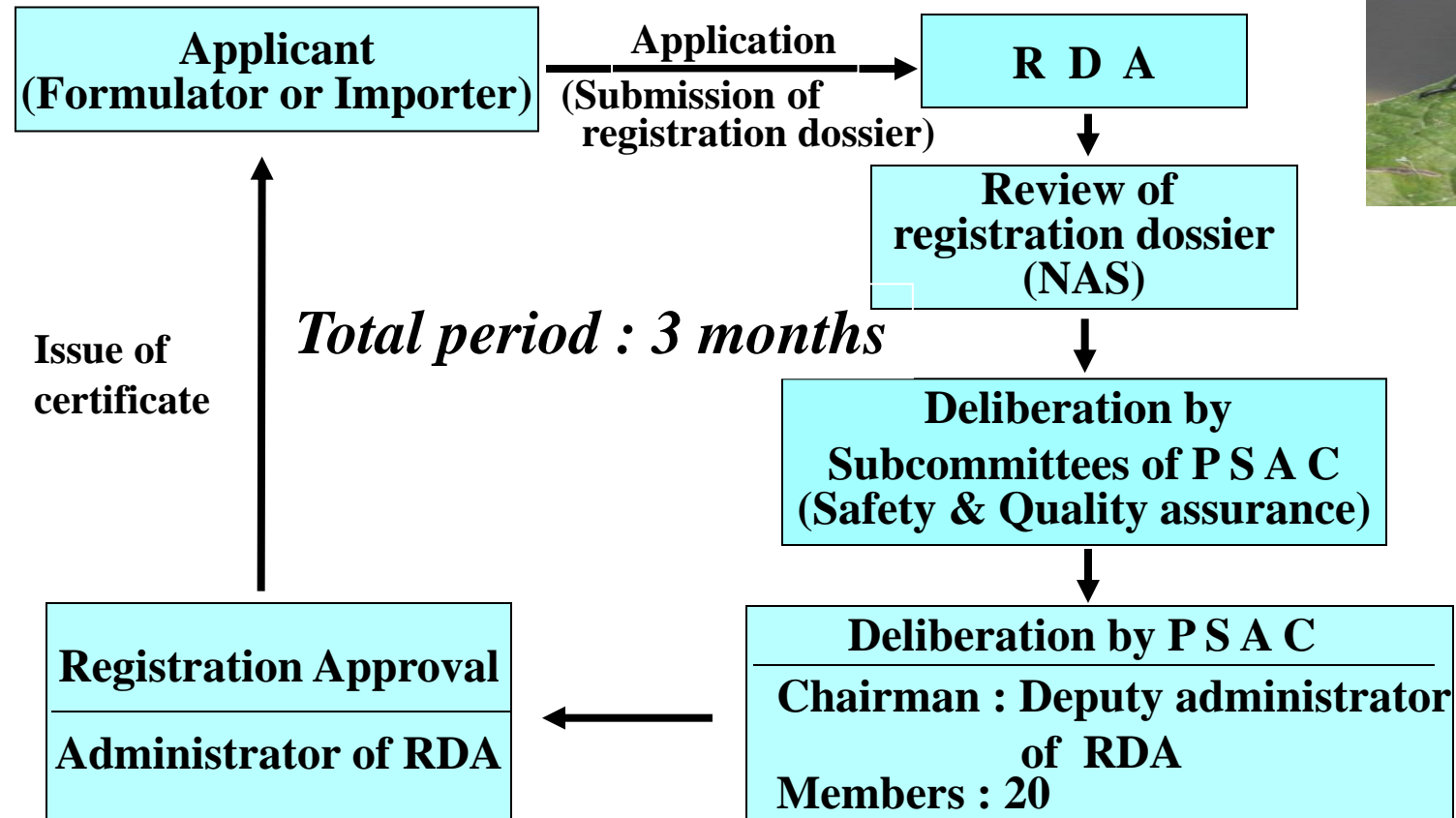
- Test Guidelines, Safety Evaluation, Re-evaluation**



## **Pesticide Management**

- Permission of Manufacturers & Suppliers,  
Quality Control of Pesticides at Market or  
in Factory**

# Pesticide Registration Procedure



*P S A C : Pesticide Safety Advisory Committee*

# Data Requirement for Registration

- Submit **domestically** produced data on chemical stability, bio-efficacy, phytotoxicity, toxicity and persistence.
- All the tests for local data should be generated from the officially recognized organizations.
- ※ Currently recognized organizations for producing local data  
< testing institute : 117 (2015.6.31)>
  - Efficacy & Phytotoxicity , Crop & Environmental residue  
Physico-chemical properties, Toxicity & Eco-toxicity  
< GLP testing institute : 17> = env. Toxicity & mam. toxicity

# Data Requirement

## Chemical identity

**Shelf-life**

**Physico-chemical  
property parameters**

- A.I. contents
- Impurity profiles

## Efficacy

**Fungicide, Insecticide:  
3 field tests**

**Herbicide: 6 field tests  
(2 to 3 years)**

## Phytotoxicity

**Target crops**

- Standard & double dose

**Carry-over crops**

**Regional adaptability**

- Herbicides for paddy rice
- Tank-mixing compatibility

- Most trials are modulated by Korea Crop Protection Association.
- Physico-chemical property parameters are confirmed by NAS.

*KCPA : The Korea Crop Protection Association*

- continued

## Toxicology

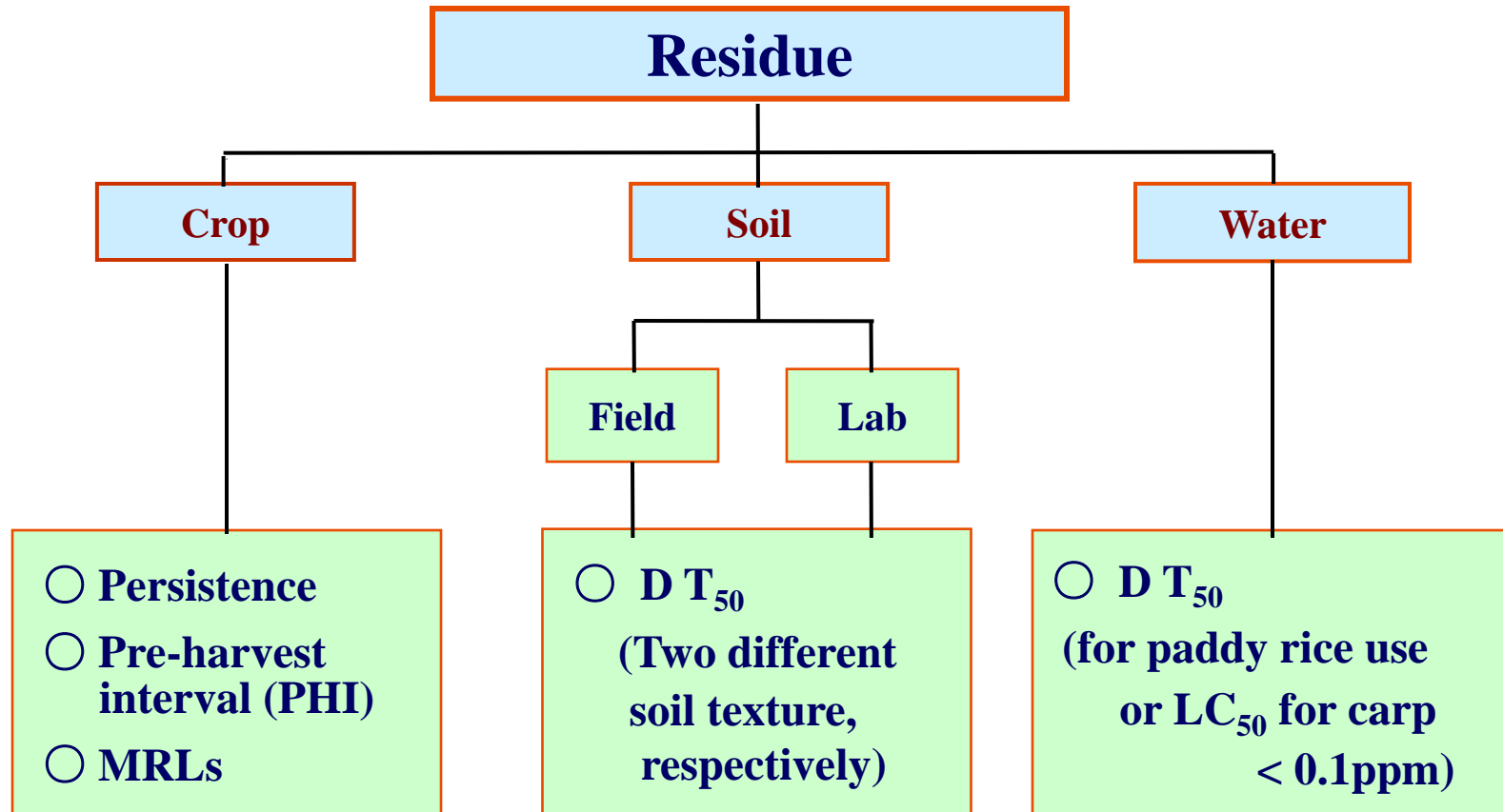
- Acute oral for mice
- Acute dermal for rats
- Primary skin  
& Eye irritation  
for rabbits
- Skin sensitization  
for guinea pig

## Ecotoxicology

- Carp LC<sub>50</sub> test
- *Daphnia magna*  
LC<sub>50</sub> test
- ※ Additional test  
for paddy rice use
  - Loach LC<sub>50</sub>



- continued



## Additional Data Requirement

Toxicology		Ecotoxicology	
Data	Remarks	Data	Remarks
Subacute		Daphnia	For paddy rice
Chronic		Algae	
Mutagenecity	Battery of 3 tests	Avian	
Reproduction		Earthworm	
Carcinogenecity		Silkworm or	
		Natural enemy	
Teratogenecity		Bioaccumulation	> Log Pow 3
Acute delayed neurotoxicity	ChE inhibitors only	Honeybee	
Animal metabolism*			

※ Metabolism and fate study in plant/soil/water are required due to tier approach

# Registered Pesticides in Korea

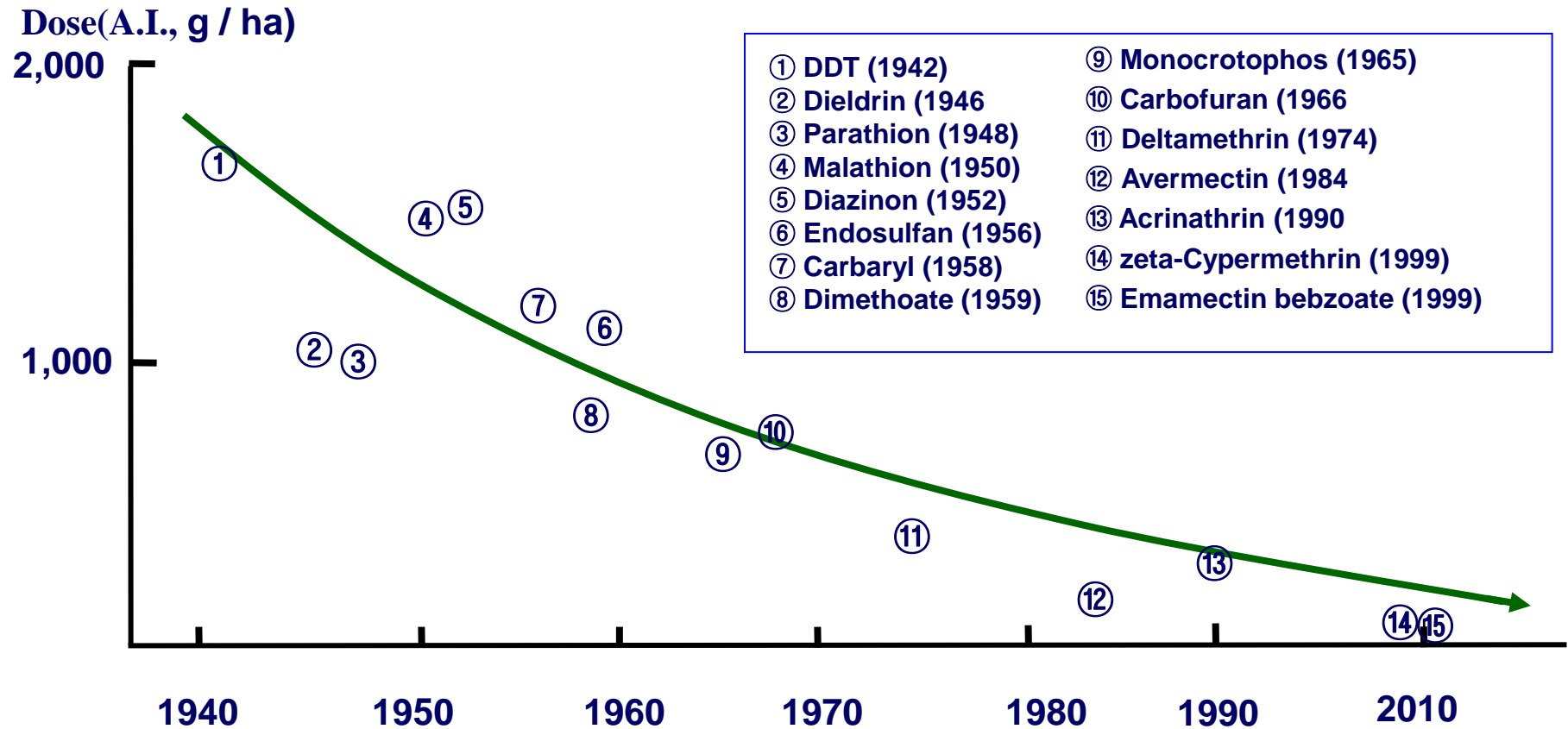
- 481 A.I.s (Chemicals >98%)
- 1,870 Formulated Products
- Biocides(21 A.I.s, 35 products)

## Registration of Products

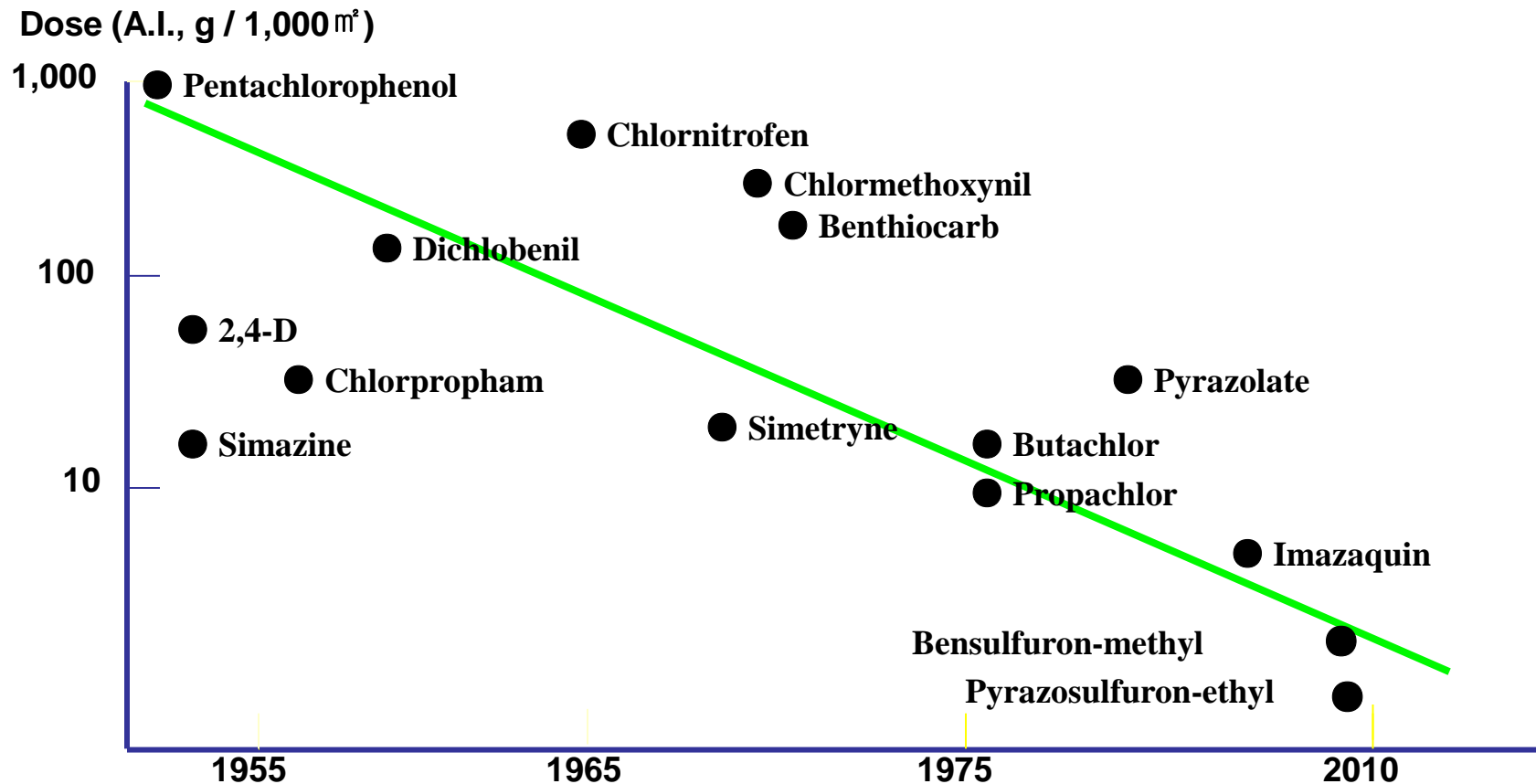
Year	'81	'90	'00	'15
Total	230	467	941	1,837
Fungicide	72	156	295	607
Insecticide	100	185	352	521
Herbicide	37	90	234	565
Other	21	36	60	144

- ~1981 Permission, 1981~96 Notice, 1996~ Registration
- Every 10 years No. of Pesticide products increased rapidly.

# Insecticide A.I. Input / ha



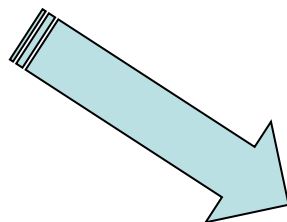
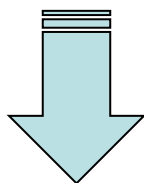
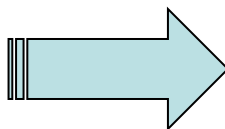
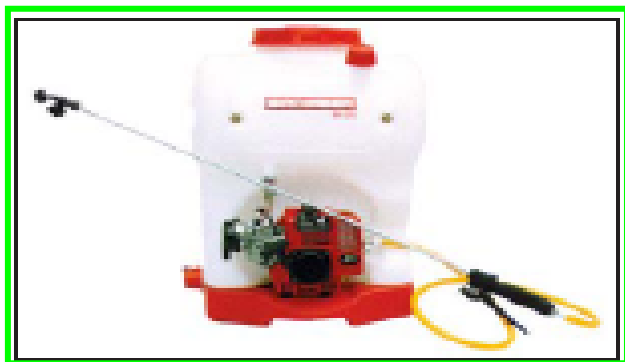
# Herbicide A.I. Input / ha







# Recent Spraying







# New Formulation Technology



**3**

## **Safe Usage of Pesticides**

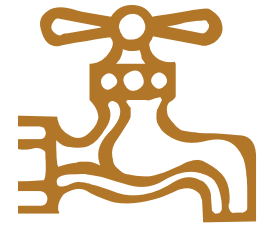
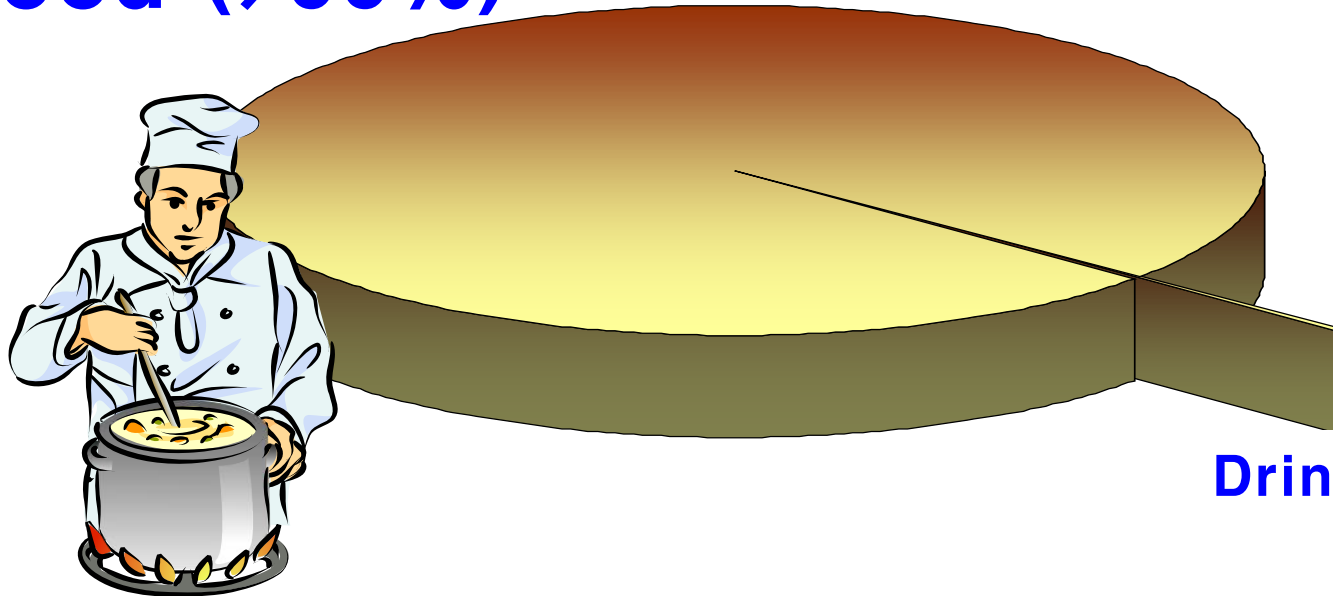
# **Pesticide Safety Regulation on Crops**

-  **NAQS : MRLs before Market**
-  **MFDA : MRLs on the Market**
-  **RDA : PHIs(Pre-harvest Intervals)**
-  **Min. of Environment : Water, Soil**

♣ NAQS : National Agricultural Products Quality Management Service

# Dietary Intake of Pesticides

**Food (>99%)**



**Drinking water (<1%)**

# Setting the Korean MRLs

Calculating the NOAEL from Animal Tests(Monkey, Dogs)

Apply 1/100 ~ 1/1000 of NOAEL as Acceptable Daily Intake (FAO/WHO)

Considering the Dietary Amounts of each food and Residues  
Each country has its own MRLs  
※ MFDA (441 A.I.s, 7,333 items)

Setup the Safe Use Guidelines not violate the MRLs  
**Notice the SUG by RDA**  
- Violation Fee to Farmers (<\$ 500)

## **Applicability of MRLs**

-  **Korea MRL for Each Food**
-  **CODEX Standards**
-  **Lowest Value within Large Group**
-  **Lowest Value within Small Groups**  
(Nuts, Vegetables, Fruits)

# Korean MRLs Examples

(Unit : mg/kg)

Pesticide	Potato	Onion	Lettuce	Cabbage	Cucumber	Apple
Carbendazim	–	2.0	5.0	2.0	0.5	2.0
Chlorothalonil	0.1	1.0	–	5.0	1.0	2.0
E P N	0.1	–	0.1	0.2	0.1	0.2
Diazinon	0.1	0.5	0.1	0.1	0.1	0.5
Imidacloprid	0.3	–	5.0	3.5	0.5	0.5
Metalaxyl	0.05	0.2	2.0	0.1	1.0	0.05

**\* 7333 items (2015. 12.)**

# **Monitoring Offices for Residues**



**Food(before Markets) : NAQS♣**



**Food(at Markets) : MFDA**



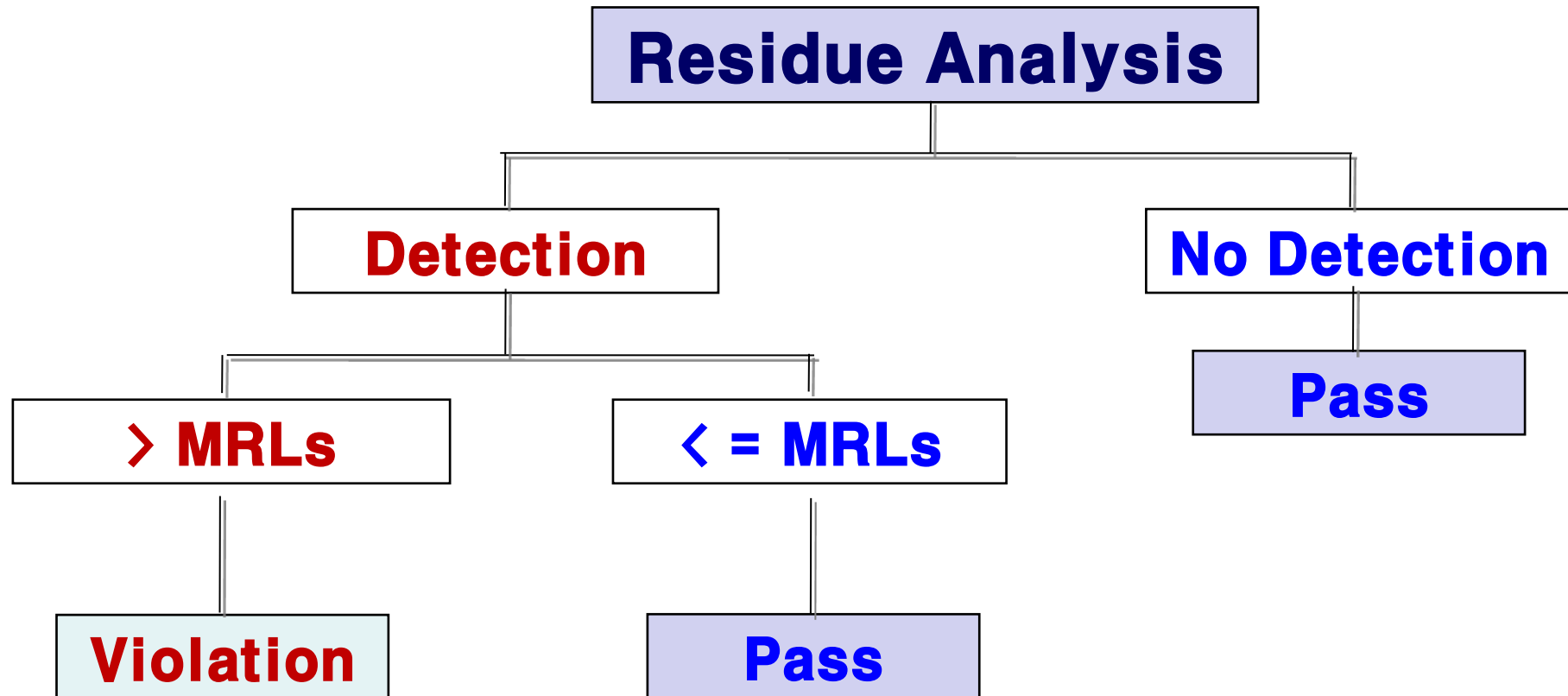
**Water, Soil : Ministry of Environment  
(RDA, NAQS)**



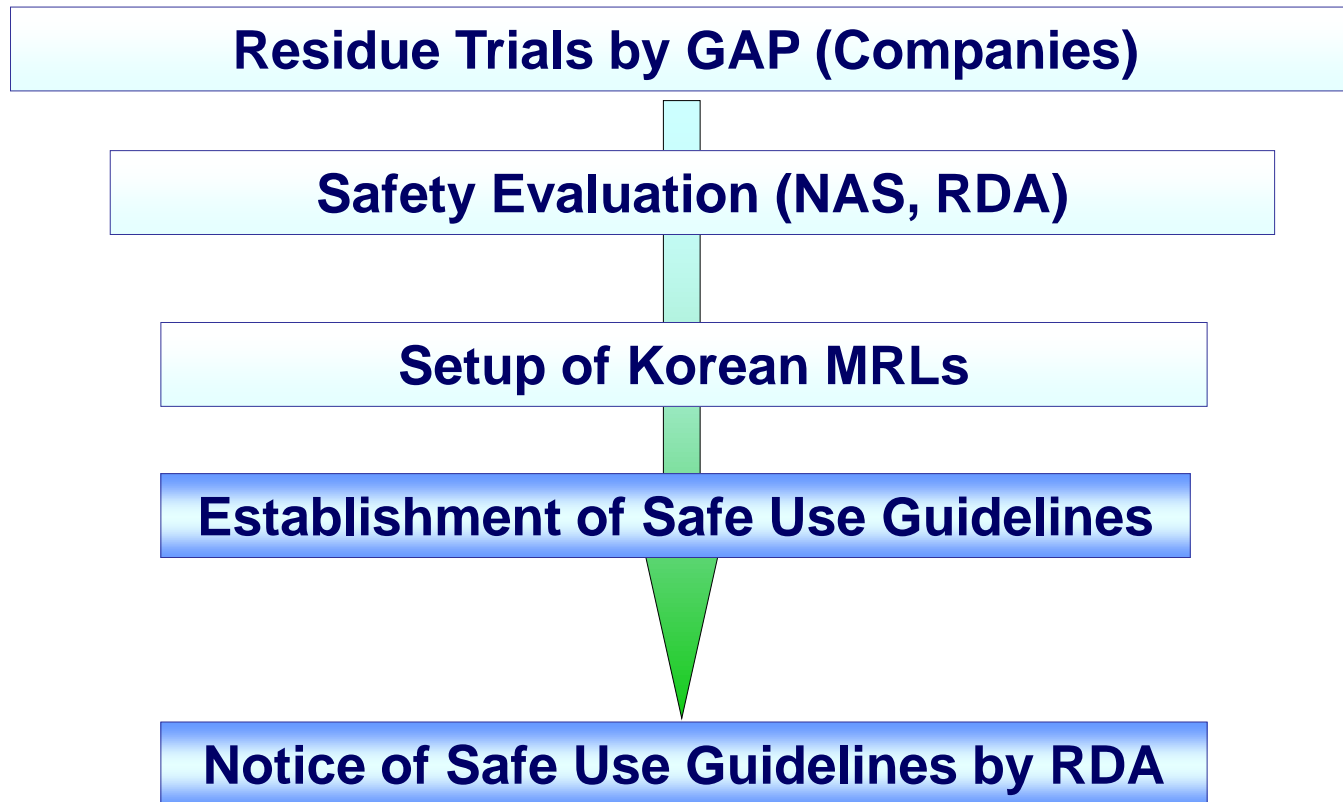
# Monitoring Targets (NAQS)

Types	Main Monitoring Targets
Residues	320 Pesticides considering Usage amounts
Heavy Metals	Cadmium and Lead in 10 Main crops
Pathogenic Microbes	6 Pathogenic Microbes
Fungal Toxins	6 Toxins including Aflatoxin B1
Antibiotics	84 Veterinary medicines

# Evaluation of Residues

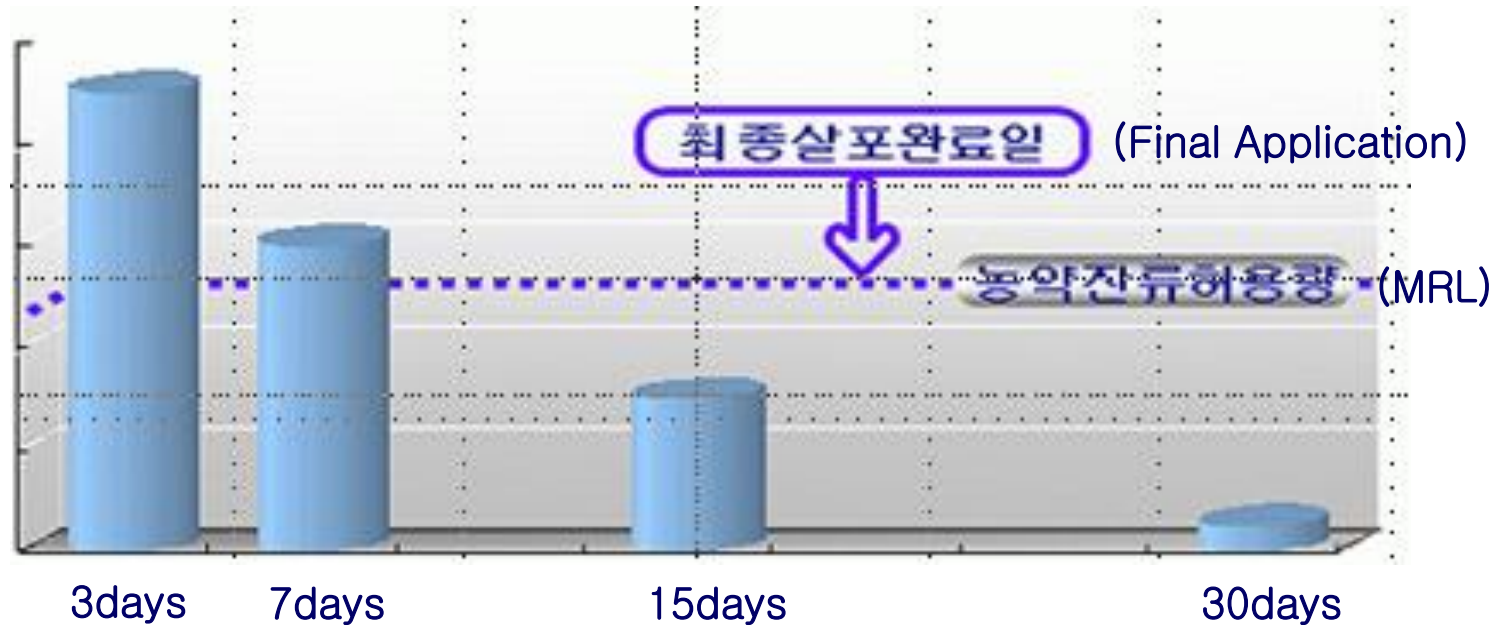


# **Scheme of Safe Use Guidelines**



**\*All registered pesticides established SUG**

# Set Up of Safe Use Guidelines



## **Trials for Minor Usage**

- Government Supports the Minor Usage since 1998

	Crop	Pesticide	Pests
Trials	91	450	1,886
Registration	77	240	832
Rate(%)	85	54	44

◎ Budgets for Minors for 2016 : \$ 3.0 million (RDA)

# Export Crops

**To secure the Safety, not to violate the foreign MRLs**

## □ Safe Guidelines for Export Agro-products (2003 ~ )

- Publishing the guidance books for 28 crops exporting to 11 nations
  - Distributing to and educating for 2,000 farmers every year



**Guidance books for export crops**

**4**

## **Pesticides Management**

## **Market Conditions**

-  **Size of Pesticide Market : 15 B\$**
-  **Most A.I.s imported : >91% (320 m\$)**
-  **Domestic A.I.s : 48 m\$(34% export)**
-  **Import : USA, France, China, India,  
UK, Germany**



## ☐ **Pesticide Management Offices**

**MAFRA**

**Pesticide Control Act, Establishment of Policy**

**RDA**

**Pesticide Registration, Quality Control, Registration of Industry, Pesticide Use Guidelines, Education of New Pesticide Salers**

**NAS**

**Pesticide Analysis, Review of Dossiers**

**Province or City**

**Pesticide Quality Surveillance**

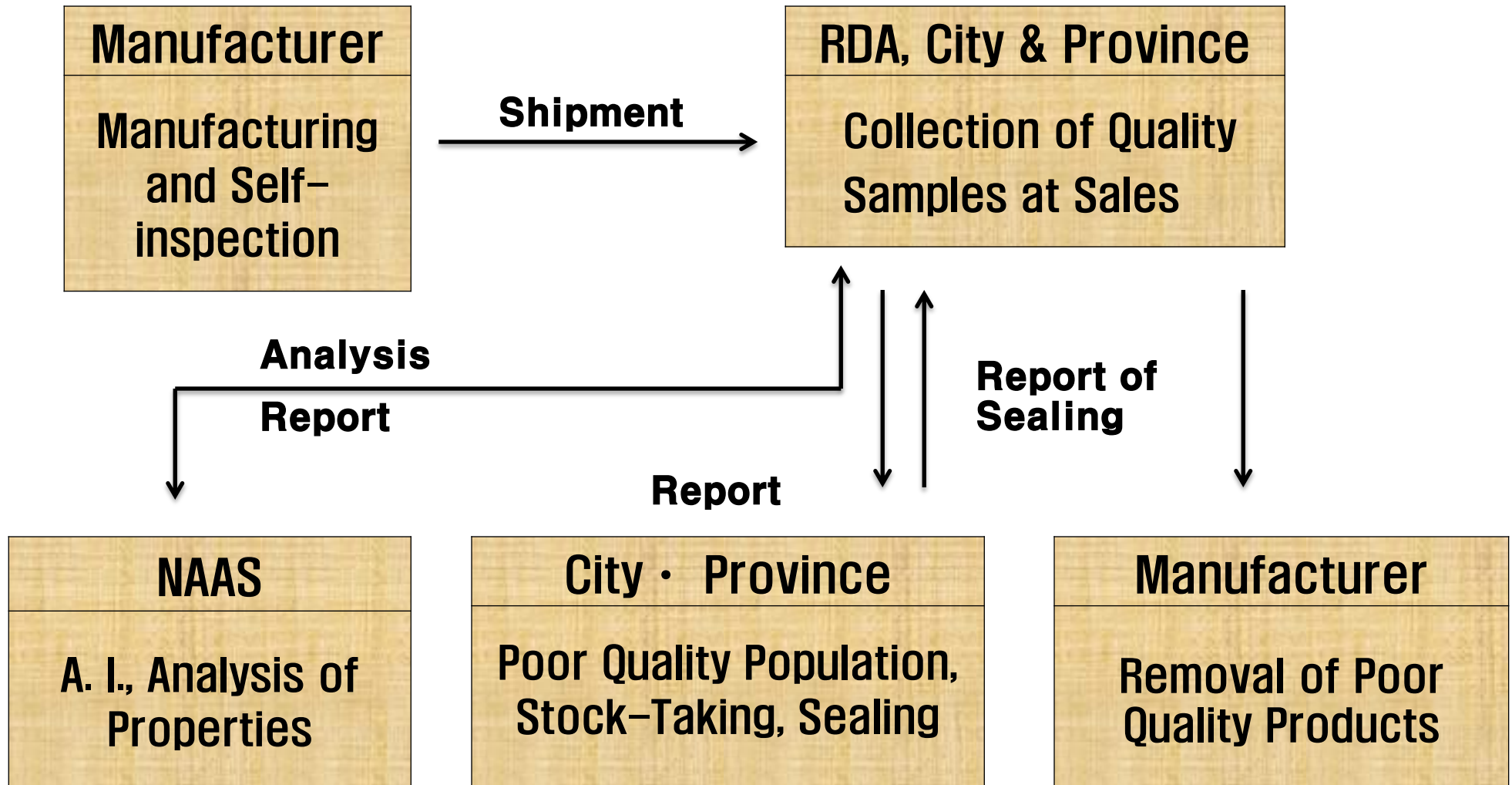
**City, County**

**Sales Registration, Pesticide Quality Surveillance, Violation Fee, Observation of Safe Use Guidelines**

**NAQS**

**Safety Control before Market**

## Quality Control of Circulation Pesticides



## □ Regulations of A. I.s

Pesticide	No.	Direction
<b>Highly Toxic</b>	<b>5</b>	<b>. No newly registration, Restricted Sales</b>
<b>EDs</b>	<b>57</b> <b>(Carbaryl)</b>	<b>. No new and more registration</b>
<b>Toxicity B2</b> <b>(Captan)</b>	<b>10</b> <b>(Captan)</b>	<b>. No newly registration, Restricted Sales</b>
<b>EBDC s</b> <b>(ETU)</b>	<b>16</b> <b>(Mancozeb)</b>	<b>. No newly registration</b>
<b>Paraquat</b>	<b>–</b>	<b>. Banned since 2011</b>
<b>Molinate</b>	<b>11</b>	<b>. No Production &amp; Sales since July, 2008</b>

# Reevaluation of safety

## Regular Reevaluation of Pesticides every 10 years

\* No. of Pesticides Cancelled for 10 years : 280 products


## Irregular safety reevaluation : 37 Pesticides Cancelled

---

Causing	Pesticides
Acute Toxicity	12 (Aldicarb, Chlorfenvinphos, Dialifos, Phosalone et al)
Residues in Soil	12 (BHC, PCNB, Chlordane, Toxaphene, DDT et al)
Residues in Crops	5 (Chlordimeform, Lead arsenate, PTA-B, PMA, Phosvel)
Carcinogen et al	9 (Captafol, DEA-MH, Fenoprop, Maneb, et al)

---

# **Emergency Reevaluation**

- 
- **Reevaluation of pesticides banned by U.S. & EU : 158 A.I.s**
    - **1<sup>st</sup> Reevaluation : Cancellation 18, Data requirement for Worker safety 23**
  - **Reevaluation continue by 2017**
    - \* **Regular reevaluation : 117**

## ☐ **Details of Pesticides Labeling**

- **Product Name : Front Side, Larger(>1/2 of Brand Name)**
- **Easily Understanding of Principal Information for Safety**
- **Not Use the Pictures Misunderstood as Beverages**
- **Allowing Extra Instruction Papers for Small Label Size**





# Labeling

Insecticide

Instructions

Brand

Crops  
Usages  
Dilution

Pre-  
Harvest  
intervals

Active  
Substance





*Thanks for your attention !!*

[wideyun@korea.kr](mailto:wideyun@korea.kr)