

Low-cost Organic Cultivation Status and Development Strategy of Rice in Korea

Kyong-Ju Choi, Man-Cheol Jung
Gwangju Metropolitan City,
Organic consultant

Jeollanam-do

Agricultural Research and Extension Services



Organic Evangelist dreamy organic paradise,
the Garden of Eden to the earth

Kyongju Choi
최경주 박사

Current

Gwangju Metropolitan City, **Organic Consultant**
Chonbuk Agricultural Meister University,
Professor of Cucumber Course

Career

Jeollanam-do Agricultural Research and Extension Services

Director General

Chief of Environment-friendly research institute

Chief of Horticultural research division

Rural Development Administration

Chief of Organic Agriculture Division

Vice Chairman, Korea Organic Agricultural Society

Vice Chairman, Korea Horticultural Society

010-4602-5230

kicho337@gmail.com



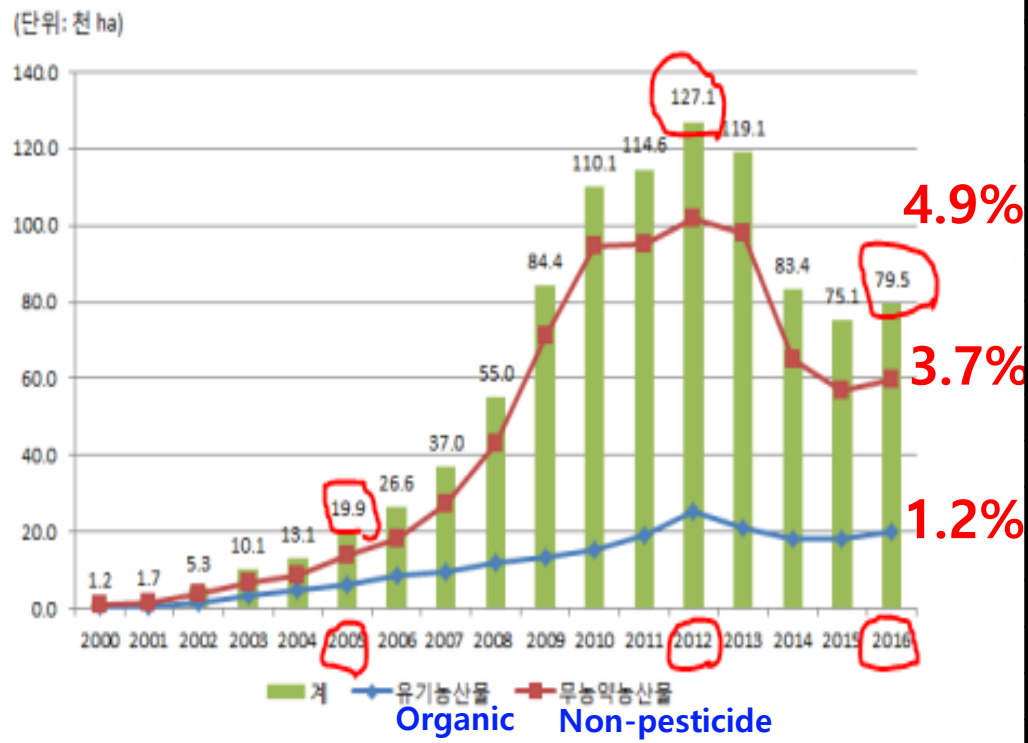


차례

- 1. Organic cultivation status and problems in Korea**
- 2. Low-cost organic cultivation technology of rice**
- 3. Development strategy of rice organic cultivation**

1. Organic cultivation status and problems in Korea

- Certified Area : '01 1,745ha → '16 79,479ha (ratio 4.9%) 46 times
- Organic : 450 19,862ha (ratio 1.2%)
- Non-pesticide : 1,295 59,617ha (ratio 3.7%)
- Jeonnam province 51%, Jeonbuk 9%, Chungnam 8%



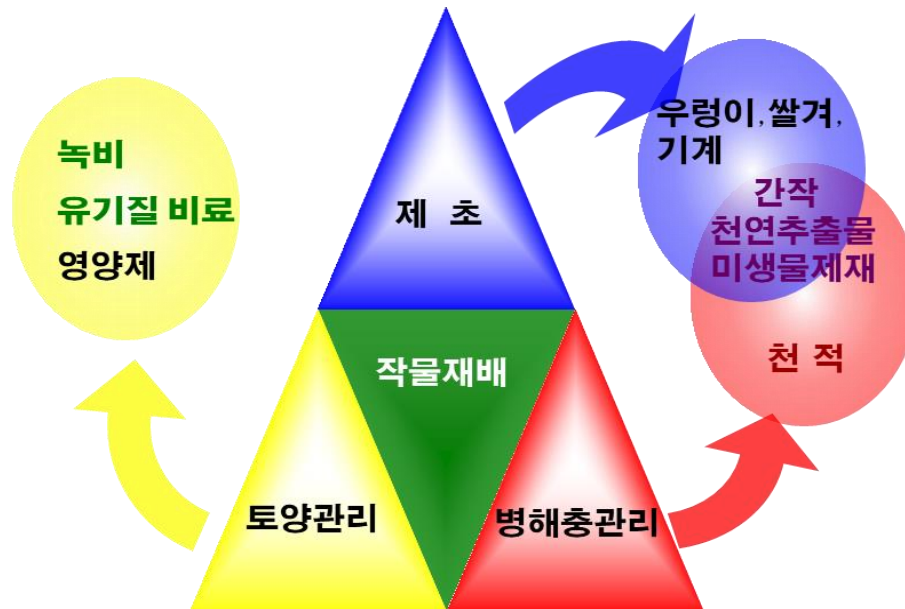
구 분	Total (ha)	Organic (ha)	Non-pesticide (ha)
Seoul	12	-	12
Busan	56	1	55
Daegu	99	7	92
Incheon	447	114	333
Gwangju	336	9	327
Deajeon	11	2	9
Ulsan	111	27	84
Sejong	119	40	79
Gyeonggi	5,024	1,702	3,322
Gangwon	4,283	1,653	2,630
Chungbuk	3,607	922	2,685
Chungnam	6,100	2,579	3,521
Jeonbuk	6,799	1,947	4,852
Jeonnam	39,940	6,567	33,373
Gyeonbuk	4,909	1,199	3,710
Gyeongnam	5,217	1,673	3,544
Jeju	2,409	1,420	989
Total	79,479	19,862	59,617

2016 Major Crops Certified area (ha)

crops	Total	Organic	Non-pesticide
Rice	51,256	10,336	40,920
Wheat	2,214	545	1,669
Soybean	951	334	617
Mung bean	165	32	133
Tomato	436	130	306
Pepper	459	201	258
Cabbage	611	213	398
Chinese cabbage	471	141	330
Radish	516	156	360
Onion	580	150	430
Garlic	405	96	309
Grape	294	106	188
Blueberries	1,045	163	882
Chestnut	6,798	1,770	5,028

Problems of Organic Agriculture in Korea

- Lack of recognition of soil and ecosystem conservation
- Material-dependent high input agriculture for high yield
- No rotation system established
- Crop cultivation and livestock circulation not established
- Excess fertilization of livestock manure
- No standard technology established



Organics are gold in the soil



Taking rice straw from a rice paddy while doing organic farming

Disconnection of natural circulation ring !!!



Good quality organic matter supply is easy to grow green manure crops!

Legume crop



Hairy vetch



milk vetch



red clover



Vicia angustifolia

Gramineae crop



rye



barley



maize



Sudangrass

Fertilizer value of major green crops (kg/10a)

crop	Fresh wt.	N content	K content
Legume			
Austrian pea	2,688	16.5	13.7
Hairy vetch	2,503	19.7	20.4
Gramineae			
Barley	3,362	13.4	22.9
Wheat	4,390	15.5	24.3
oat	2,085	10.6	18.6
Italian Grass	3,735	13.0	30.2
Legume+ Gramineae			
Barley + Hairy vetch	4,095	17.6	22.6
Barley + Pea	4,007	17.7	22.3

2. Low-cost organic cultivation technology of rice

Green manure crop suitable for rice farming – Hairy vetch



Hairy vetch sowing method video

한 GOM MIX Pro



Hairy vetch cultivation

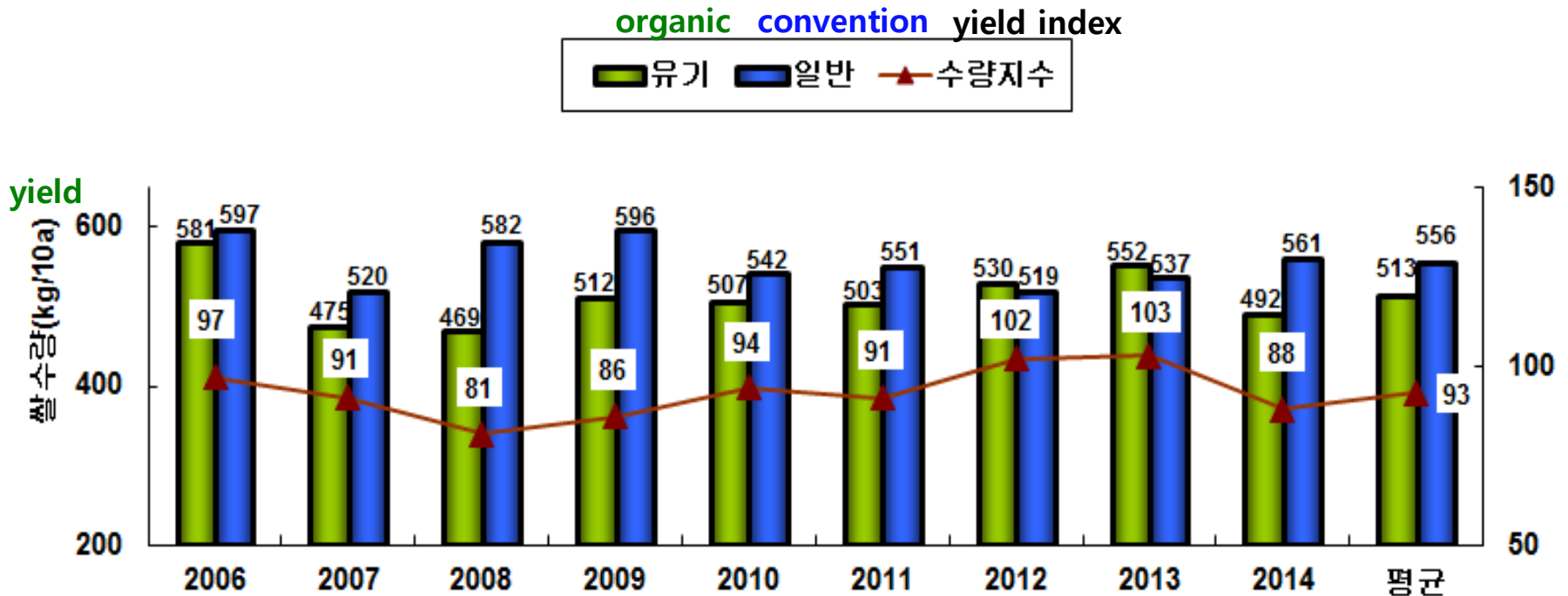
- Sowing 10 days before rice harvest : Late Sep. ~ Mid Oct.
- Sowing after rice harvest: October to late October
- seed seeding rate : 5 ~ 9 kg / 10a
(Mixed: 3 kg of hairy vetch + rye or barley 8 kg / 10a)
- In the middle of May, tillage input : 1,500 ~ 2,000kg / 10a
The amount that exceeds 2,000kg use in other field or livestock feed



Yield variation in organic cultivation by year (06~14)

compared to the conventional cultivation reduced yield was 3% in the first year, 19% in the third year, 6% in the fifth year. 7th and 8th years, it increased by 2 ~ 3%.

9 years average 7% reduction



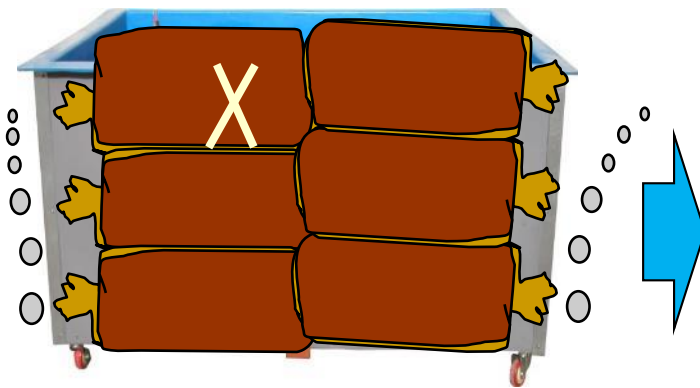
※ Tested variety : Hopyeong, Ilmi, Dongjin1, Unkwang (2006~2009),
Hopyeong, Ilmi, Dongjin1 (2010~2014)

Bakanae disease symptom

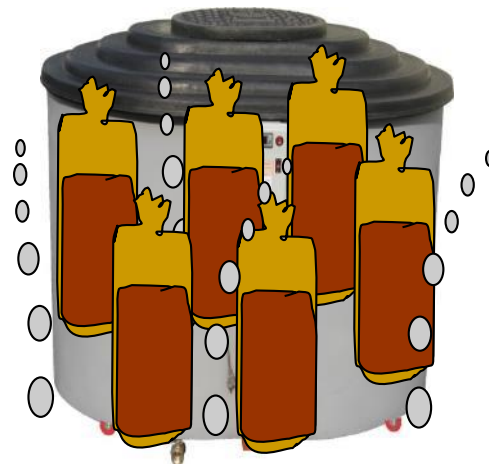


Disinfection method of organic seed using hot water sterilizer

- Seed volume for one time disinfection
Water : Seed ratio = 10 : 1 (300L : 30kg)
- Disinfection method
 - 1) Sterilizer temperature set at **60 °C**
 - 2) Put in seed (in 10kg unit) and immersed for **10 minutes**
 - 3) Immerse in cold water immediately after soaking in hot water (10 minutes) and perform germination work



RS600T / 60kg 용



RS300T / 30kg 용

Organic seed disinfection video



Seed sowing (100~130g/ Nursery Box) and Seedlings



35 ~ 40 days Seedling
20 ~ 25cm Height,
4.5 ~ 5.5 leaves

2~4 plant/hill, Wide planting , Deep water management



Through deep water management
Creating a fan-shaped rice

Plant density: 30 x 18~22cm
(18.4~15.2plant/m²)



Enhance sunlight penetration and
ventilation

Weed control method in rice organic cultivation



Pellet rice bran



EM molasses



Duck



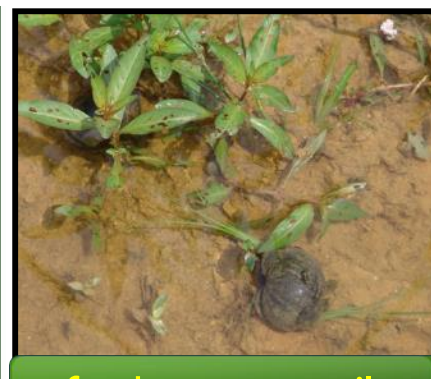
Paper mulching



Rice bran spray



EM molasses



freshwater snails



Mechanical weeding

The type of freshwater snails being used

- small snails : 30 to 40 days after hatching, No. 2,000/kg
- middle snails : 40 to 50, 700 ~ 1,000/kg
- big snails : 60 to 90, 200 ~ 300/kg



small snails 1kg



contol



small snails 1kg

Controllable weeds

피



물달개비



미국외풀



알방동사니



여뀌바늘



올방개



올미



벗풀



올챙이고랭이



가래



Some non-eating weeds

여뀌



새섬매자기



미국좁부처꽃



물질경이



개구리밥



자귀풀



Mechanical weeding



Environmentally friendly pest control manual for rice



「벼」친환경 병해충관리



시 기

4 상 중 하 5 상 중 하 6 상 중 하 7 상 중 하 8 상 중 하 9 상 중 하 10 상 중 하 11 상 중

모내기

수잉기, 출수기

등숙기

수확기

재 배

- 법씨 준비 및 소독: 10a 당 4kg 내외로 60℃에 10분 또는 65℃에서 7분간 담금
- 물관리: 모낸 후 30일간 7~10cm로 깊이 대 주어 잡초 발아 억제시킴
- 왕우렁이 이용 제초: 모낸 후 10일 이내에 10a 당 5kg 내외 투입
(서리질 후 7일 이내에 모내기하고 논둑을 높이고 배수로에 망 설치하고 어린 모, 직파재배는 피해가 우려되므로 지양)

병해충방제시기 및 농자재

잎도열병
이삭도열병
앞집무늬마름병



벼물바구미
벼멸구
흑명나방



- 도열병: 석회보르도액, 박도열, 당귀, 마늘, 계피+당귀, 당귀+생강, 당귀+마늘
- 앞집무늬마름병: 오배자, 감초, 함황피
- 줄무늬잎마름병: 애멸구 방제, 이병성 품종 재배시 주위 논 보다 2~3일 늦게 이앙
- 벼물바구미: 베스탑, 왕중와, 바게미, 멸구슬
- 벼멸구: 박메루, 스파이더, 크린업, 벌레리아, 명의, 헬퍼3-1, 진장군, 진압, 선초, 바이진, 마늘, 죽순+흑설탕, 편백유, 은행잎+현미식초:젠피+현미식초, 자리공+현미식초:무공해제조비누, 울금(주정추출)
- 흑명나방: 베스탑, 왕중왕, 흥맹이, 슬빛채



도 열 병



앞집무늬마름병



벼물바구미



벼 멸 구



흑명나방

Major organic farming practices in Korea

	Standard organic cultivation	Resource circulation agriculture	natural cultivation
Fertility management	Hairy vetch, Rice straw, Non-additional fertilizer	Compost, Self-made Nutrients	Rice straw Non-input
Tillage	Tillage	Tillage	Minimum-tillage
Plant density/m ²	50~60	50	50
Weed control	Snails	Snails	Snails
Pest control	environment-friendly materials 1 time or no	No	No
Other materials	No	Self-made Nutrients 3 times	No

Standard organic cultivation



Resource circulation agriculture

Spraying indigenous microorganisms



Nutrient spray



Indigenous
microorganism

Nutrients by natural plant
(Wormwood, parsley, acacia)

Nutrients by medicinal herbs
(Angelica, cinnamon, licorice,
ginger, garlic)



Natural cultivation

No pesticide, No fertilizer, No compost

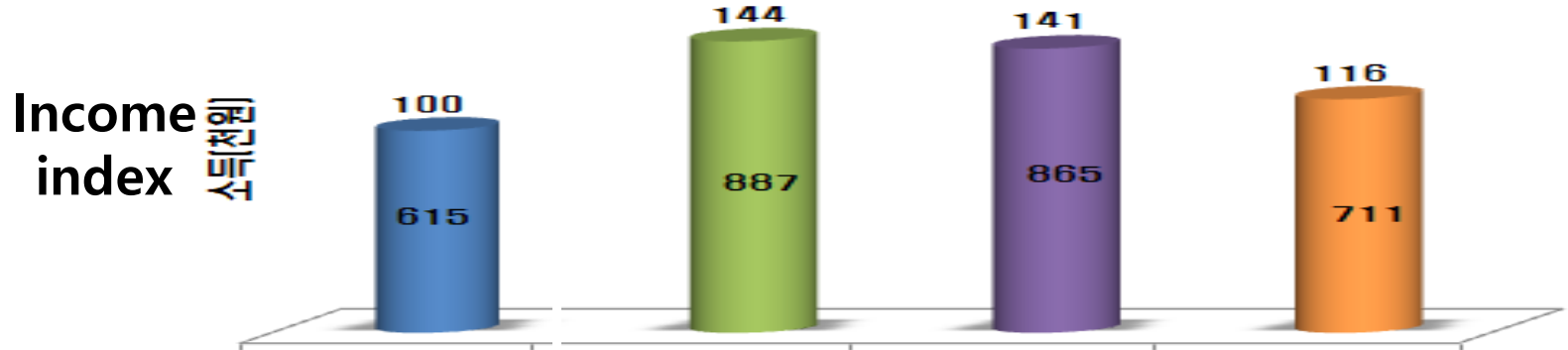


Annual rice yield by organic cultivation type

Type	2011	2012	2013	2014	2015	average	index
Standard organic cultivation	483	529	511	516	475	503	96
Resource circulation agriculture	496	514	569	521	498	520	99
Natural cultivation	431	358	392	375	344	380	72
Conventioal cultivation	529	504	517	517	561	526	100

Comparison of production cost by organic cultivation type

(2012~2013)

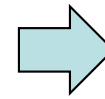


	Conventional cultivation	Standard organic Cultivation	Resource circulation agriculture	Natural Cultivation
Income (\$/10a)	615(100)	887(144)	865(141)	711(116)
Production cost (\$/10a)	718(100)	756(105)	1,017(142)	582(81)
Yield(kg/10a)	511(100)	498(97)	542(106)	375(73)
Price(\$/kg)	1.9(100)	2.6(133)	2.6(133)	2.7(142)
Palatability value(취반미 윤기치)	67.2	75.3	74.9	78.6
Protein con.(%)	6.4	5.8	5.9	5.4

Low-cost organic rice cultivation



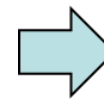
Hairy
vetch



Chemical
fertilizer
100%
replacement



Snails



Herbicide
100%
replacement



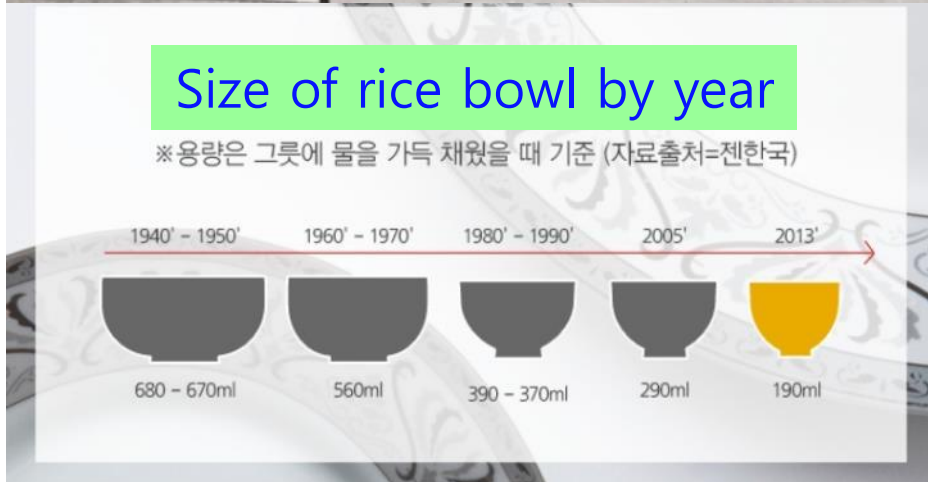
3. Development strategy of organic rice cultivation

- 1) **Stable consumption expansion by using obligatory organic rice for school, military, and public meals**
- 2) **Promotion of low-input, low-cost organic rice cultivation by growing green manure crops in the whole area of rice in Korea**

1) Stable consumption expansion by using obligatory organic rice for school meals, military meals, and public meals



annual rice consumption per capita



organic rice is expensive?

Organic feed
\$18



Organic rice
\$4



1kg
Price

Rice price of a bowl?

General rice children \$0.12 (60g), adults \$0.2 (100g)

Organic rice \$0.18, \$0.3

Organic rice for school lunch added \$1.2 a month

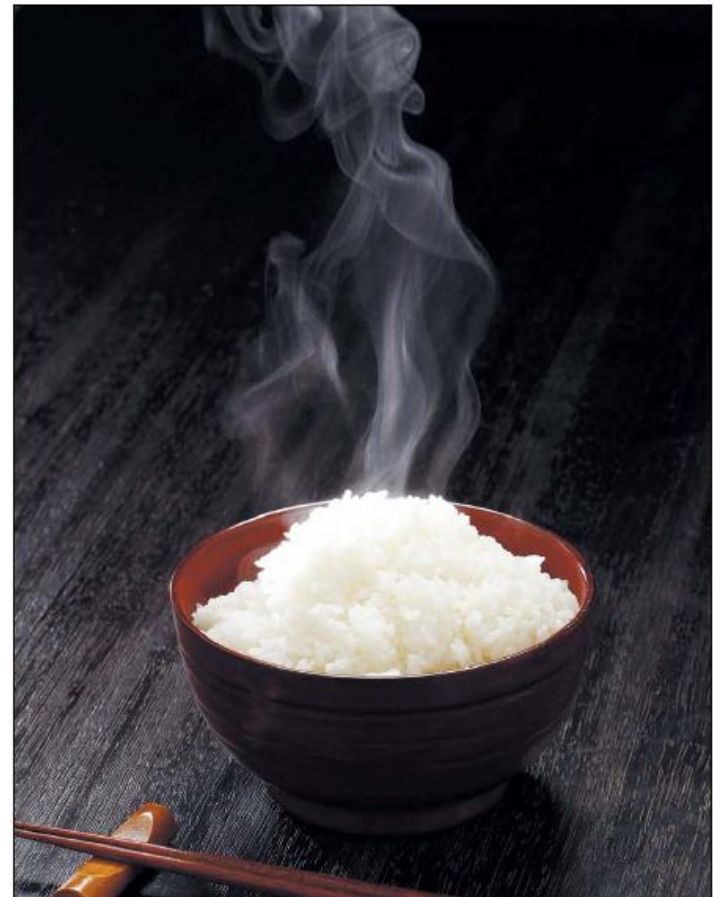


coffee

\$ 4

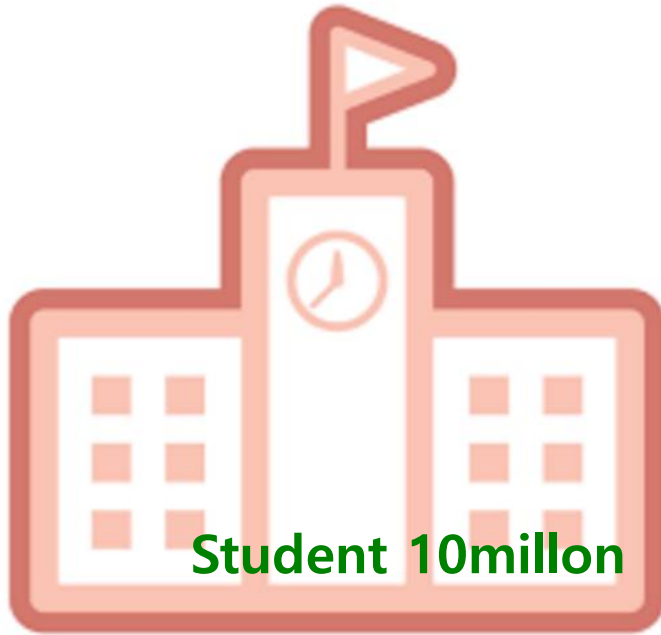


\$ 0.36



Feed organic rice to schools and military

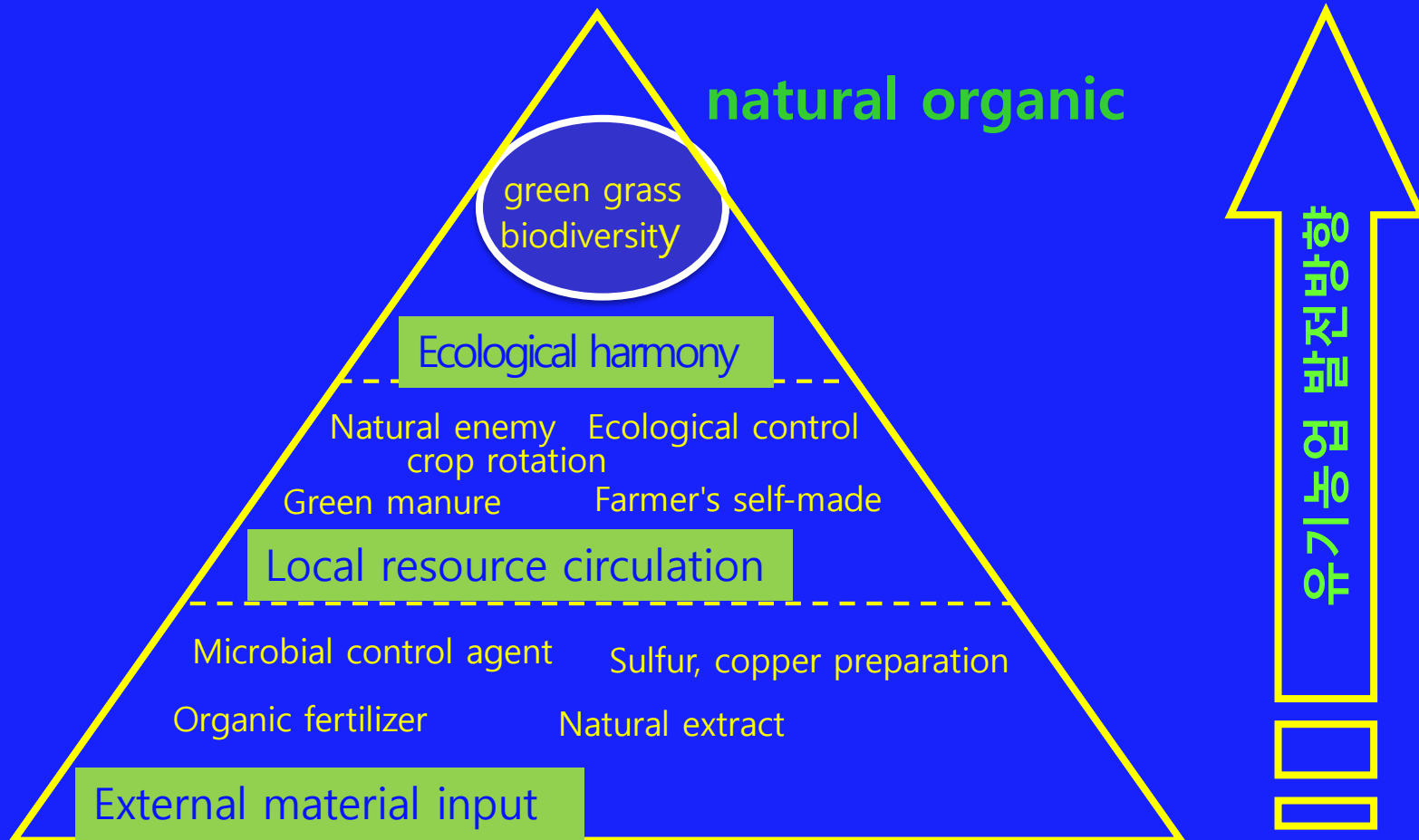
Save our children's health and environment!



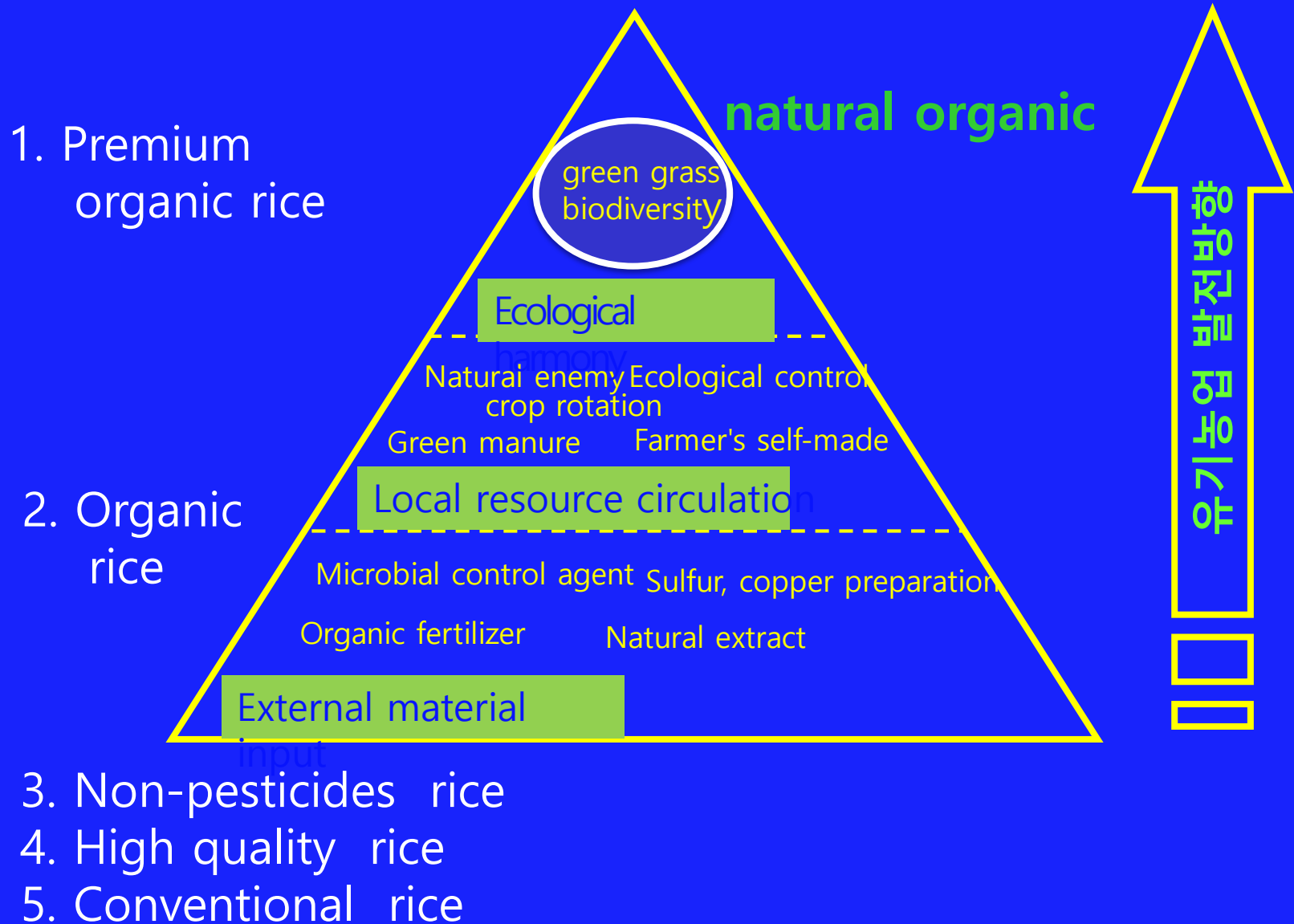
- school, military meal 50,000ha Rice Organic cultivation required
- government officials, hospitals, large corporations 250,000ha

Organic cultivation rate in Korea 1.2% → 20%

2) Promotion of low-input, low-cost organic cultivation



Rice grade in Korea



Plant welfare !!!

organic 'green music rice'

유기농 (ORGANIC)
농림축산식품부
국립농산물품질관리원 제15-13-1-02호

GAP (우수관리인증)
농림축산식품부
농산물우수관리인증 제023-1513-0001호

JAS OCO
일본유기농인증자스 SES-23081001

본 농산물은 3년이상 농약·화학비료를 사용하지 않고 재배한 농산물임

유기농 그린음악 쌀

고품질 쌀, 유기농 그린음악쌀이 만들어 갑니다

- 전라남도지정 제7호 유기농명인 오경배 생산 쌀
- 2011년 제11회 한국유기농산물 품평회 은상수상 쌀
- 국내최초로 벼에 동화책에서나 나옴직한 오피르트음악과 풍물을 들려주면서 재배한 고품질 쌀입니다.

• 상품소개

유기농 그린음악쌀
규격: 1kg
가격: 6,000원

유기농 그린음악쌀
규격: 4kg
가격: 20,000원

유기농 그린음악쌀
규격: 10kg
가격: 45,000원

• 상품특징

논둑에서 풍물을 들려주면서 풍년을 기원했던 옛 조상들의 지혜를 현대과학으로 계승한 농법으로 생산되었으며, 특히 유기농업으로 우렁이농법과 (주)J&K미생물연구소의 토양미생물을 이용한 고품질의 쌀입니다. 한편 간척지로서 미세날 함량이 풍부하고 해풍을 맞으며 농사를 짓기 때문에 결실이 완전하고 미질이 뛰어난 쌀 뿐 아니라 찰기가 많아 밥맛이 으뜸입니다.

• 주문전화(수신자 부담전화) : 080-432-4250



Spikers



하나님께서 지으신 모든 것이 선하매
감사함으로 받으면 버릴 것이 없나니

For every creature of God is good, and nothing to be refused,
if it be received with thanksgiving (1 Timothy 4:4)

Is the weed really troublesome grass?
The more precious things were, the more common
it was.(sunlight, water, oxygen, weed)

“잡초는 우리가 그 가치를 아직 알지 못하는 식물이다.

잡초의 뿌리는 지구 창세로부터 최초의 생명을 흡수하고

그 생명의 본체를 조용히 인간과 함께 붙들고 있는 것이다.

잡초는 언제나 그 생명의 본체를 되돌려주려고

재배되는 식물 앞에서 한걸음 뒤로 물러서 있는 것이다.“

Beryl Markham, West with the Night, 1942

Conclusion

1. Low-cost organic farming is the best way to make healthy and pure soil through cultivation of green manure crops

- continuously support the supply of green seeds and joint seeding in the country
- * General Rice cultivation is also highly recommended to use green manure crops and snails

2. Stable consumption expansion by using obligatory organic rice for school meals, military meals, and public meals

- school, military meals 50,000ha Rice Organic cultivation required
- government officials, hospitals, large corporations 250,000ha

Organic cultivation rate in Korea 1.2% → 20%

At present 'high-input, high-cost, high production organic farming'
Future 'low-input, low-cost, medium production organic farming'

Hope and New Future on the Korean Peninsula



Welcome to Asia's Latest Organic Retreat : North Korea

By [CHARLIE CAMPBELL / DANDONG AND BEIJING](#)

TIME July 29, 2016

"I trust food safety in North Korea as it is all organic,"
says one Dandong-based Chinese trader
who regularly travels all over North Korea.

"I can feel the organic taste from potatoes and beans in North Korea,
but in China you rarely get food like that.
I find it cozy to occasionally live in North Korea for 10-15 days.
The isolation makes me feel relaxed."

북한 전역에 정기적으로 다니는 단동에 있는 한 중국 상인은
"나는 유기농이기 때문에 북한의 식량 안전을 신뢰한다.
"나는 북한의 감자와 콩에서 유기적인 맛을 느낄 수 있다.

그러나 중국에서는 이런 식품을 거의 먹을 수가 없다.
나는 때때로 10-15 일 동안 북한에 살기를 아늑한 것으로 본다.
격리는 나를 편안하게 만든다."

**Land of communication and peace
Demilitarized zone(DMZ) is alive**



*God's blessing on organic
agriculture of the Philippines!*

Thanks

