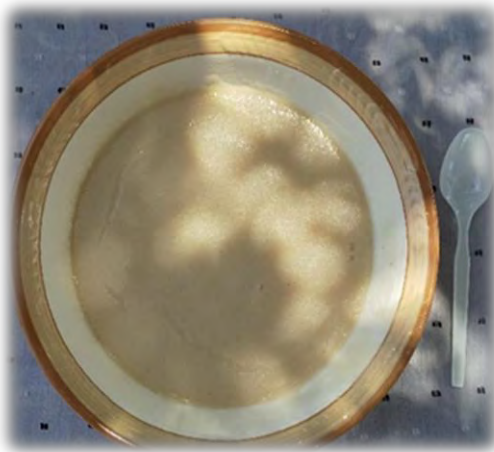




# Nutrition Improvement

## Let's enjoy parboiled rice for our health!!

**-On Site Training-**



# Nutrition Improvement

~Let's enjoy parboiled rice for our health!~

- Today let's learn about nutrition improvement through parboiled rice!
- How often do you eat parboiled rice? (ask farmers)
- How do you cook it?  
(ask farmers)
- Did you know that parboiled rice is very nutritious?  
(ask farmers)

Sustainable Development of Rain-fed Lowland Rice Production  
MoFA/JICA TENSUI RICE PROJECT PHASE II

FM OST-3



MOFA/JICA TENSUI RICE PROJECT

## Nutrition Improvement

Let's enjoy parboiled rice for our health!!

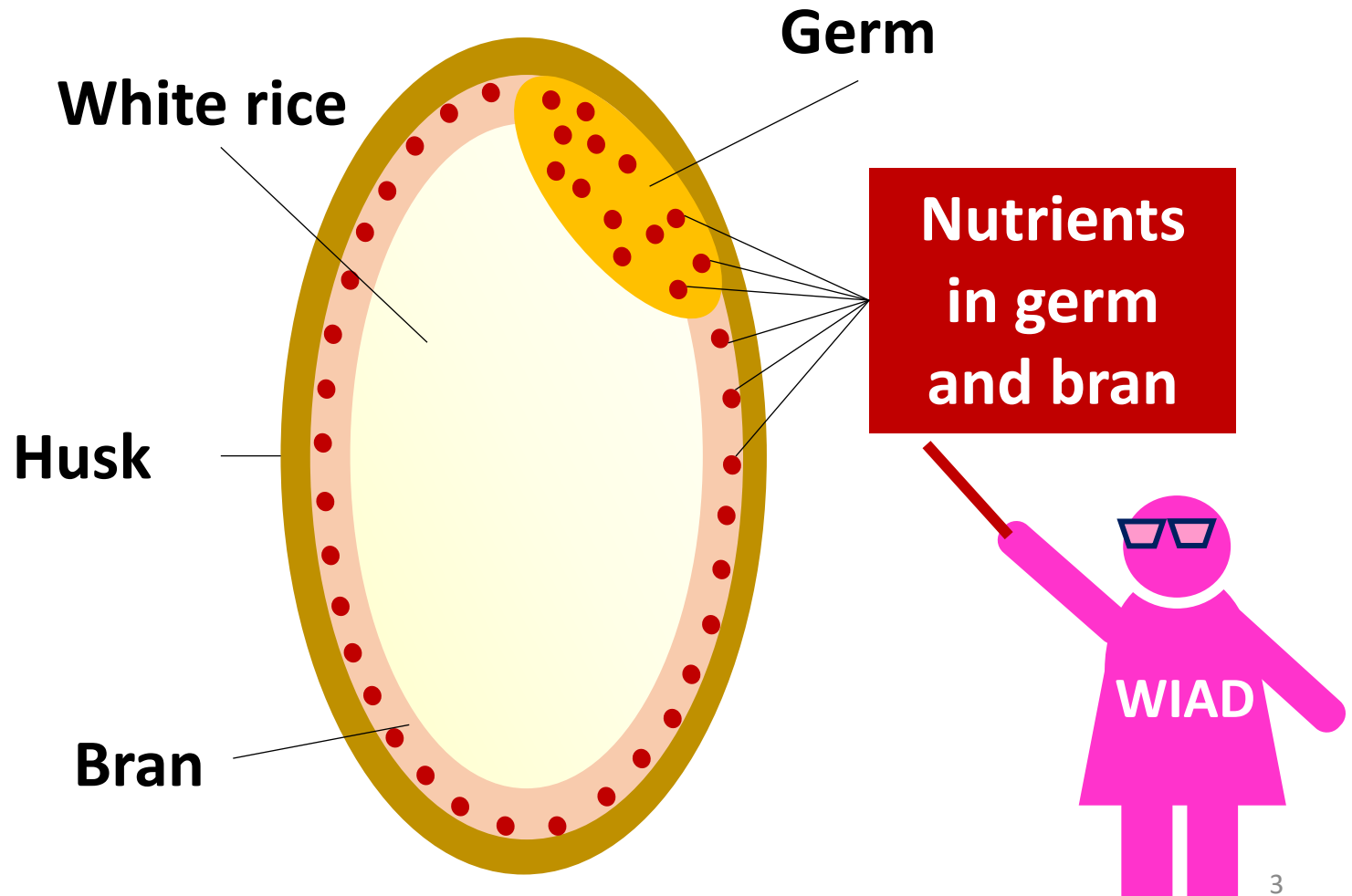
-Northern Region-



Page 1 (Front)

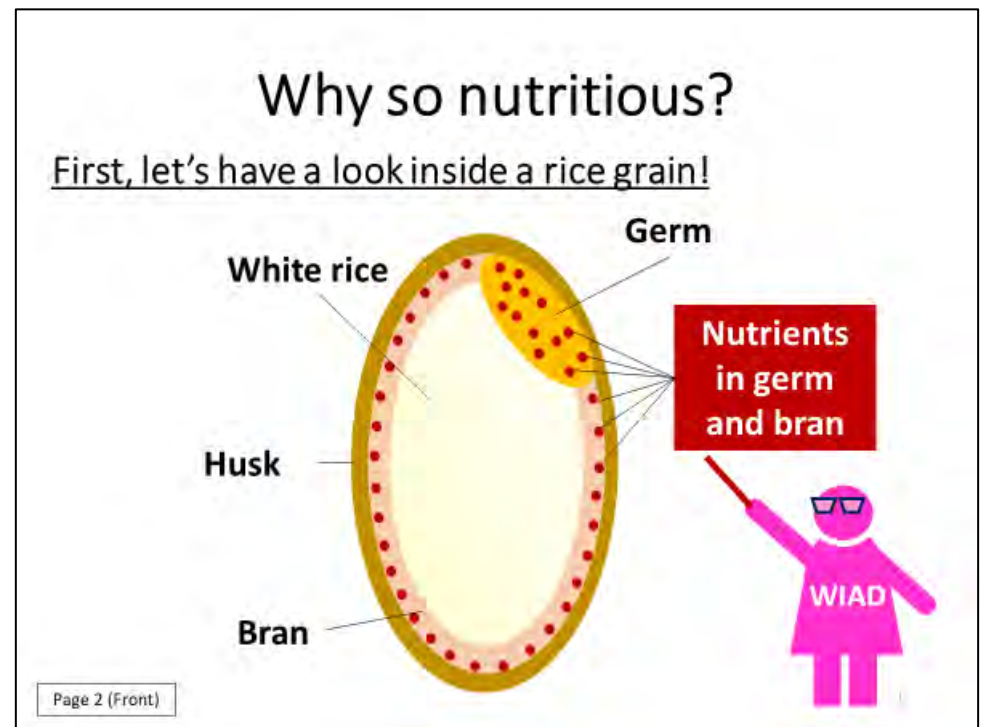
# Why so nutritious?

First, let's have a look inside a rice grain!



# Why So Nutritious?

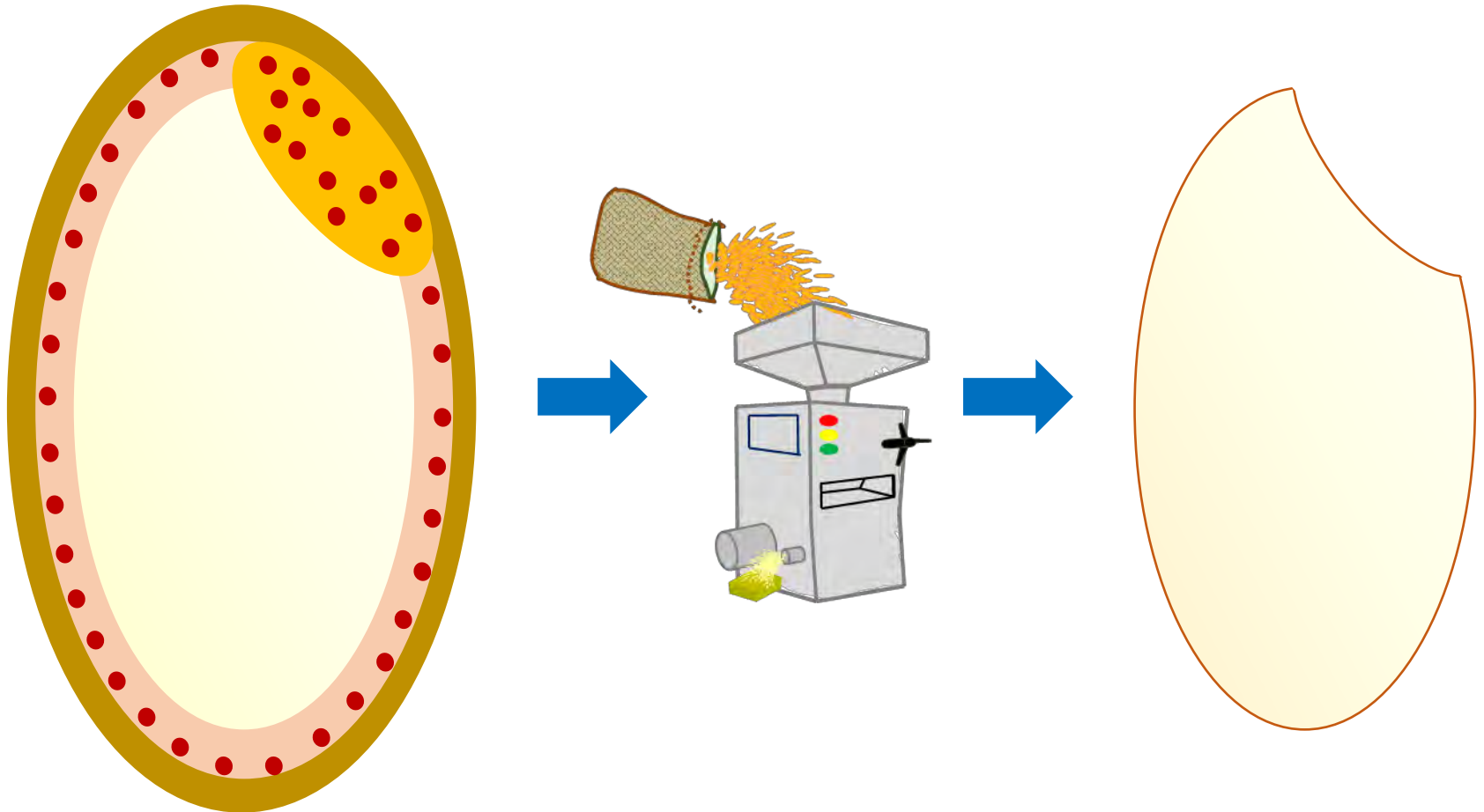
- Do you know why parboiled rice is so nutritious? (ask farmers)
- First, let's have a look inside rice! (explain all the parts of the rice grain by showing its section)
- Germ and bran contain nutrient components such as vitamin Bs and minerals.





# Why So Nutritious?

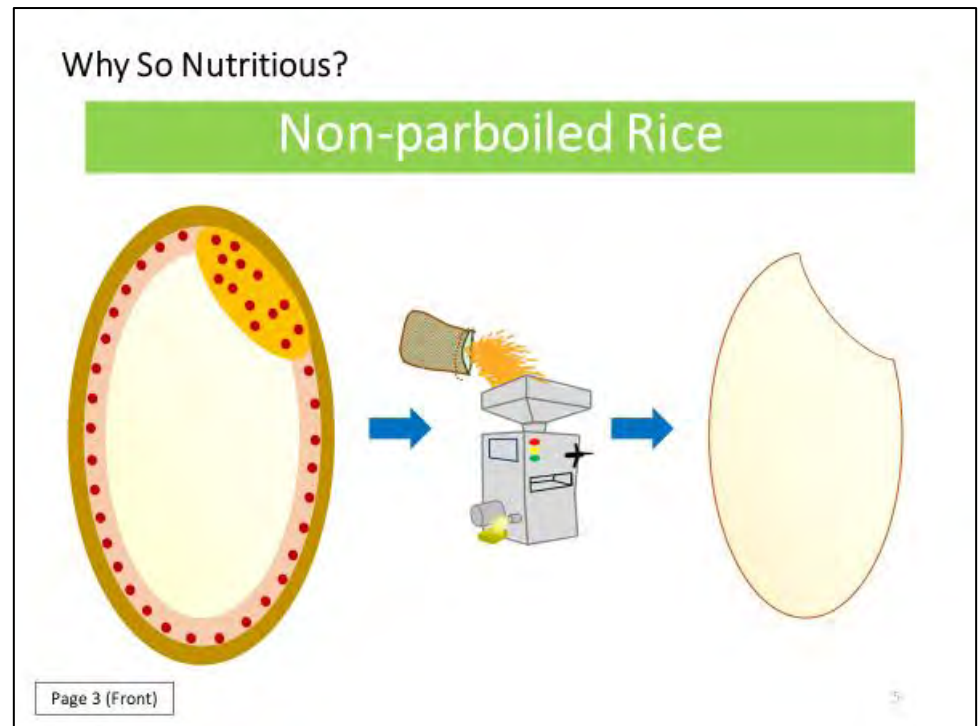
## Non-parboiled Rice



# Why so nutritious?

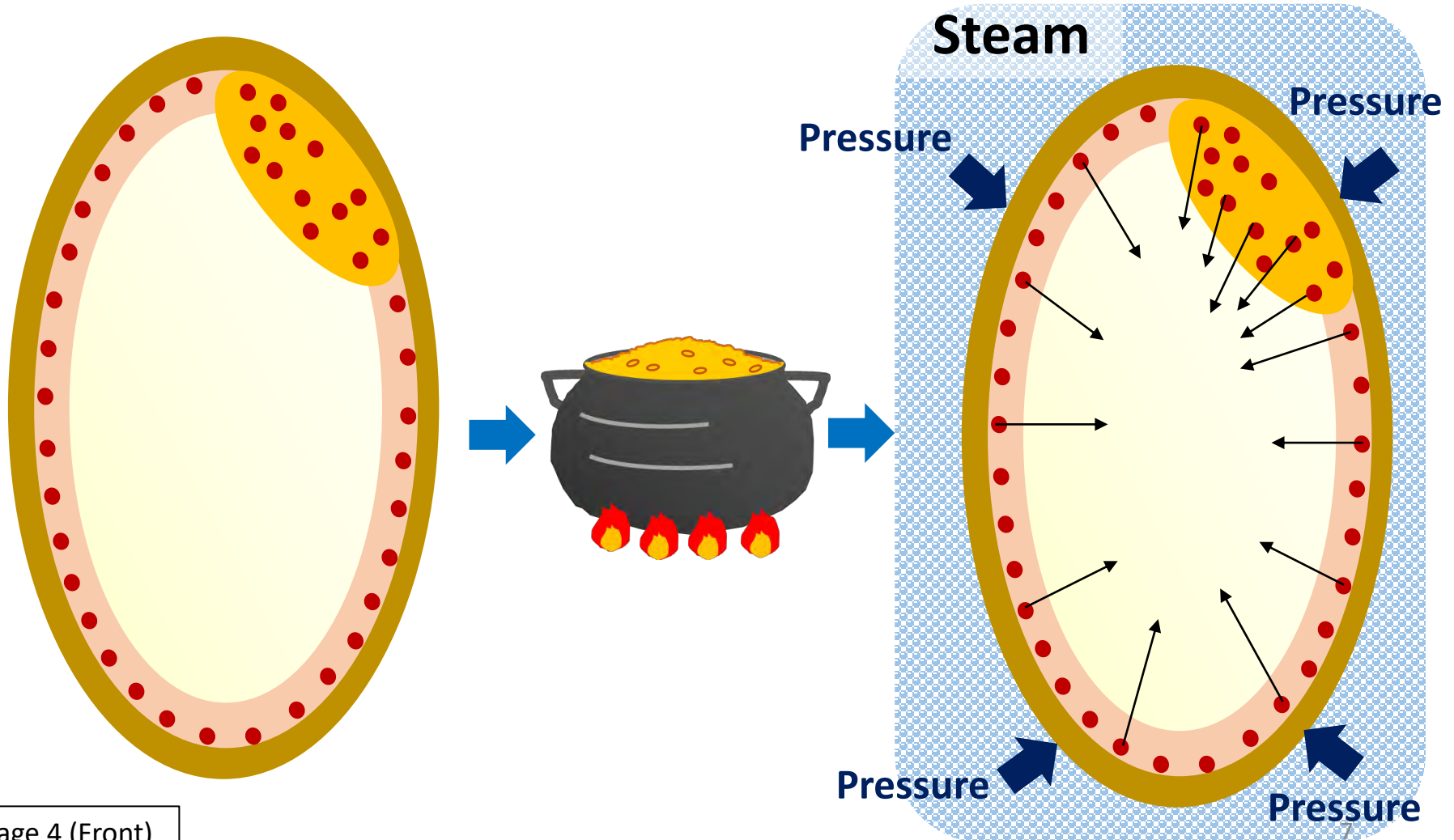
## ~Inside non-parboiled rice grain~

- Next, let's have a look inside a non-parboiled rice grain.
- After milling, all the outer parts, including germ and bran, are removed.
- Consequently, important nutrient components are lost in non-parboiled white rice...



# Why So Nutritious?

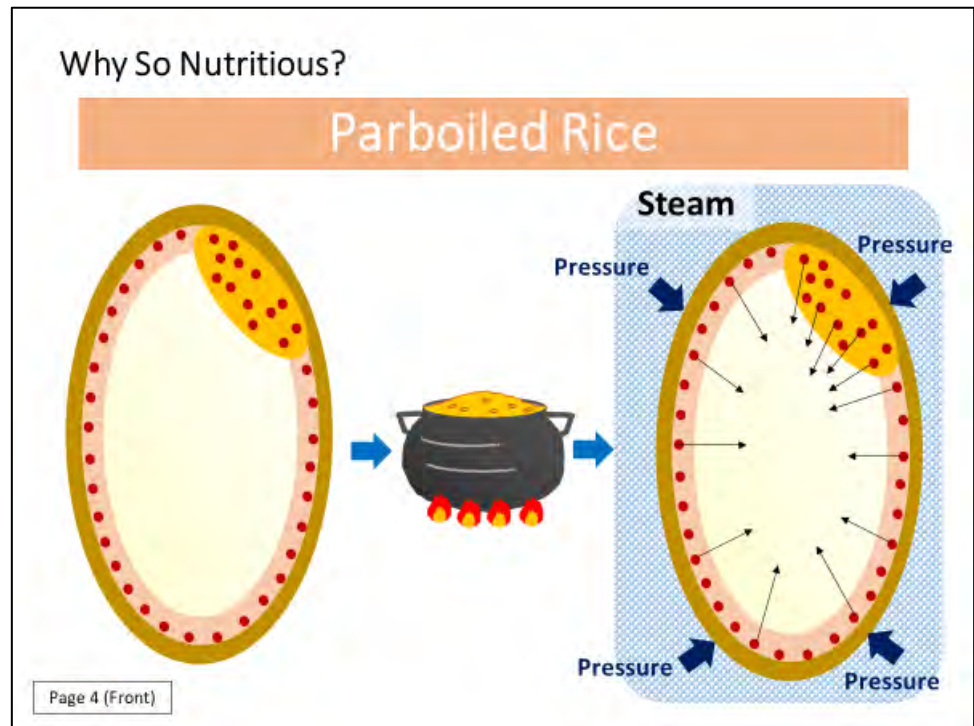
## Parboiled Rice



# Why so nutritious?

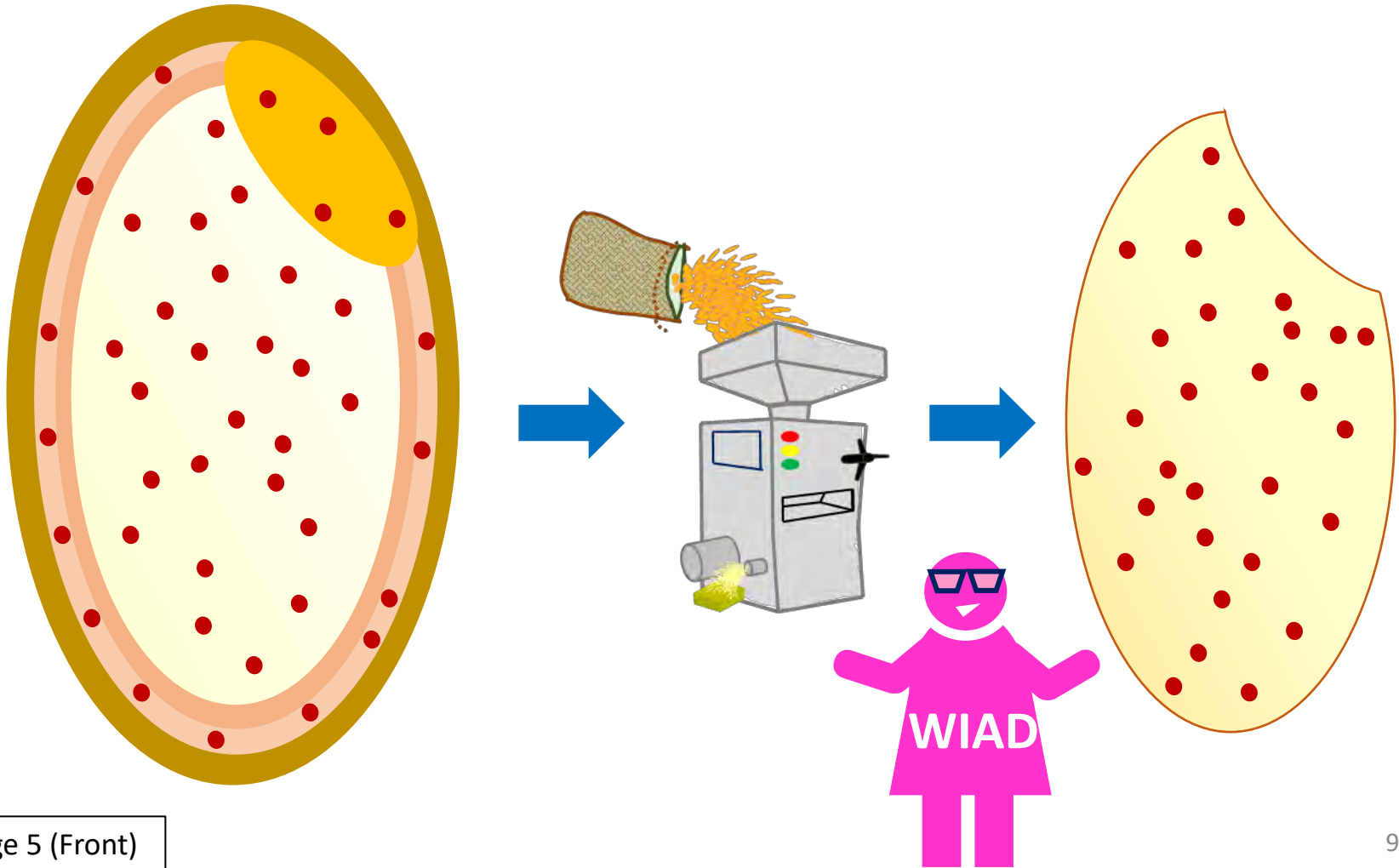
## ~Inside parboiled rice grain~

- Then, let's have a look inside parboiled rice grains!
- As you know, paddies are steamed inside the parboiling pot. During this process, nutrient components inside the germ and bran move to white rice by the water pressure.



# Why So Nutritious?

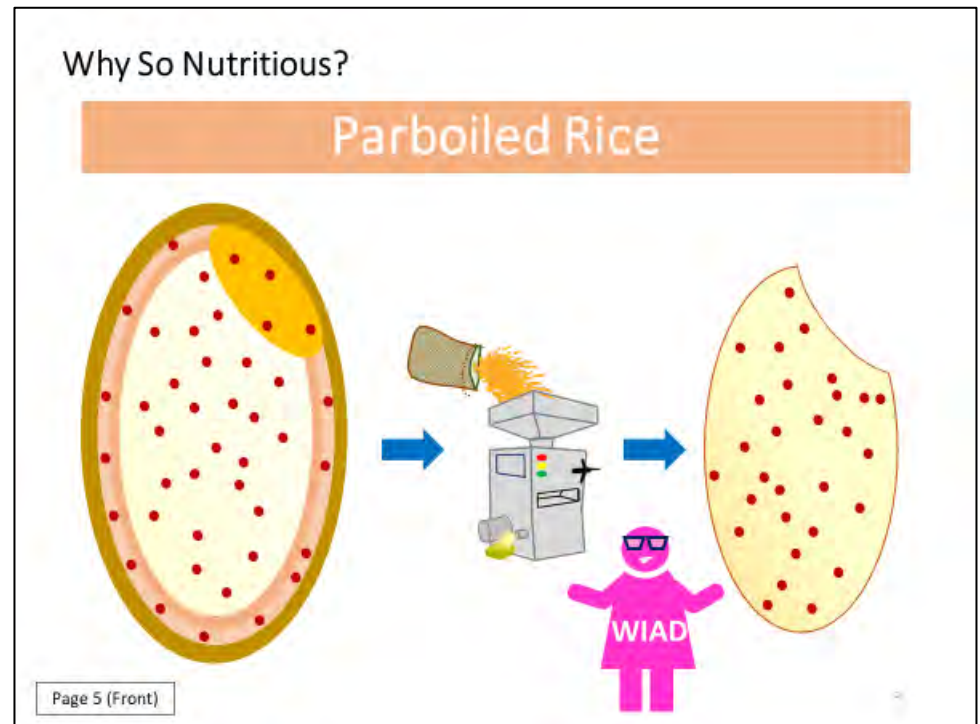
## Parboiled Rice



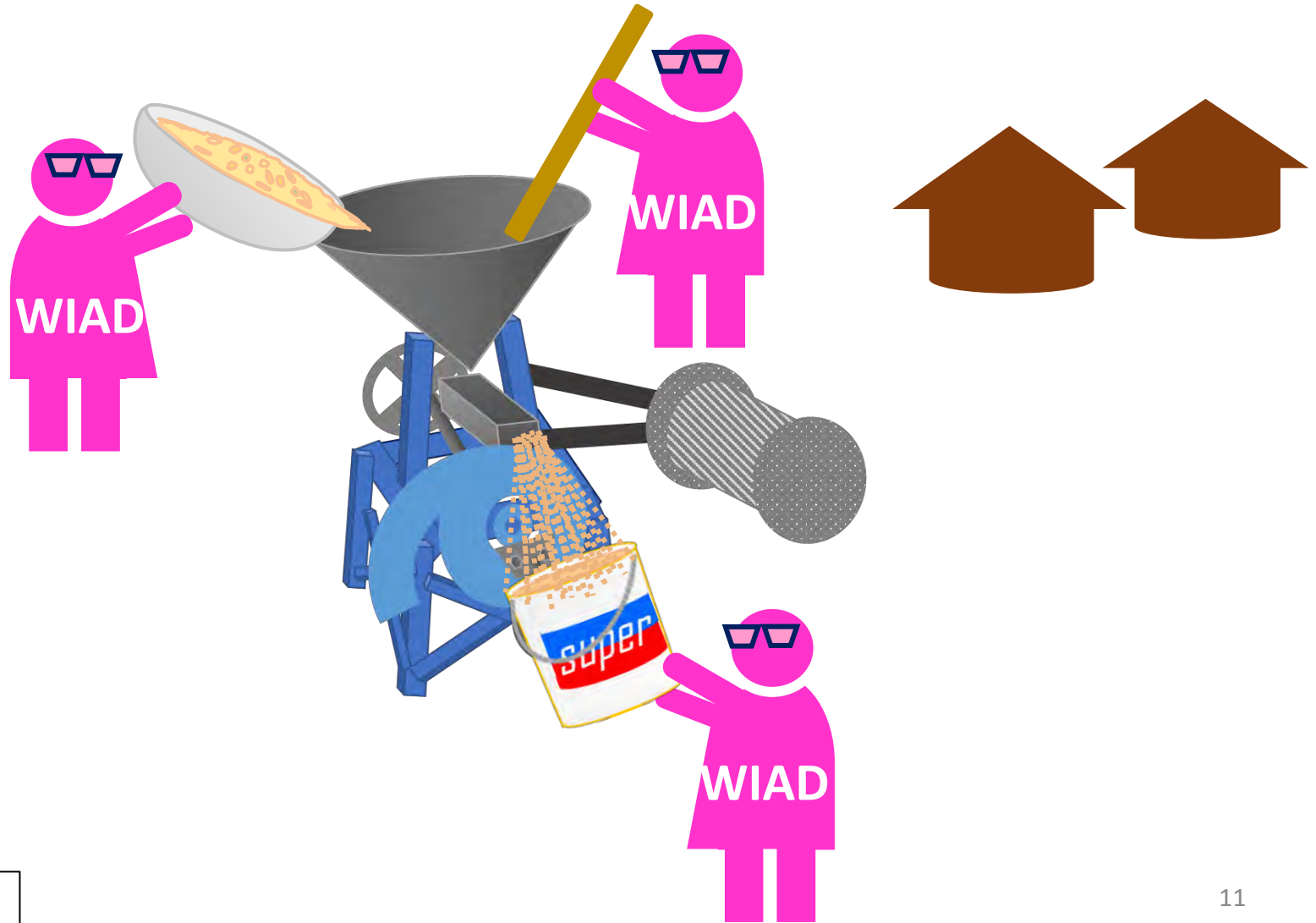
# Why so nutritious?

## ~Inside parboiled rice grain~

- After parboiling, nutrient components of the germ and bran retain in white rice.
- Consequently, even after milling, white rice contain nutrient components originally from the germ and bran.
- This is how parboiling process increases nutritive value of white rice!  
(Confirm if farmers have understood well)



# Did you know that rice can be grinded into flour like maize?!



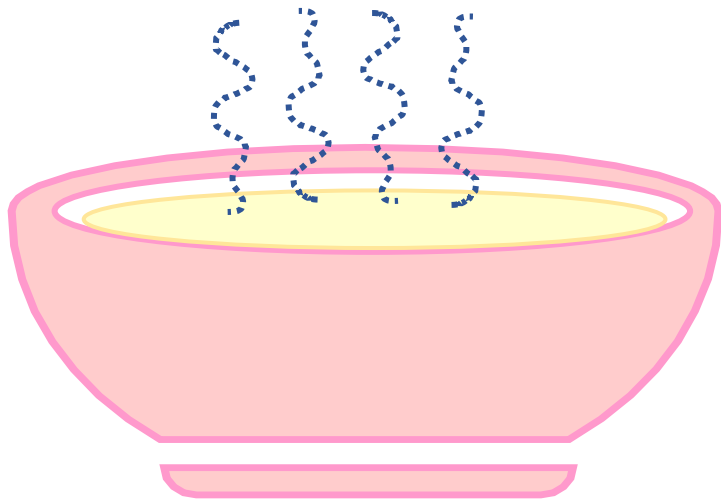


# Did you know that rice can be grinded into flour like maize?!

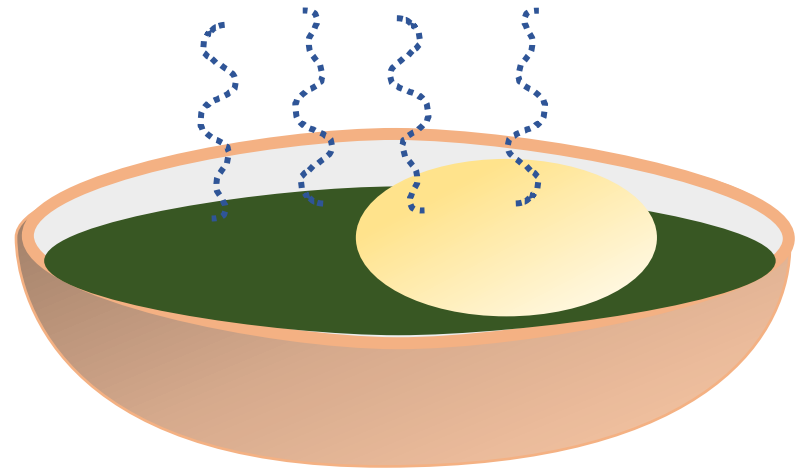
- Did you know that rice can be grinded into flour like maize?
- To grind rice, you can simply use a grinding machine equipped in your village!



# Did you know that rice flour can replace maize flour?!



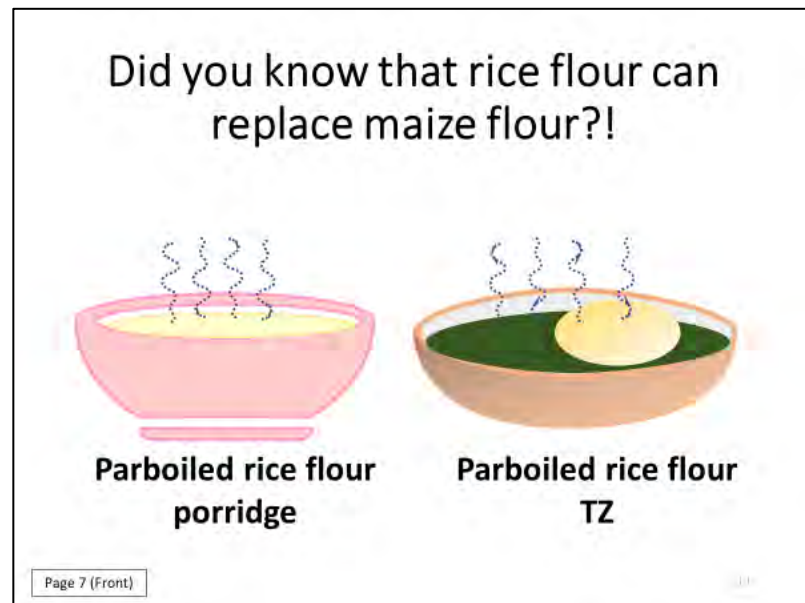
**Parboiled rice flour  
porridge**



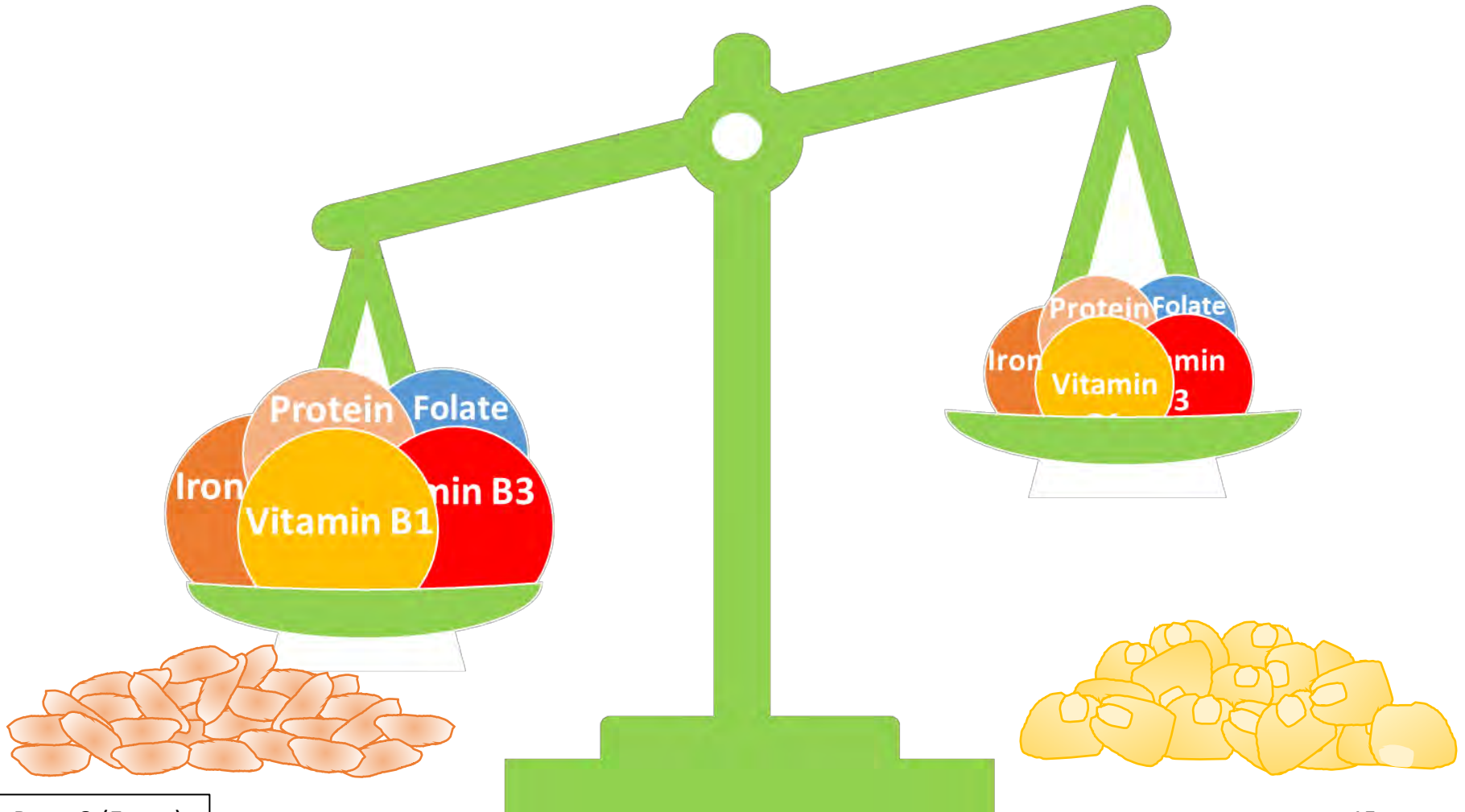
**Parboiled rice flour  
TZ**

# Did you know that rice flour can replace maize flour?

- Did you know that rice flour can replace maize flour for some dishes such as porridge and TZ?
- Once you grind rice into flour, you will more often feel like cooking rice at home than storing it in the paddy form!

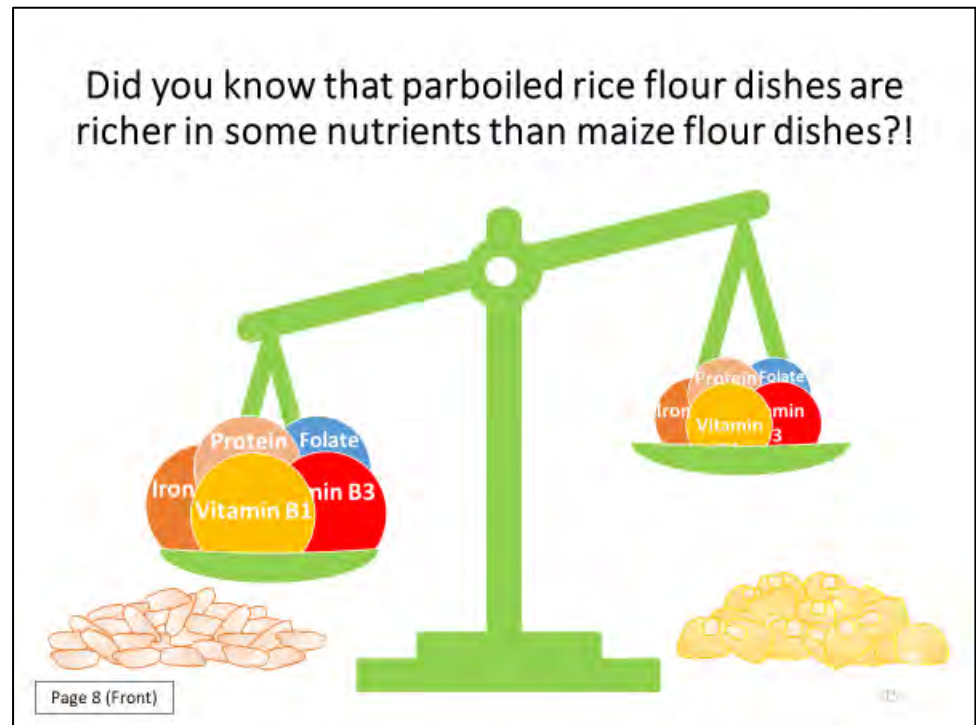


Did you know that parboiled rice flour dishes are richer in some nutrients than maize flour dishes?!

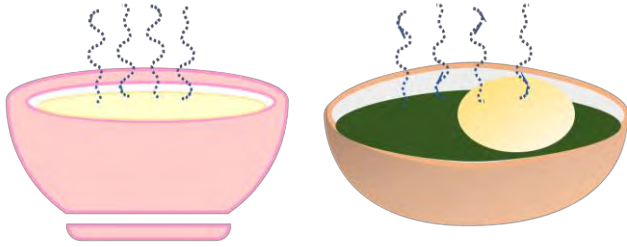


# Did you know that parboiled rice flour dishes are richer in some nutrients than maize flour dishes?!

- Parboiled rice flour porridge and TZ contain sufficient vitamin B1, vitamin B3, folate, iron or protein.
- Compared to maize flour porridge and TZ, parboiled rice flour porridge and TZ contain sufficient amount of the nutrients!



# How effective for your health?



**Improve muscle strength**



**Prevent beriberi**



**Prevent pellagra**

**Prevent fatal growth restriction**



**Prevent anemia**

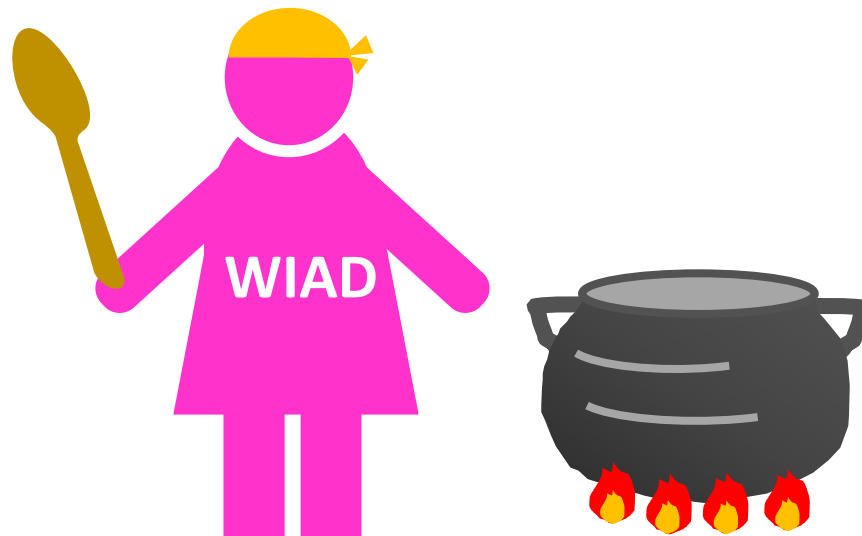
# How effective for your health?

- Parboiled rice flour dishes are rich in vitamin B1, vitamin B3, folate, iron or protein.
- These nutrients can be effective for your body health; to prevent beriberi, to prevent pellagra, to prevent fatal growth restriction, to prevent anemia or to improve muscle strength!





# Now, let's prepare and enjoy tasty parboiled rice flour recipes!



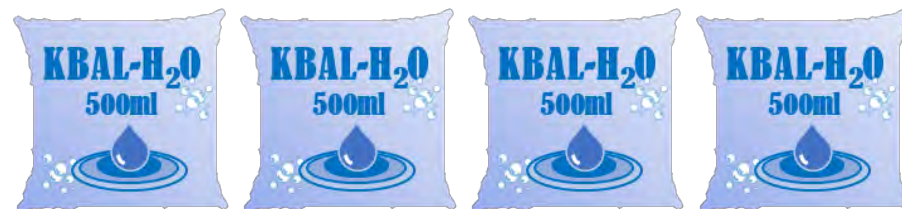
# Now, let's prepare and enjoy tasty parboiled rice flour recipes!

- Congratulations, now is the time to cook.
- Let's prepare and enjoy tasty parboiled rice flour recipes! Let's be healthy!



# 1. RICE-SOYA WEANIMIX PORRIDGE

Ingredients (No. of Servings - 4 adults or 6 children)  or 



Rice-Soya Weanimix: 1 cup (200g)

Water: 2L



or



Milk:  
1 small tin (160g)

Powder milk:  
To taste

Salt and Sugar: To taste



# RECIPE1. RICE-SOYA WEANIMIX PORRIDGE -INGREDIENTS-


- To serve 4 adults or 6 children, we use a cup of rice-soya weanimix (200g), 2L of water, a small tin of milk (or powder milk to taste) and salt/sugar to taste.


*Remark: If milk is not available, you can increase the amount of soybean for weanimix by changing the rice: soybean ratio from 4:1 to 3:1*



RECIPE 1. RICE-SOYA WEANIMIX PORRIDGE



## INGREDIENTS


(No. of Servings - 4 adults or 6 children)  or 

 Rice-Soya Weanimix: 1 cup (200g)

 Water: 2L

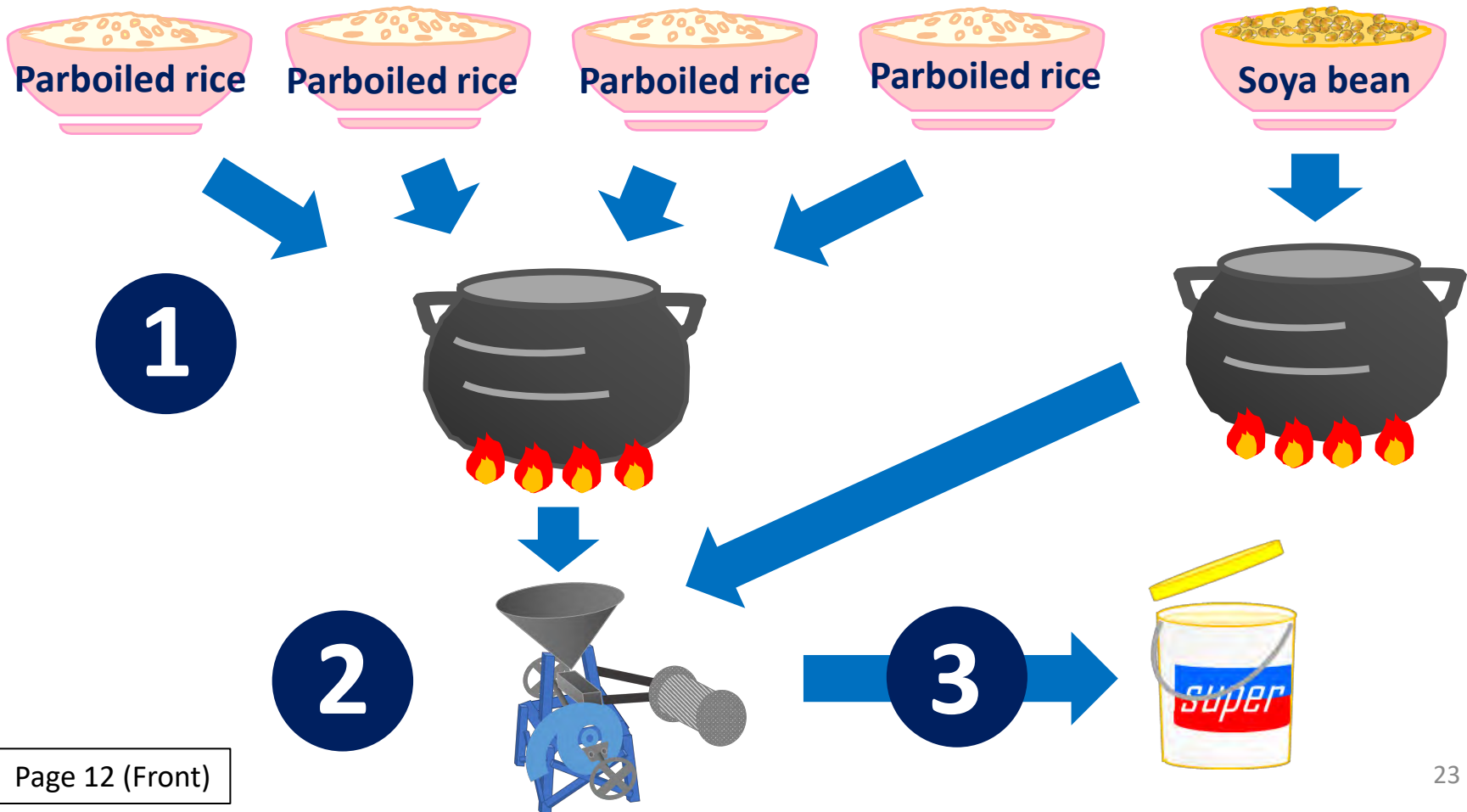
 Milk: 1 small tin (160g) or  Powder milk: To taste

 SALT  SUGAR  
Salt and Sugar: To taste

Page 11 (Front) 

# METHODS

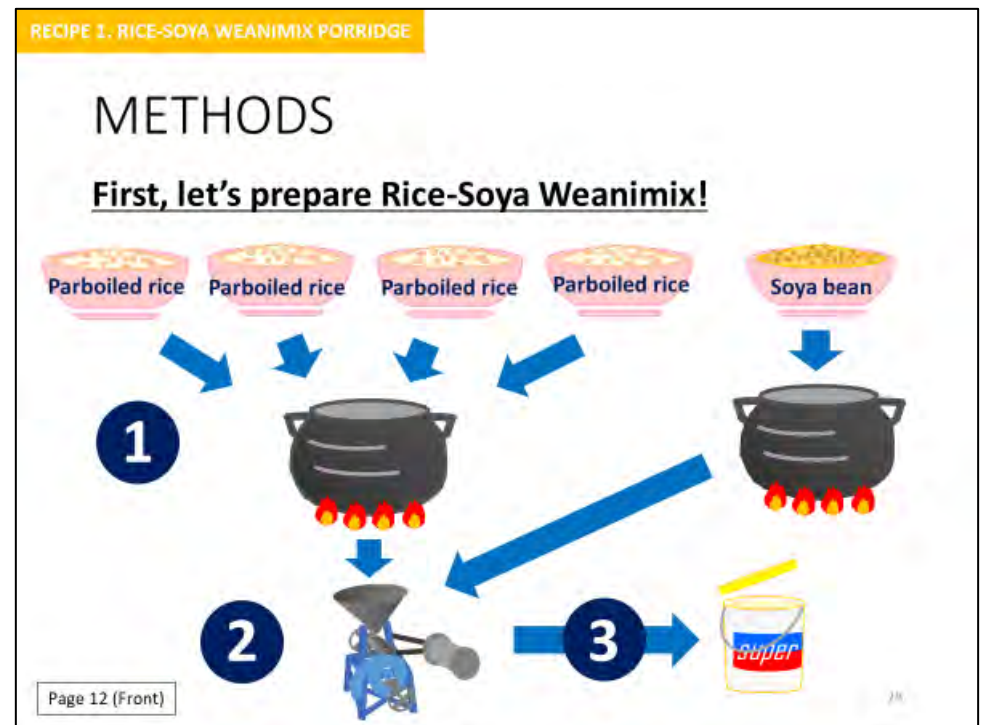
First, let's prepare Rice-Soya Weanimix!



# METHODS

First, let's prepare rice-soya weanimix! Soya flour, a good source of protein, goes so well with parboiled rice flour.

1. Roast 4 parts of parboiled rice and 1 part of dehulled soya beans separately.
2. Put them together and mill into fine flour.
3. Store the weanimix in an airtight container not more than 3 months.

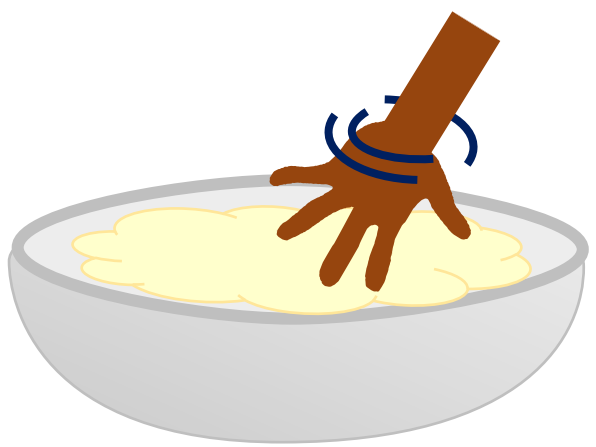


# METHODS

1



2



3





# METHODS

1. Bring water to boil
2. Mix weanimix with water to form slurry.
3. Pour the slurry into the boiled water, add salt.

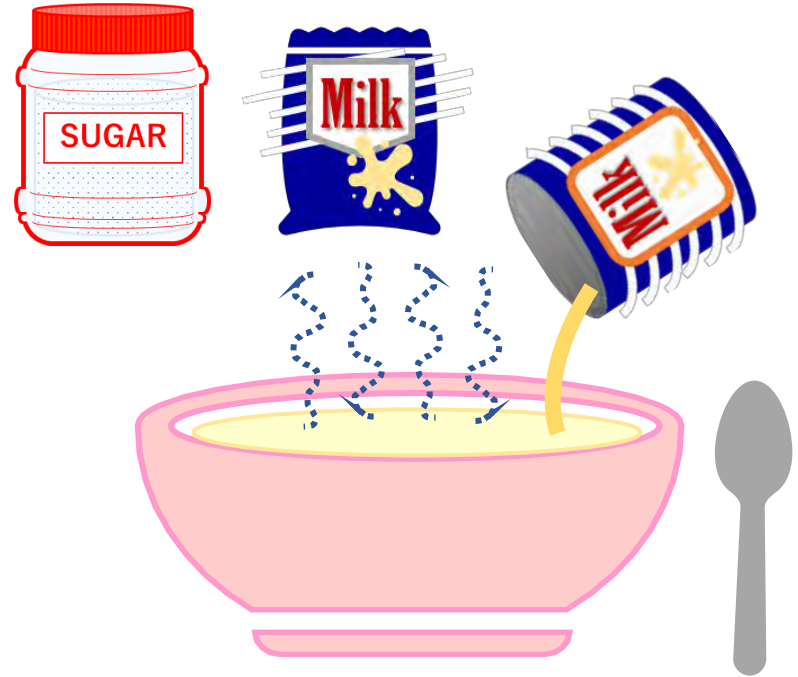


# METHODS (CONTRD.)

4

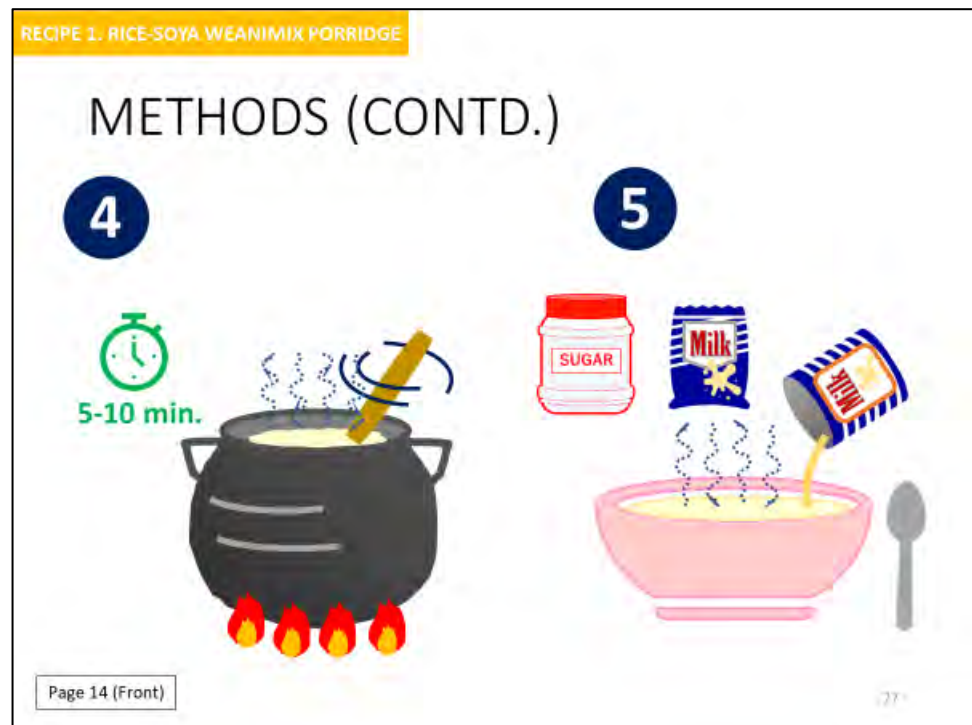


5



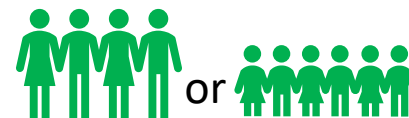
# METHODS (CONTD.)

4. Stir to avoid formation of lumps. Allow to cook for 5-10 minutes till the mixture gets thicker.
5. Serve hot with milk or sugar to taste!



# 2. RICE TUO ZAAFI (TZ)

Ingredients (No. of Servings - 4 adults or 6 children)



Parboiled rice flour:  
2 cups (400g)



*Konkonte* (cassava flour):  
1 cup (200g)



Water: 1.4L





Salt: To taste


# RECIPE 2. RICE TUO ZAAFI (TZ)


- To serve 4 adults or 6 children, we use 2 cups of parboiled rice flour (400g), a cup of *konkonte* (200g), 1.4L of water and salt to taste.


RECIPE 2. RICE TZ


## 2. RICE TUO ZAAFI (TZ)

**Ingredients** (No. of Servings - 4 adults or 6 children)  or 

  
Parboiled rice flour:  
2 cups (400g)

  
*Konkonte* (cassava flour):  
1 cup (200g)

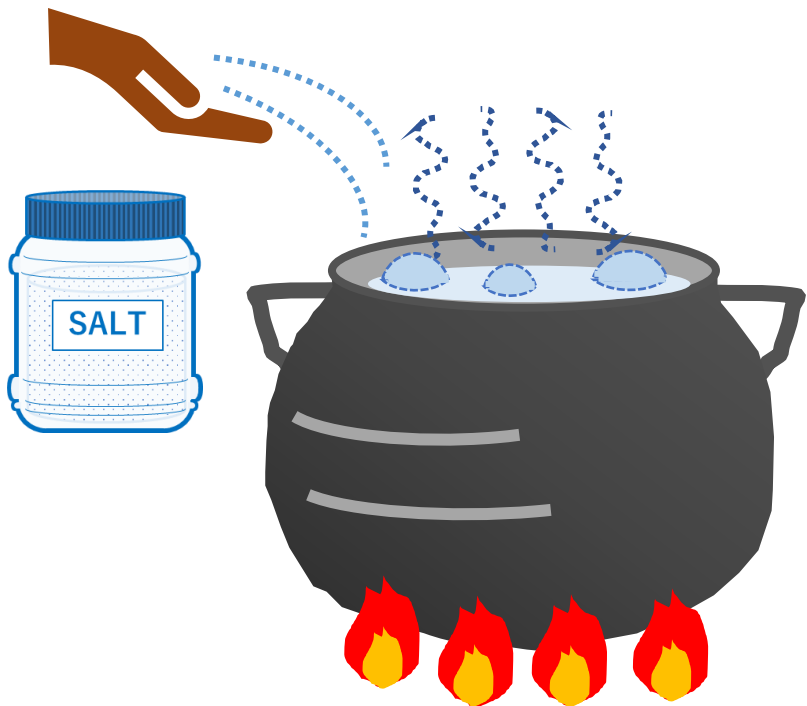
  
Water: 1.4L

  
Salt: To taste

Page 15 (Front) 30

# METHODS

1



2



# METHODS

1. Bring water to boil and add salt.
2. Mix parboiled rice flour with cold water into pouring consistency.





# METHODS (CONTRD.)

3

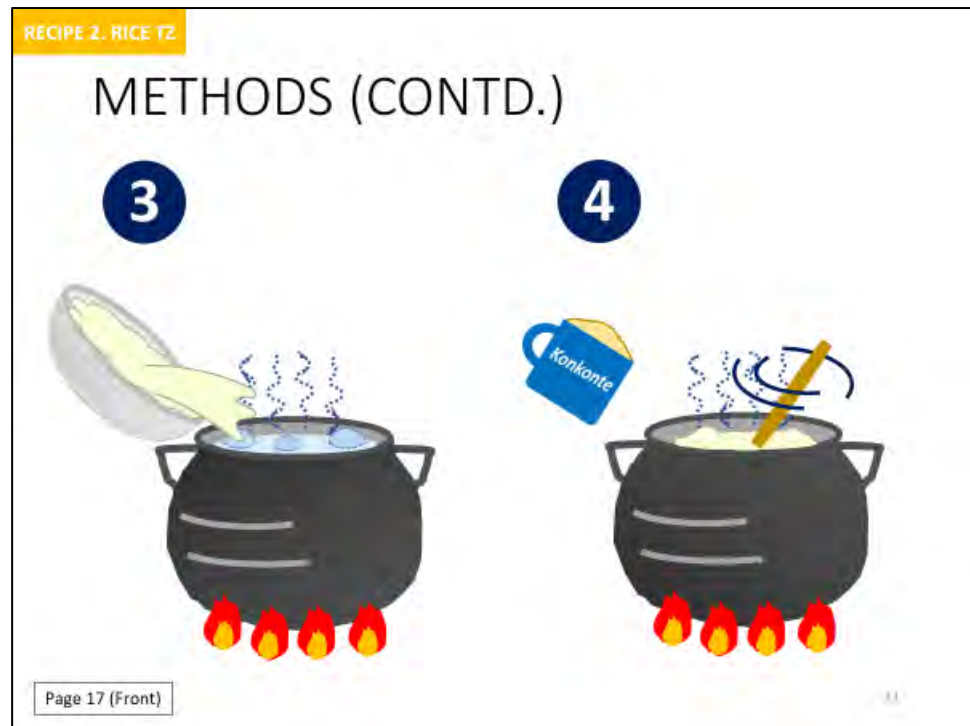


4



# METHODS (CONTD.)

1. Add mixture to the boiling water and stir.
2. Add *konkonte* and stir to avoid formation of lumps.



# METHODS (CONTRD.)

5

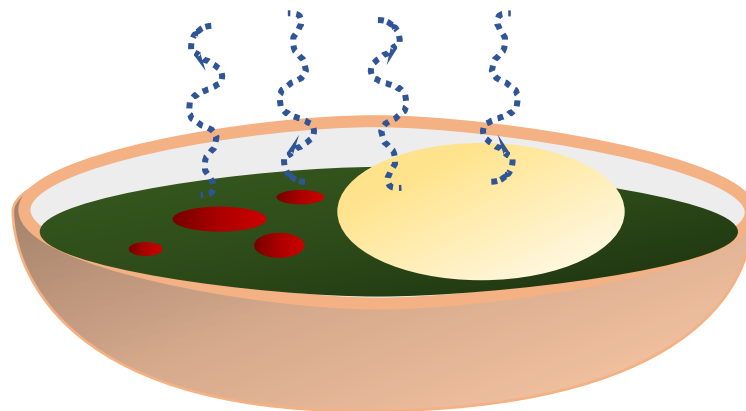


10-20 min.



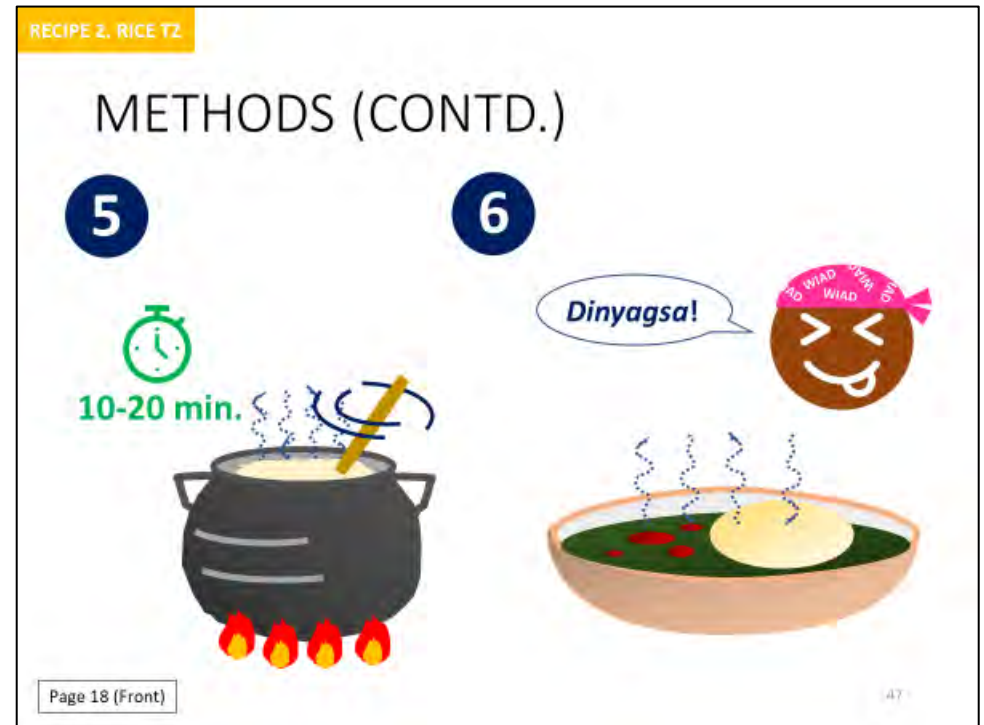
6

*Dinyagsa!*



# METHODS (CONTD.)

5. Stir continuously for 10-20 minutes.
6. Mold into balls and serve with *ayoyo* soup or any soup of your choice.



Source of the recipes: *NERICA Rice Recipe Booklet by Ministry of Food and Agriculture (MoFA) (2011)*

# Nutrition Improvement

Let's enjoy unpolished rice for our health!!

-On Site Training-



# Nutrition Improvement

~Let's enjoy unpolished rice for our health!~

- Today let's learn about nutrition improvement through unpolished rice!
- Have you ever tasted unpolished rice? (ask farmers)
- How do you cook it?  
(ask farmers)
- Did you know that unpolished rice is very nutritious?  
(ask farmers)



FM OST-X

National Sustainable Development of Agricultural Production

JICA

MDPA/JICA TESI/SUI RICE PROJECT

**Nutrition Improvement**

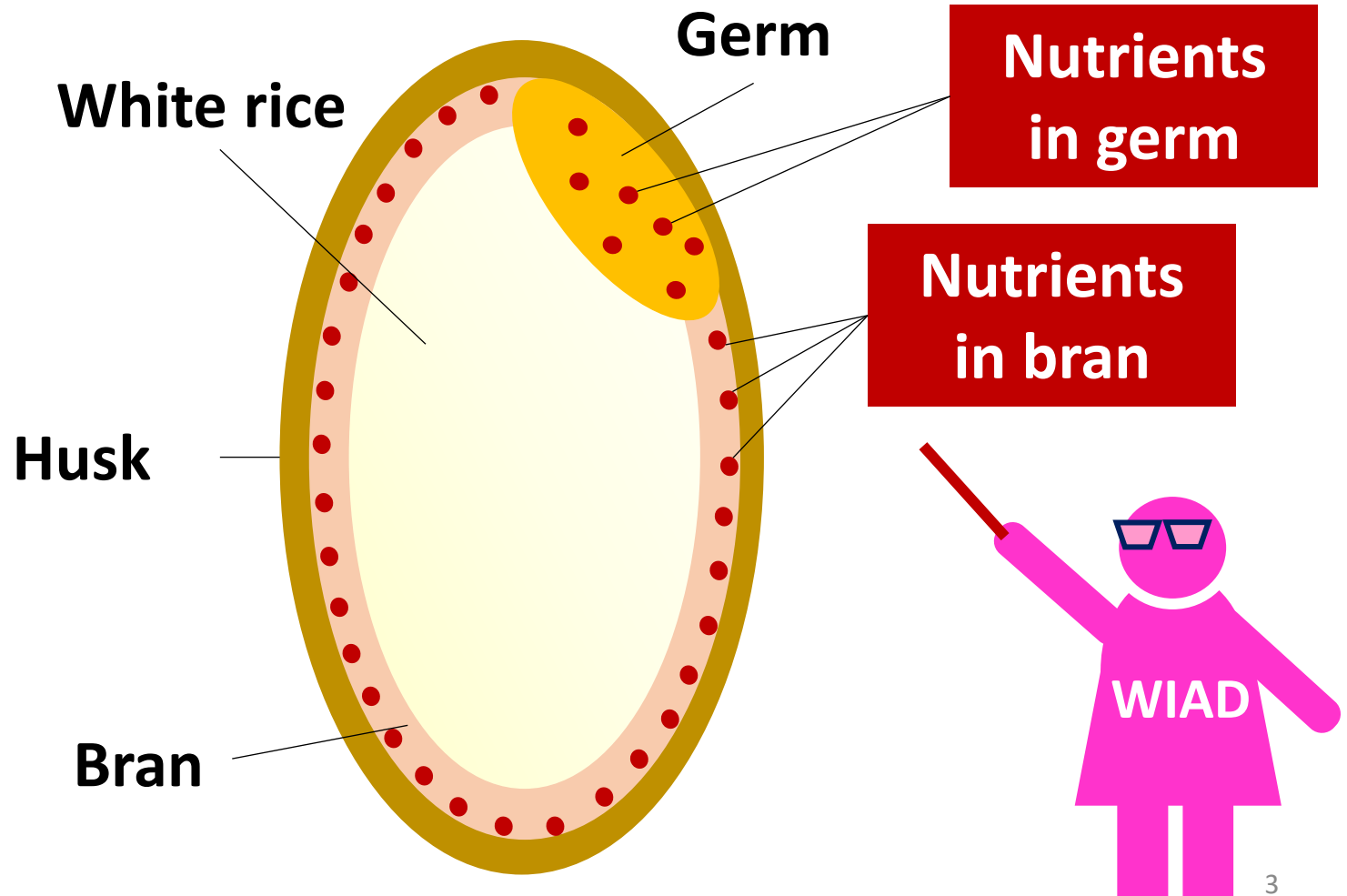
Let's enjoy unpolished rice for our health!!

**-Ashanti Region-**

Page 1 (Front)

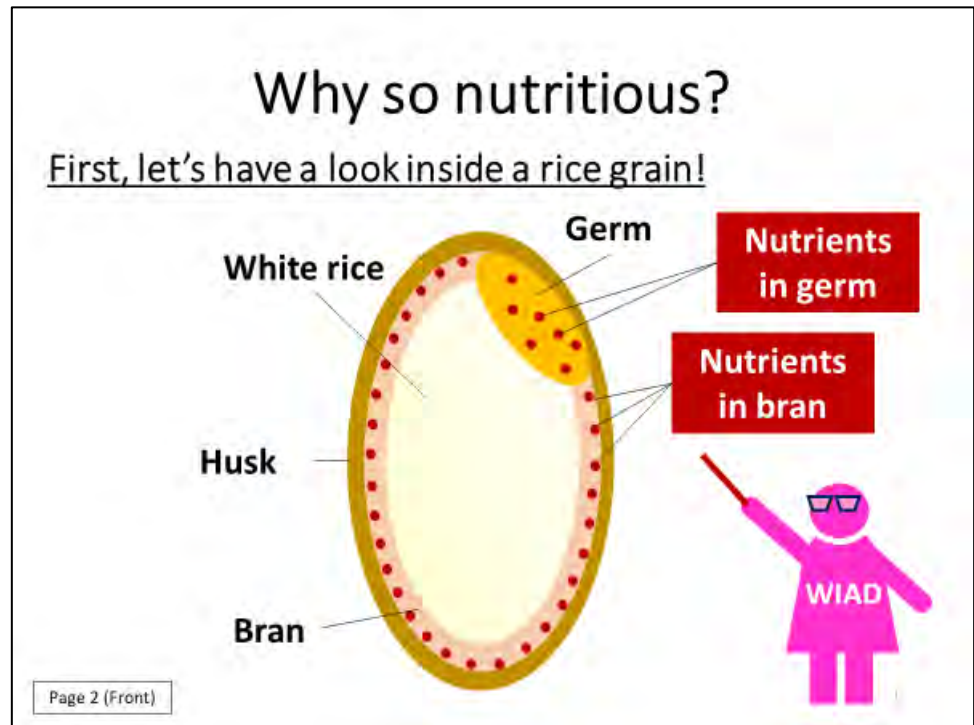
# Why so nutritious?

First, let's have a look inside a rice grain!



# Why So Nutritious?

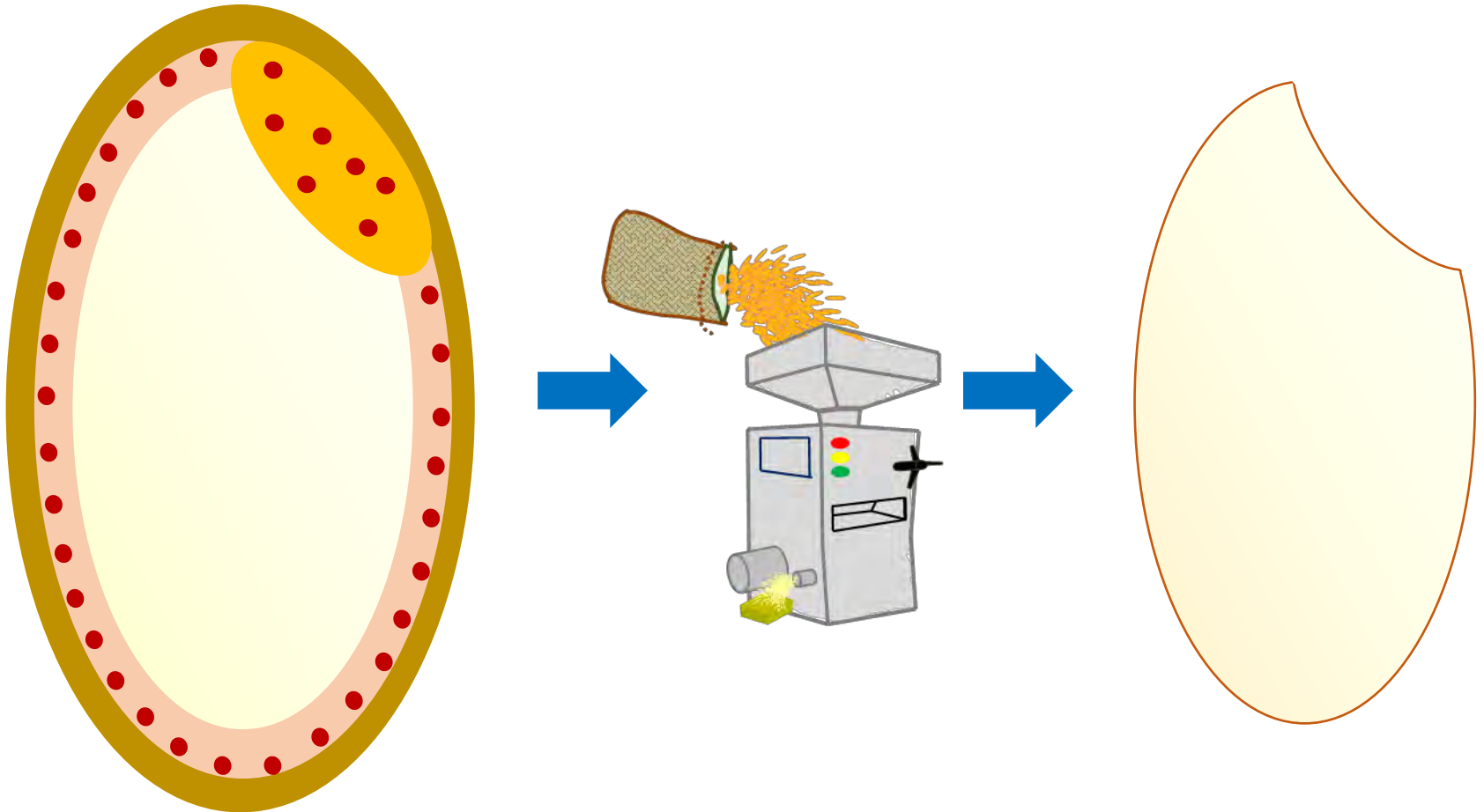
- Do you know why unpolished rice is so nutritious? (ask farmers)
- First, let's have a look inside rice! (explain all the parts of the rice grain by showing its section)
- Bran and germ are containing nutrient components such as vitamin Bs.





# Why So Nutritious?

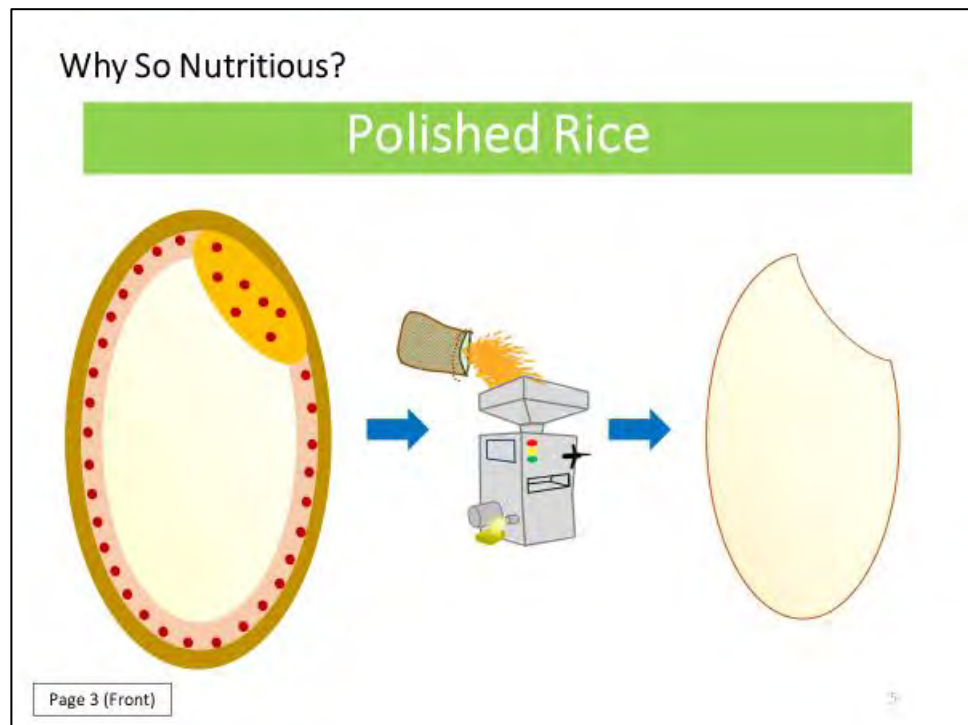
## Polished Rice



# Why so nutritious?

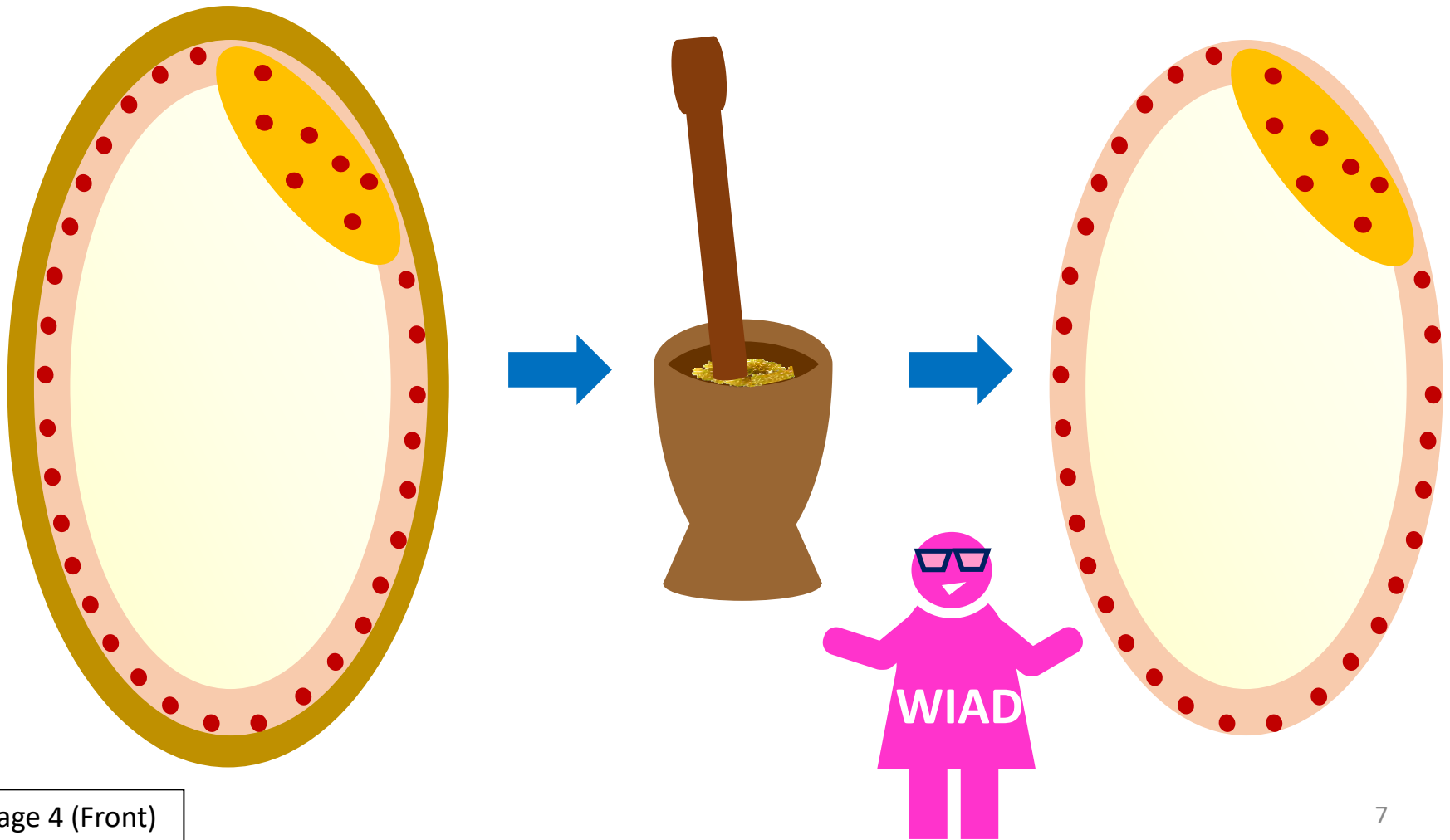
## ~Inside polished rice grain~

- Next, let's have a look inside a polished rice grain.
- After milling, all the outer parts are removed including bran.
- Then, important nutrient components are lost in polished rice!



# Why So Nutritious?

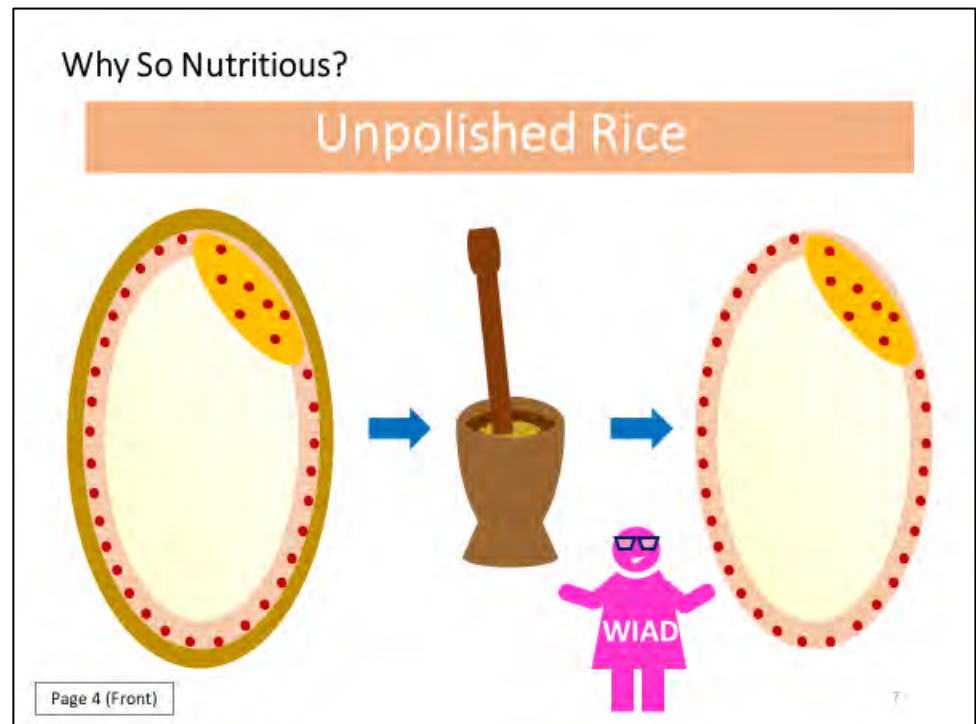
## Unpolished Rice



# Why so nutritious?

## ~Inside unpolished rice grain~

- Production of unpolished rice depends on the milling process of paddy. You can use a mortar and a pestle to remove only husk and keep bran/germ.
- Consequently, unpolished rice also keeps nutrient components originally from the bran and germ.
- This is why nutritive value of unpolished rice is higher! (Confirm if farmers have understood well)



# Did you know that rice can be grinded into flour like maize?!

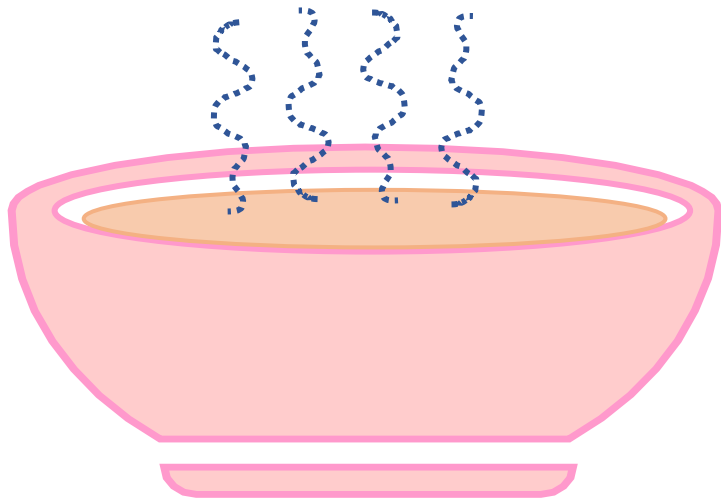


# Did you know that rice can be grinded into flour like maize?!

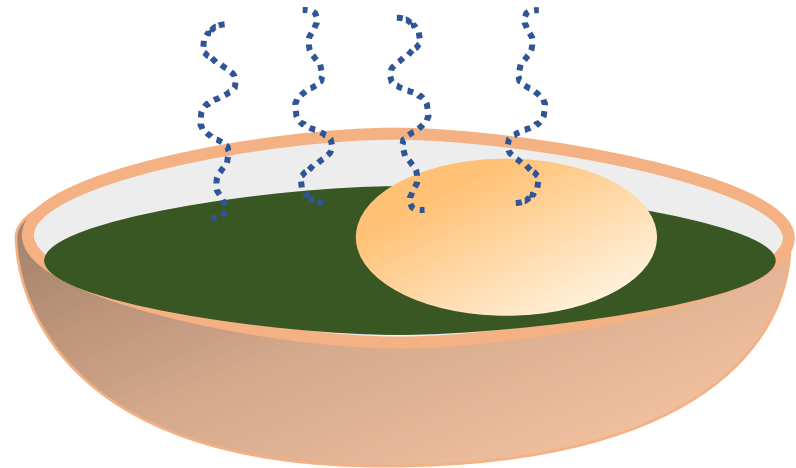
- Did you know that rice can be grinded into flour like maize?
- To grind rice, you can simply use a grinding machine equipped in your village!



# Did you know that rice flour can replace maize flour?!



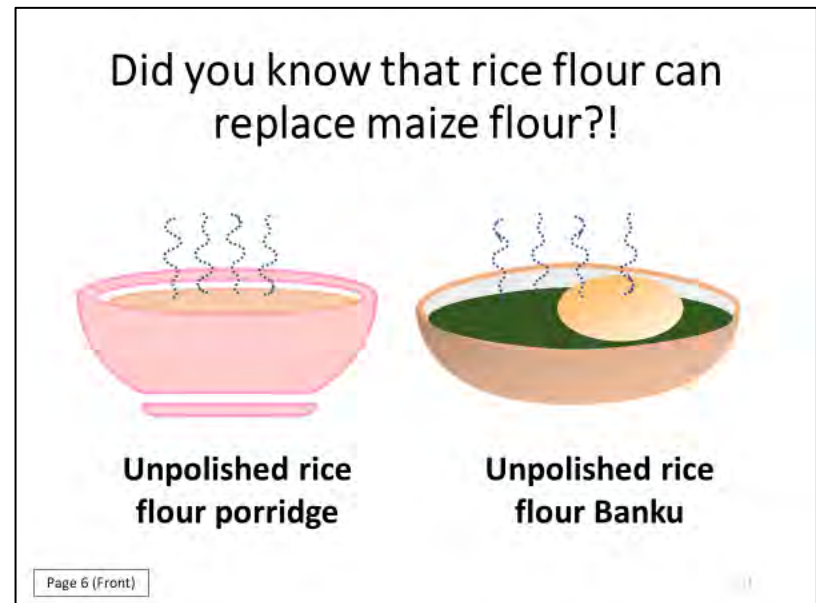
**Unpolished rice  
flour porridge**



**Unpolished rice  
flour Banku**

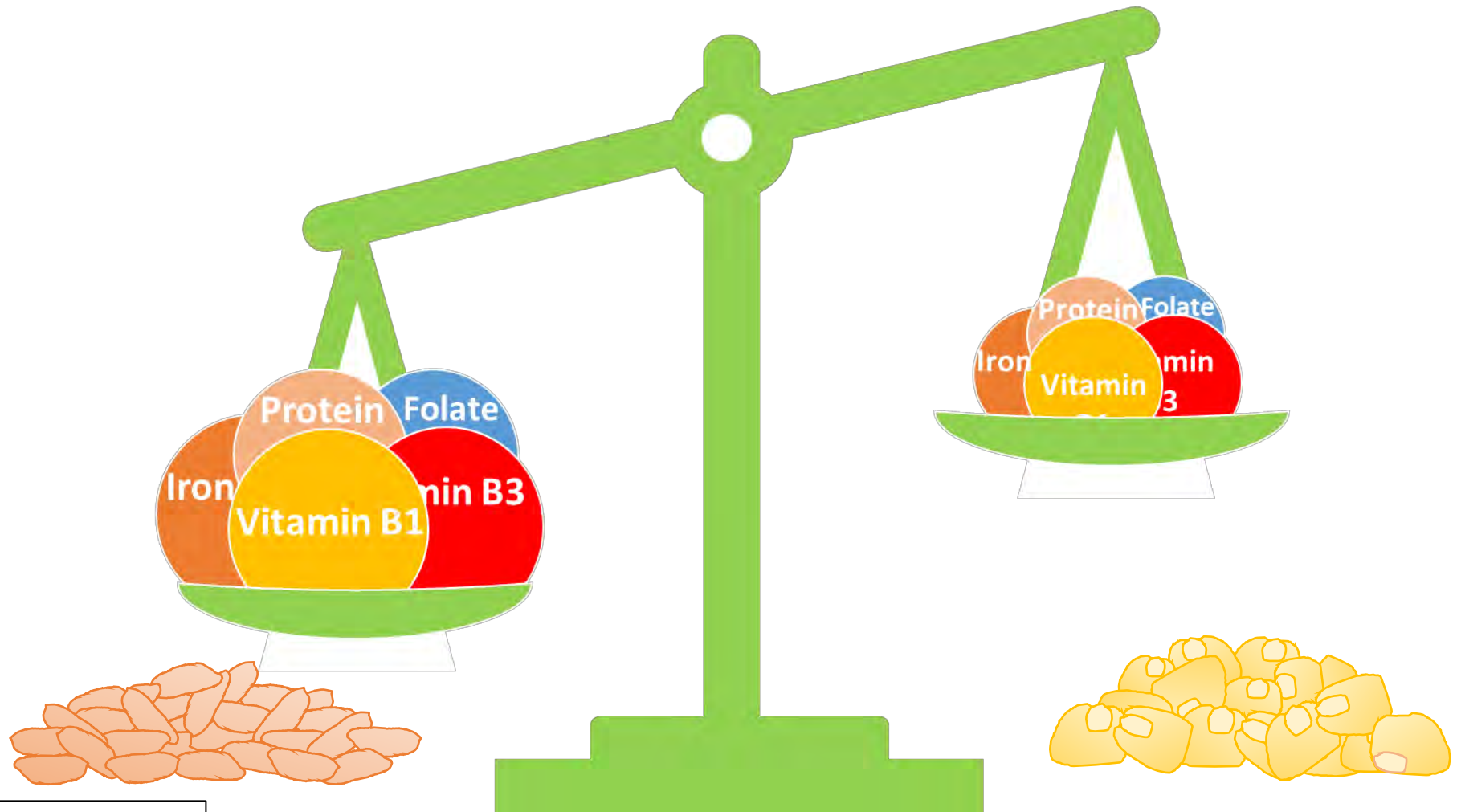
# Did you know that rice flour can replace maize flour?!

- Did you know that rice flour can replace maize flour for some dishes such as porridge and Banku?
- Once you grind rice into flour, you will more often feel like cooking rice at home than storing it in the paddy form!



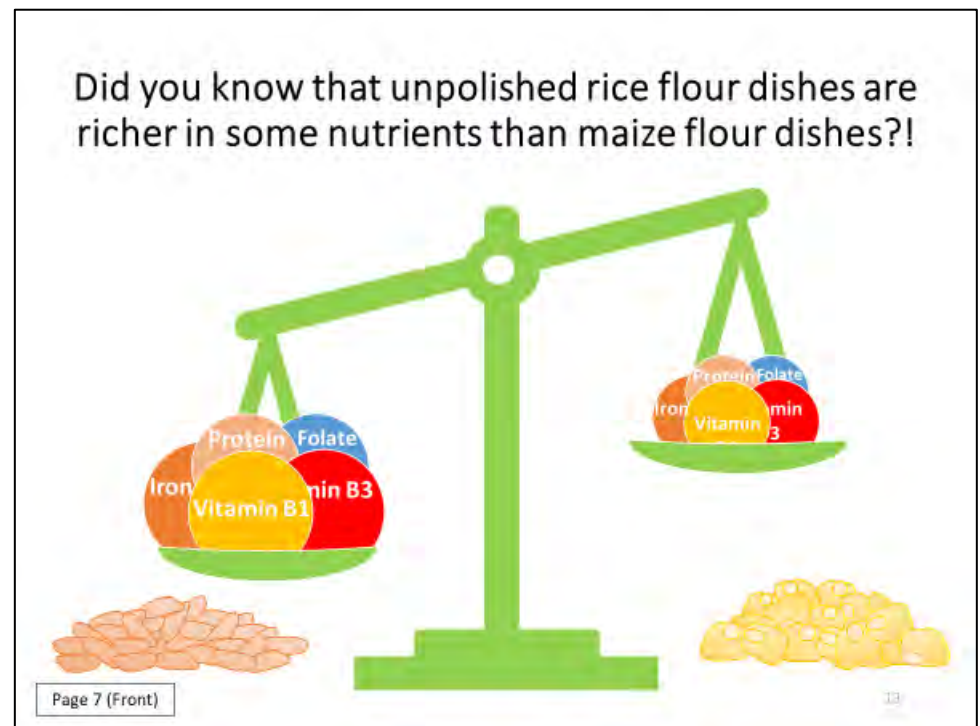


Did you know that unpolished rice flour dishes are richer in some nutrients than maize flour dishes?!

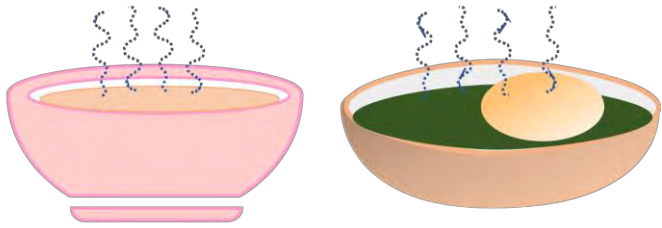


# Did you know that unpolished rice flour dishes are richer in some nutrients than maize flour dishes?!

- Unpolished rice flour porridge and TZ contain sufficient vitamin B1, vitamin B3, folate, iron or protein.
- Compared to maize flour porridge and banku, unpolished rice flour porridge and banku contain sufficient amount of the nutrients!



# How effective for your health?



**Improve muscle strength**



**Prevent beriberi**



**Prevent pellagra**

**Prevent fatal growth restriction**



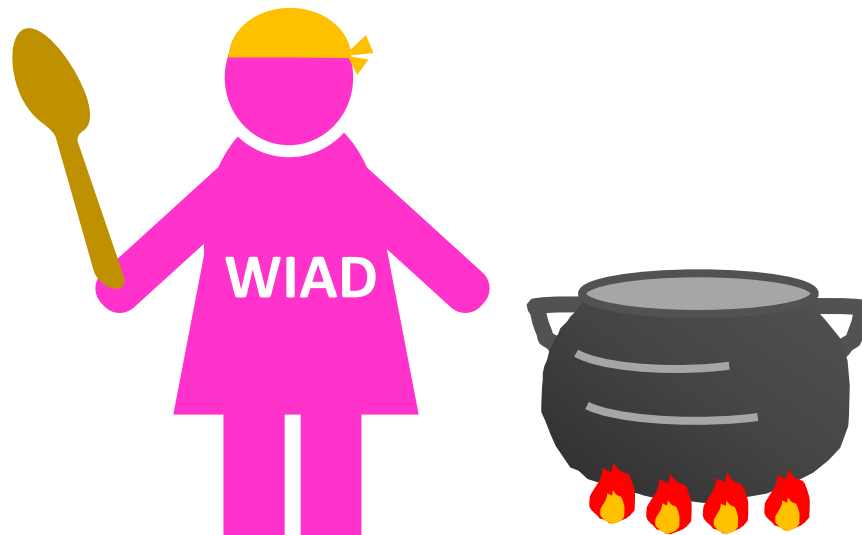
**Prevent anemia**

# How effective for your health?

- Unpolished rice flour dishes are rich in vitamin B1, vitamin B3, folate, iron or protein.
- These nutrients can be effective for your body health; to prevent beriberi, to prevent pellagra, to prevent fatal growth restriction, to prevent anemia or to improve muscle strength!



# Now, let's prepare and enjoy tasty unpolished rice flour recipes!



# Now, let's prepare and enjoy tasty unpolished rice flour recipes!

- Congratulations, now is the time to cook.
- Let's prepare and enjoy tasty unpolished rice flour recipes! Let's be healthy!

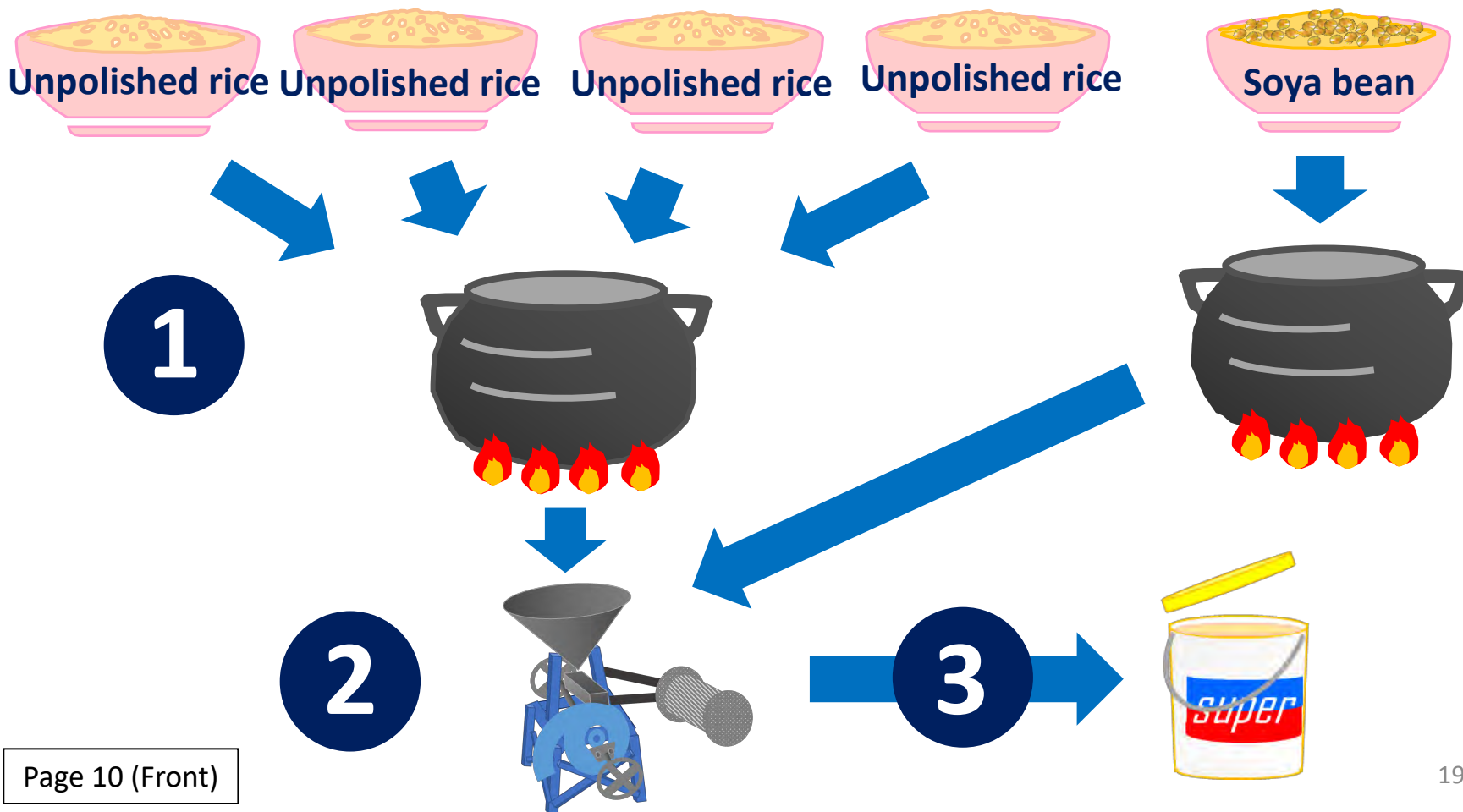
Now, let's prepare and enjoy tasty unpolished rice flour recipes!



Page 9 (Front)

# 1. RICE-SOYA WEANIMIX PORRIDGE

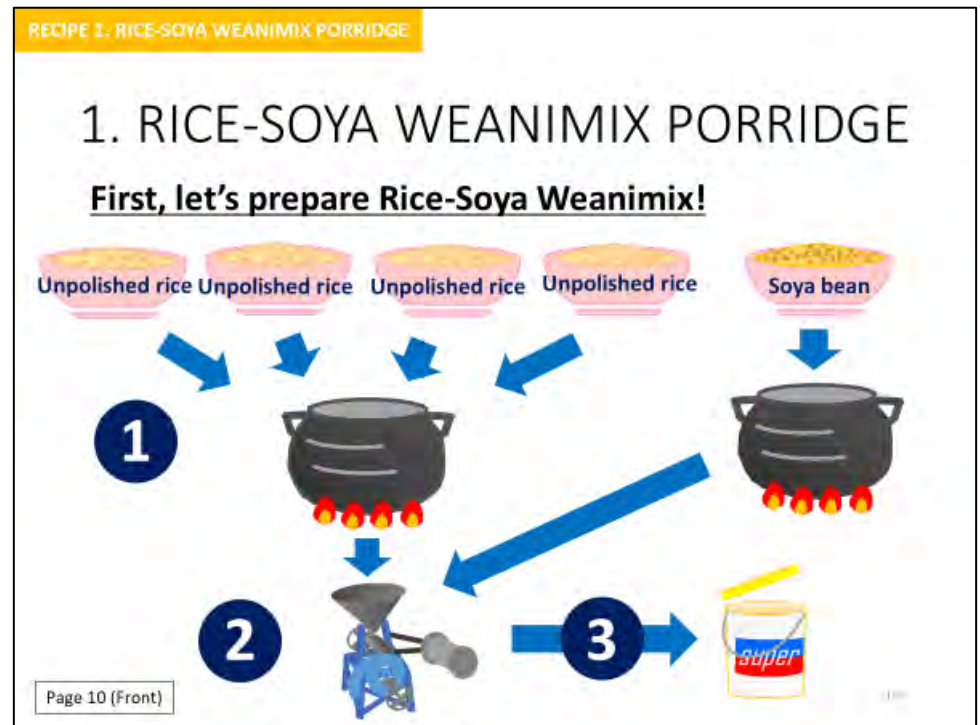
First, let's prepare Rice-Soya Weanimix!



# RECIPE 1. RICE-SOYA WEANIMIX PORRIDGE

First, let's prepare rice-soya weanimix! Soya flour, a good source of protein, goes so well with unpolished rice flour.

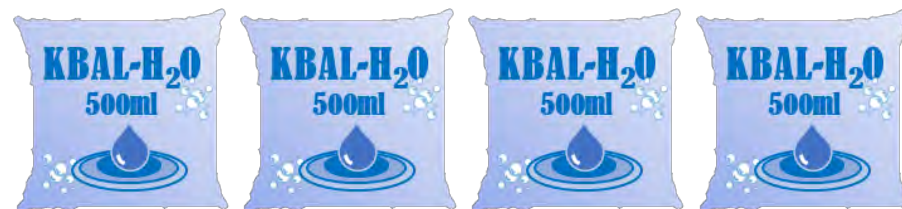
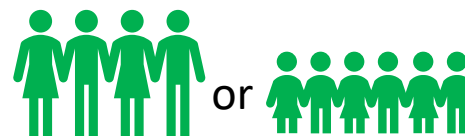
1. Roast 4 parts of unpolished rice and 1 part of dehulled soya beans separately.
2. Put them together and mill into fine flour.
3. Store the weanimix in an airtight container not more than 3 months.





# INGREDIENTS

(No. of Servings - 4 adults or 6 children)



Rice-Soya Weanimix: 1 cup (200g)

Water: 2L



or



Milk:  
1 small tin (160g)

Powder milk:  
To taste

Salt and Sugar: To taste



# INGREDIENTS



- To serve 4 adults or 6 children, we use a cup of rice-soya weanimix (200g), 2L of water, a small tin of milk (or powder milk to taste) and salt/sugar to taste.

*Remark: If milk is not available, you can increase the amount of soybean for weanimix by changing the rice: soybean ratio from 4:1 to 3:1*



RECIPE 1. RICE-SOYA WEANIMIX PORRIDGE

## INGREDIENTS



(No. of Servings - 4 adults or 6 children)  or 




Rice-Soya Weanimix: 1 cup (200g)      Water: 2L



Milk:      Powder milk:  
1 small tin (160g)      To taste



Salt and Sugar: To taste

Page 11 (Front) 

# METHODS

1



2



3



# METHODS

1. Bring water to boil
- 2 Mix weanimix with water to form slurry.
- 3 Pour the slurry into the boiled water, add salt.

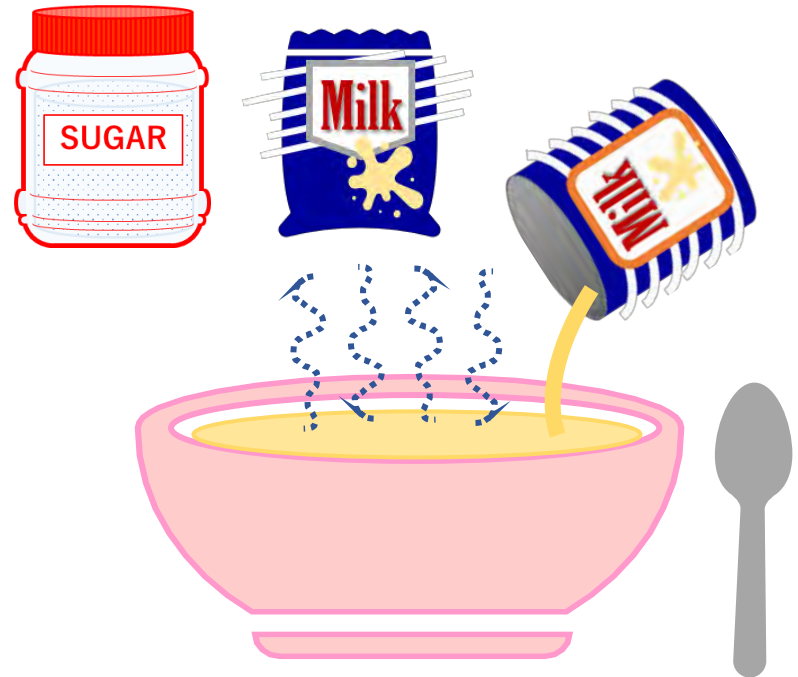


# METHODS (CONT'D)

4

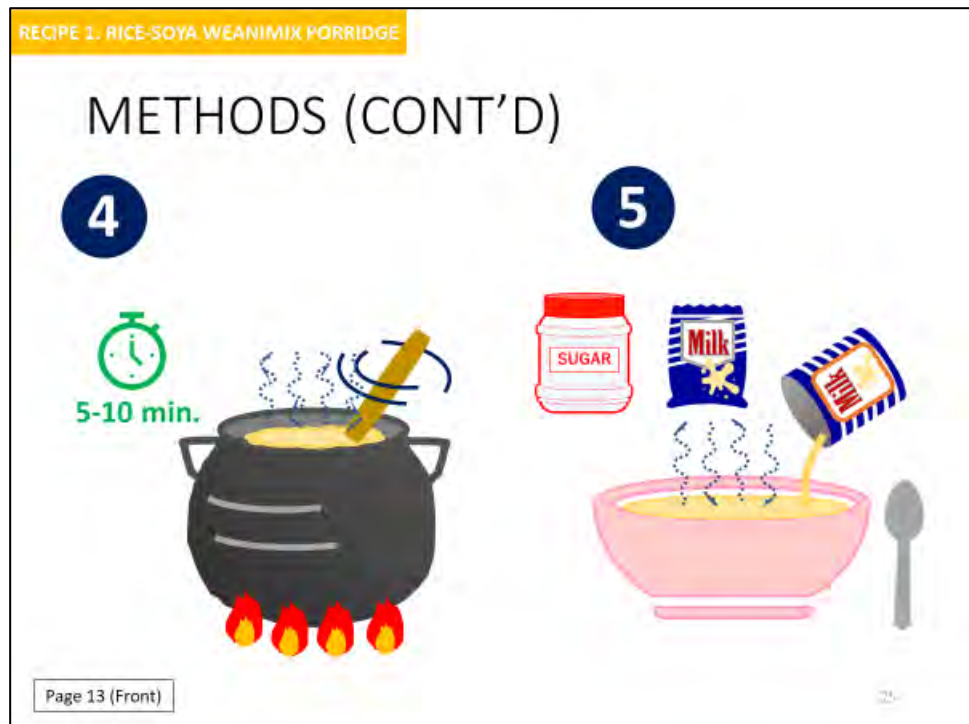


5



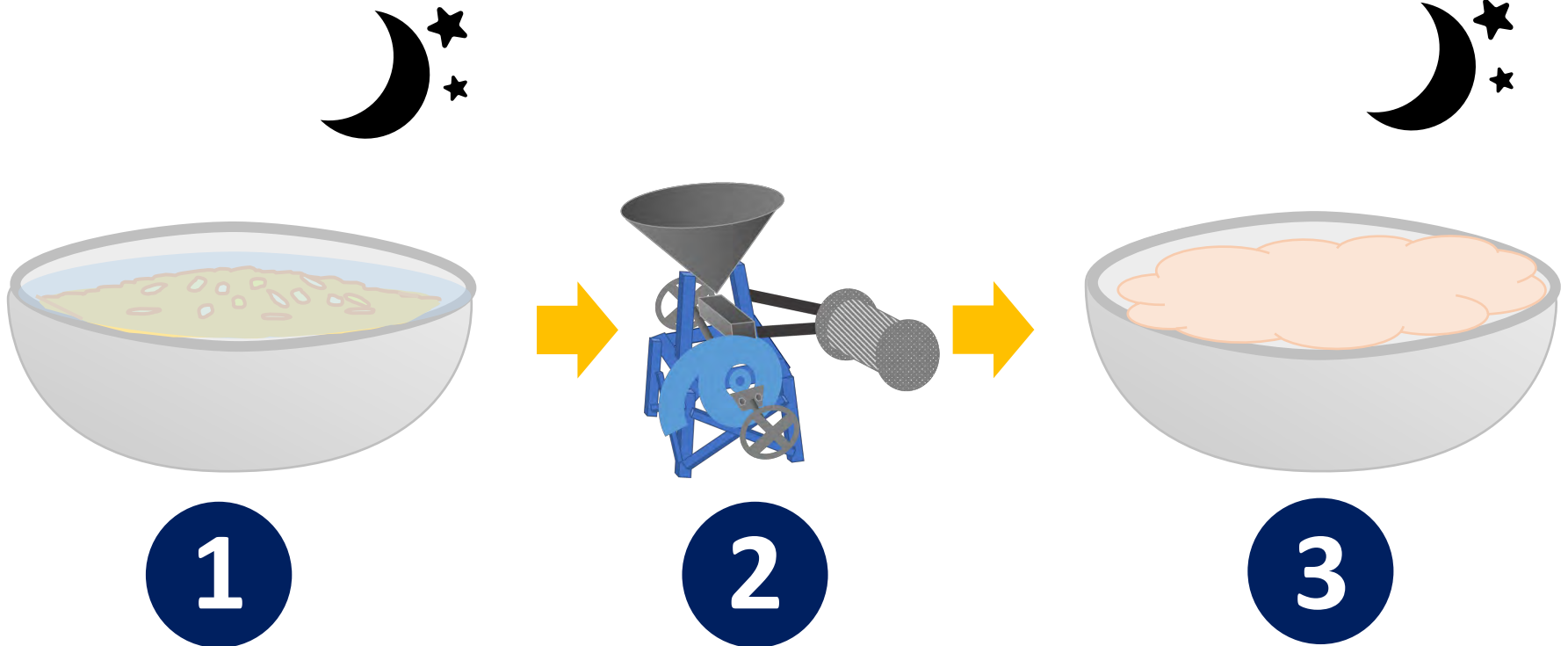
# METHODS (CONT'D)

4. Stir to avoid formation of lumps. Allow to cook for 5-10 minutes till the mixture gets thicker.
5. Serve hot with milk or sugar to taste!



# 2. BANKU

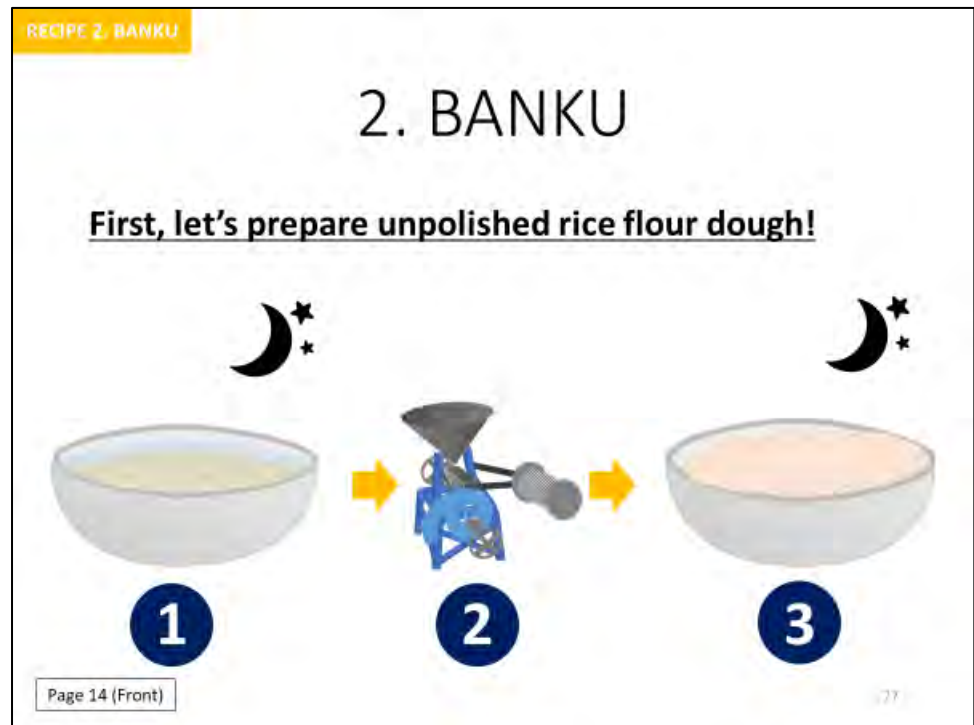
First, let's prepare unpolished rice flour dough!



# RECIPE 2. BANKU

First, let's prepare unpolished rice flour dough! This is a 2-day process as follows:

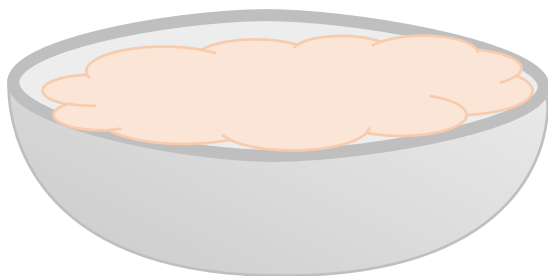
1. Let the unpolished rice into water overnight.
2. Grind the unpolished rice which absorbed water into flour.
3. Let the unpolished rice flour sit overnight for fermentation.



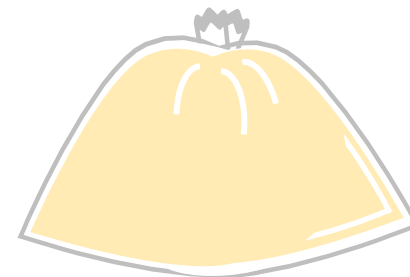


# INGREDIENTS

(No. of Servings – 10 pieces of banku)



Unpolished rice flour dough:  
1 bowl (1kg)



*Bankey mmore* (cassava dough):  
1 packet (400g)



Water: 2L



Salt: To taste




# RECIPE 2. BANKU

- To serve 10 pieces of banku, we use a bowl of unpolished rice flour dough (1kg), a packet of *bankye mmore* (400g), 2L of water and salt to taste.

RECIPE 2. BANKU



## INGREDIENTS

(No. of Servings – 10 pieces of banku)



Unpolished rice flour dough: 1 bowl (1kg)

*Bankey mmore* (cassava dough): 1 bag (400g)



Water: 2L

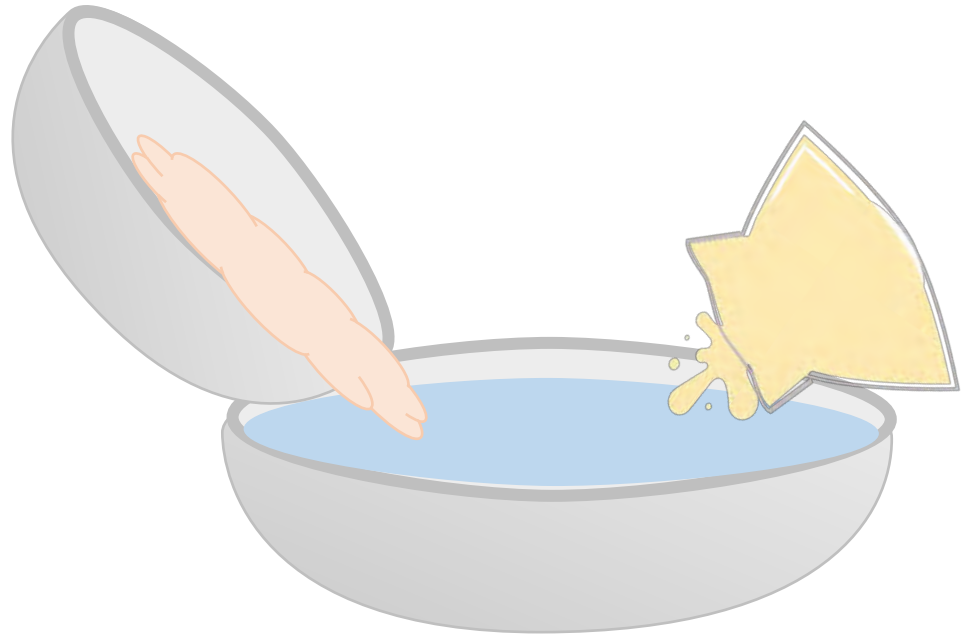
Salt: To taste

Page 15 (Front)

29

# METHODS

1



2



# METHODS

1. Mix unpolished rice flour and *bankye mmore* with 2L of water.
2. Mix the slurry into pouring consistency.



# METHODS (CONT'D)

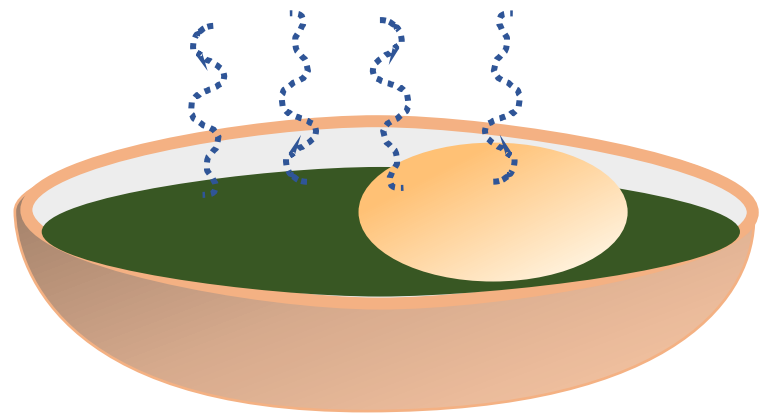
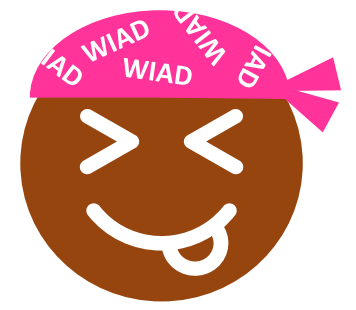
3

  
60 min.



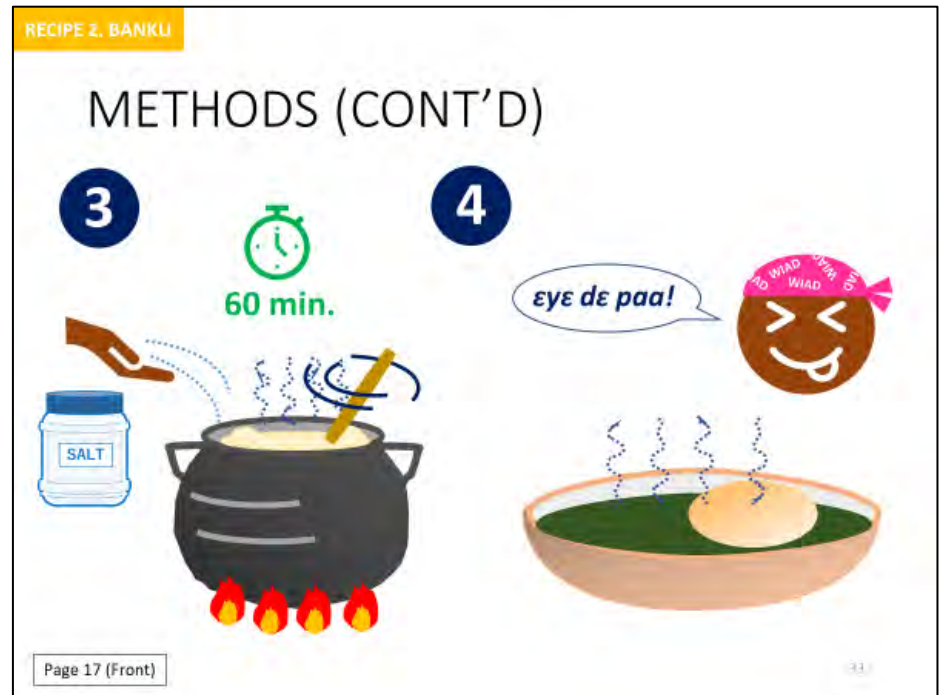
4

*eye de pa!*



# METHODS (CONT'D)

3. Stir continuously for around 60 minutes.
4. Mold into balls and serve with *ayoyo* soup or any soup of your choice.



Face



MOFA/JICA TENSUI RICE

# 1<sup>st</sup> Onsite Training

- ◆ Land Development
- ◆ Rice Cultivation
- ◆ Farm Management

Sustainable Development of Rain-fed Lowland Rice Production  
MOFA/JICA TENSUI RICE PROJECT

Rice  
Cultivation

Farming  
Management

Land  
Development

Extension

Other

Back side

This chapter includes 10 topics;

1. Bush and grass Clearing
2. Burning
3. De-stumping
4. Land Demarcation
5. Virgin land ploughing
6. Grading and Levelling
7. Temporary Bunds Construction
8. Bunds Construction
9. Puddling (for transplanting only)
10. Land levelling



LD-OST. 01



## Land Development and Preparation

From a Virgin Land to an Arable Land

Land Development



Sustainable Development of Rain-fed Lowland Rice Production  
MOFA/JICA TENSUI RICE





MOFA/JICA TENSUI RICE

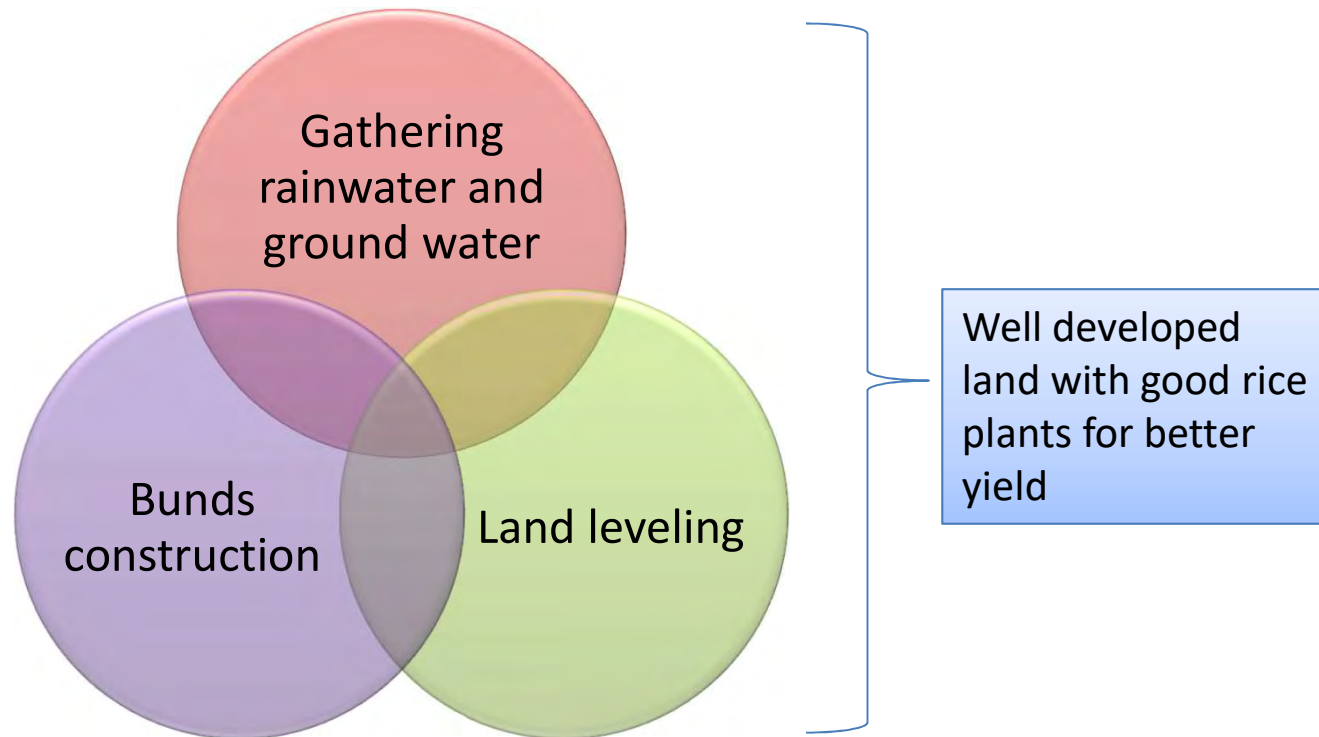
# Land Development and Preparation

## From a Virgin Land to an Arable Land

Land  
Development

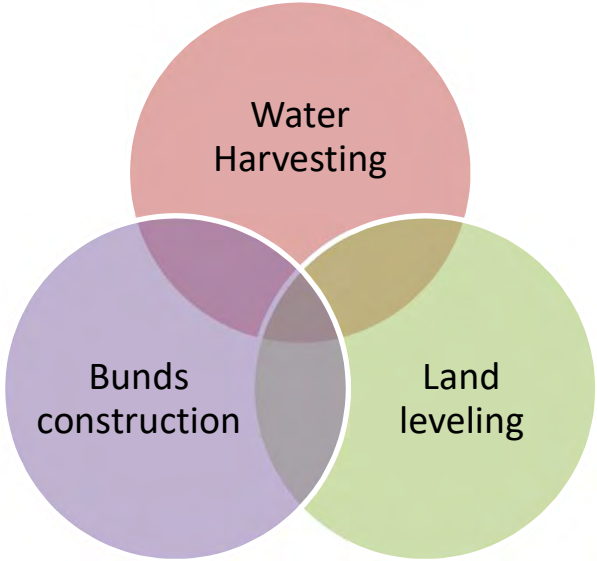
Back side

# Land Development for rice cultivation under rain-fed system



# Land Development for rice cultivation under rain-fed system

Main component  
(maximization of water use by)



Mpasatia, Atwima Mponua District



Katabo Central, Ahafo Ano North District

# Steps

1. Bush and grass Clearing
2. Burning
3. De-stumping
4. Land Demarcation
5. Virgin land ploughing
6. Grading and Levelling
7. Temporary Bunds Construction
8. Bunds Construction
9. Puddling
10. Land levelling

Generally Land Development procedures followed by activities on the left table.

However, sometimes you can jump some steps or do some steps at same time, if it is not necessary such as grading, puddling and land levelling.

Land Development by machine might be requested by farmers because of tedious and tough works, in that case, please remind them how farmer/MOFA can access the machine.

# Steps

1. Bush and grass Clearing
2. Burning
3. De-stumping
4. Land Demarcation
5. Virgin land ploughing
6. Grading and Levelling
7. Temporary Bunds Construction
8. Bunds Construction
9. Puddling
10. Land levelling

# 1. Bush and Grass Clearing



## Explanation

1. Cut grass and clear bush.
2. After cutting grass, leave number of days for drying.

## Note

Remain/Do not remove grass or bush at upstream area as a buffer zone against flood.



# 1. Bush and Grass Clearing



## 2. Burning



### Purpose

1. Kill seed of weeds
2. To see well geographical condition/situation

The grass is well dry?



## 2. Burning



Back side

### 3. De-Stumping



#### Explanation

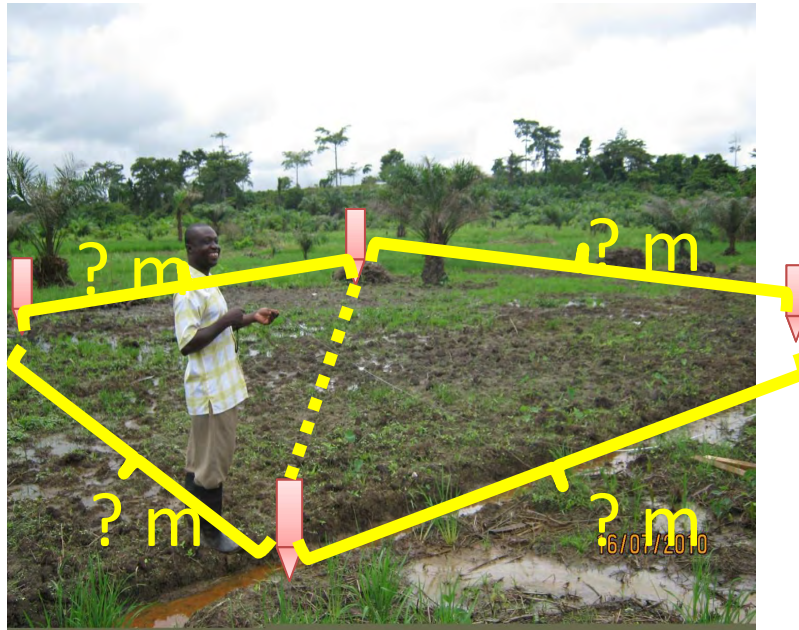
- Remove the roots
- Group work
- Get it out from field (don't remain)



# 3. De-Stumping



## 4. Land Demarcation



### Purpose

1. To Identify actual area for rice cultivation (determine right amount of seed and fertilizer application)
2. Easily identify the location of peripheral bunds.

### How

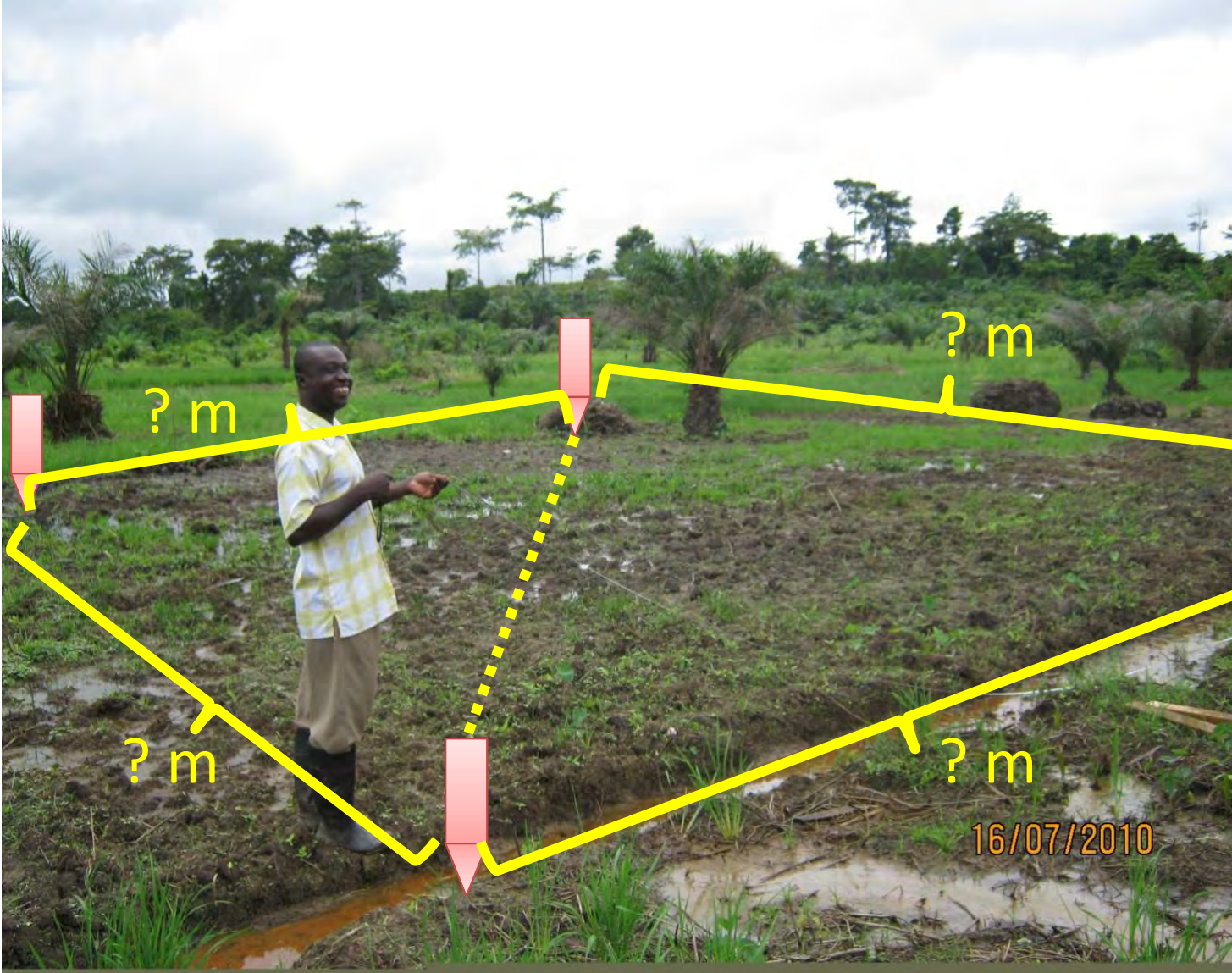
1. Peg should be put at each corner

### Then

1. Area should be around measured and calculated



# 4. Land Demarcation



## 5. Virgin land ploughing



### Purpose

1. To make the soil medium smooth and fine to enhance rice growth.
2. To bury(kill) weeds

### When

Plough when the soil is moist

### How

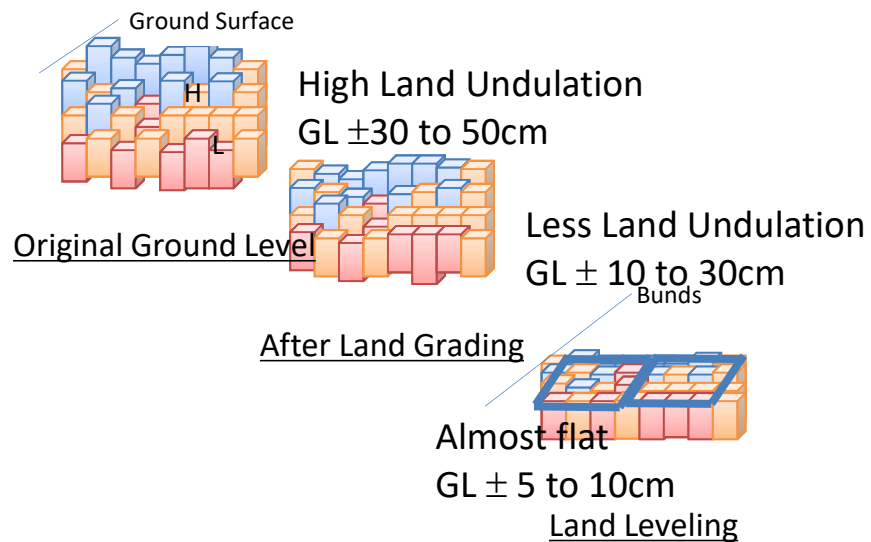
- Use available simple tools like hoe
- As much as possible farmers should be groups to reduce the drudgery
- Deep ploughing should be avoided (top soil)
- Ploughing depth should be uniform (around 20 cm)



# 5. Virgin land ploughing



# 6. Grading and leveling



Why grading and land leveling are necessary?

Uniform water depth

- Uniform growth of rice
- Effective fertilizer and herbicide utilization

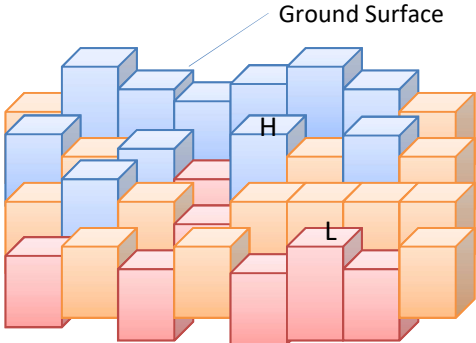
Drainage of surface water

- For agric. Machinery application in the field
- For harvesting of rice under dry field condition

Better yield

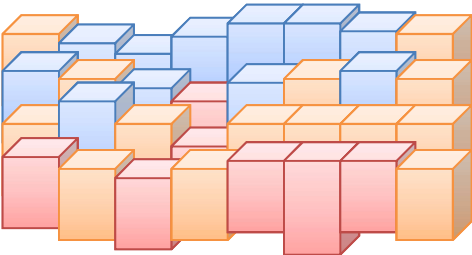


# 6. Grading and leveling



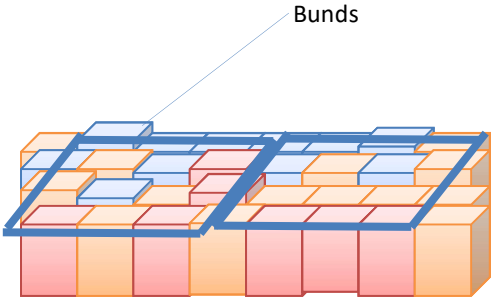
Original Ground Level

High Land Undulation  
GL ±30 to 50cm



After Land Grading

Less Land Undulation  
GL ± 10 to 30cm



Almost flat  
GL ± 5 to 10cm

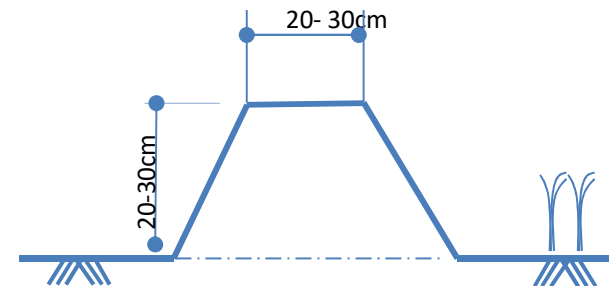
Land Leveling

# 7. Temporary Bunds Construction (1)



## Purpose

- Store and keep water
- Identify lower and higher portion

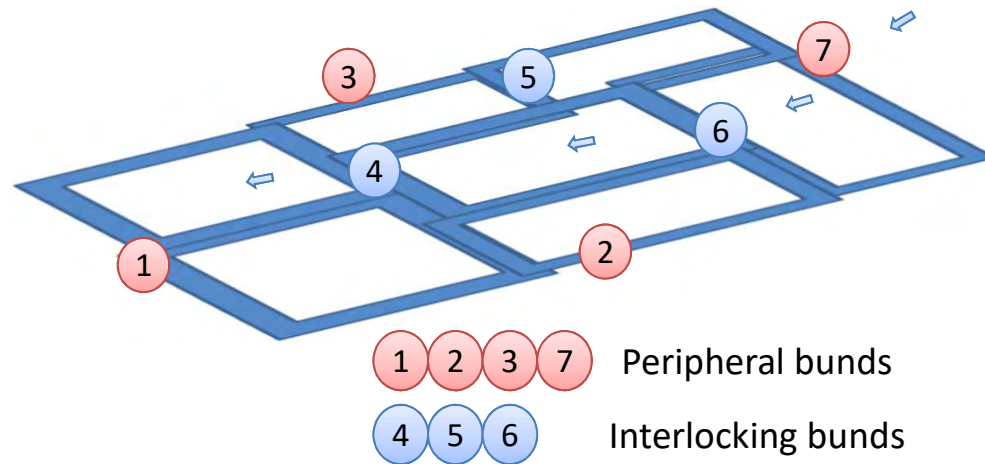


- Height and width is just enough one or two scoops of soil
- Scope the soil from higher side, not lower side

# 7. Temporary Bunds Construction (1)

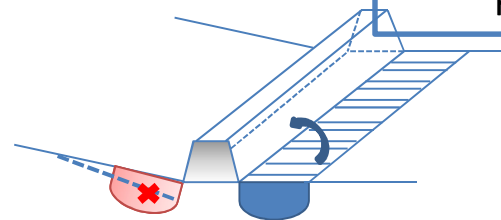


# 7. Temporary Bunds Construction (2)

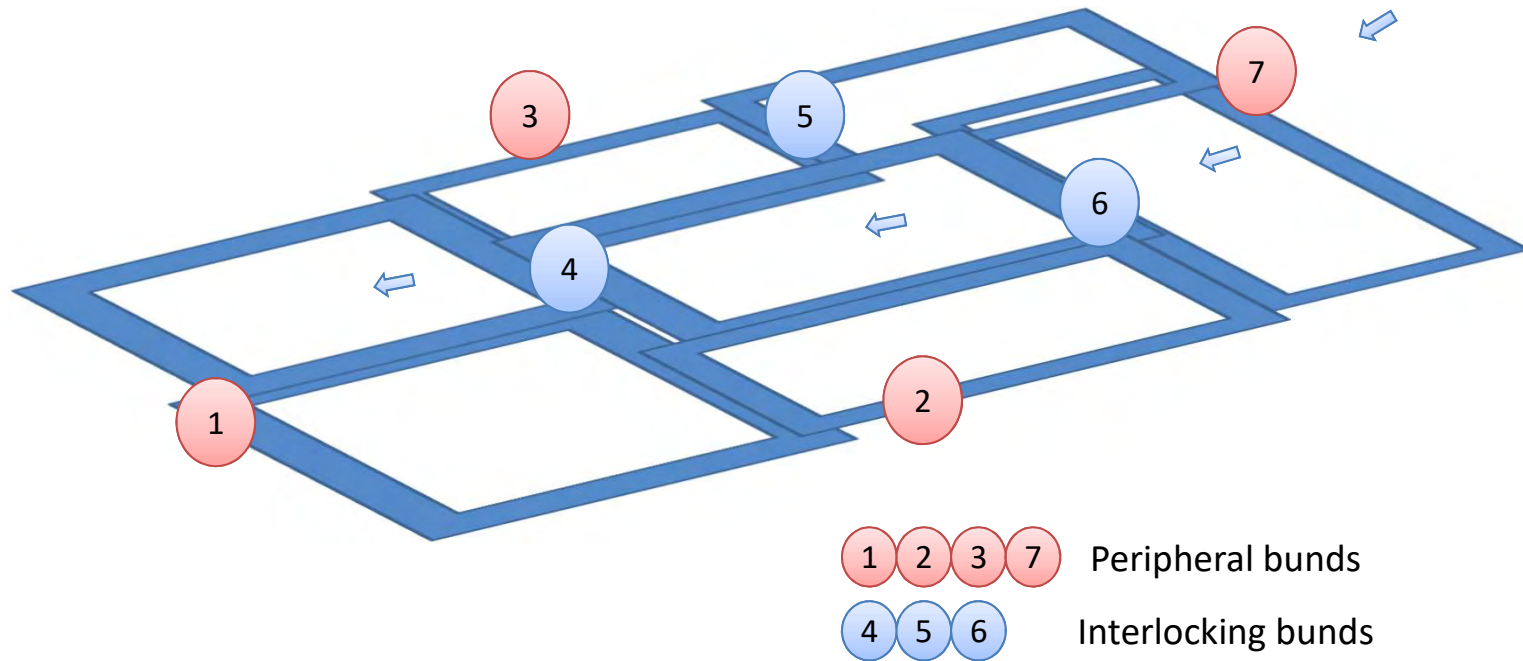


## Procedure

1. Install the last bunds 1, then get water into the plot at around 0 -5 cm water depth.
2. Identify place with no-water, where interlocking bunds is needed.
3. This temporary bunds become interlocking or peripheral bunds.



# 7. Temporary Bunds Construction (2)





## 7. Temporary Bunds Construction (3)



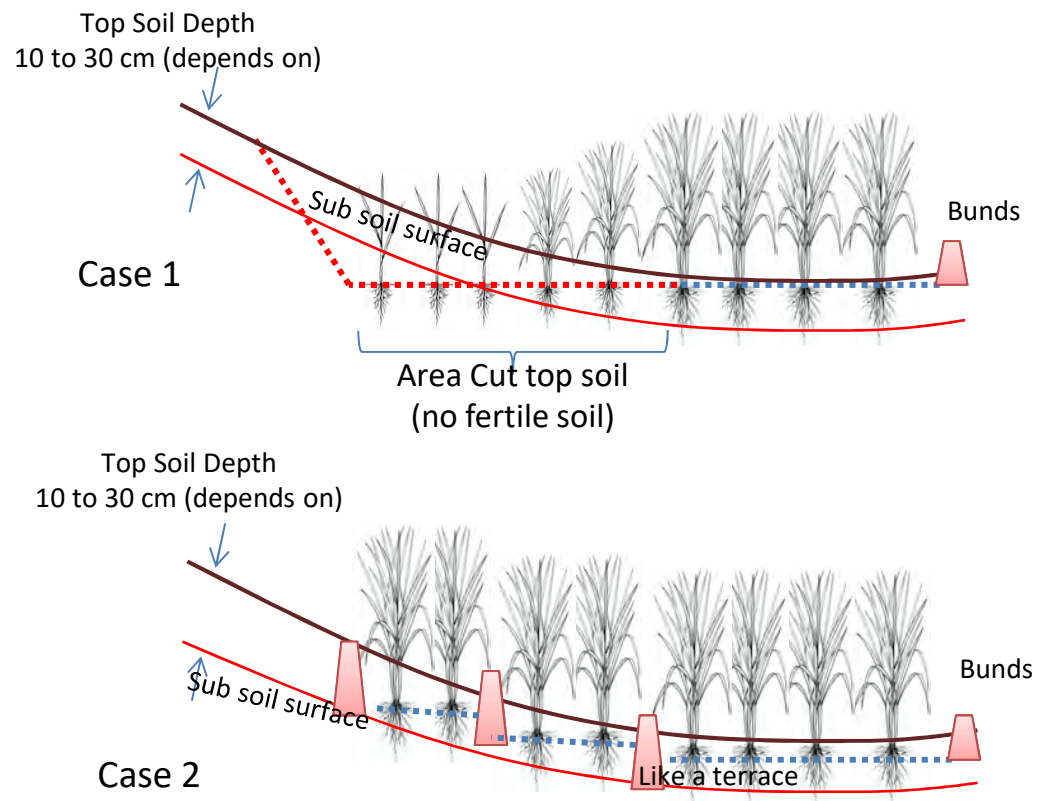
- Peripheral Bunds might be an interlocking bunds, it depends on the slope of valley.
- However the function between Peripheral and interlocking bunds is different, so size of bunds also should be different.

# 7. Temporary Bunds Construction (3)



# 7. Temporary Bunds Construction (3) Land levelling by Cutting and Banking

Valley Cross section



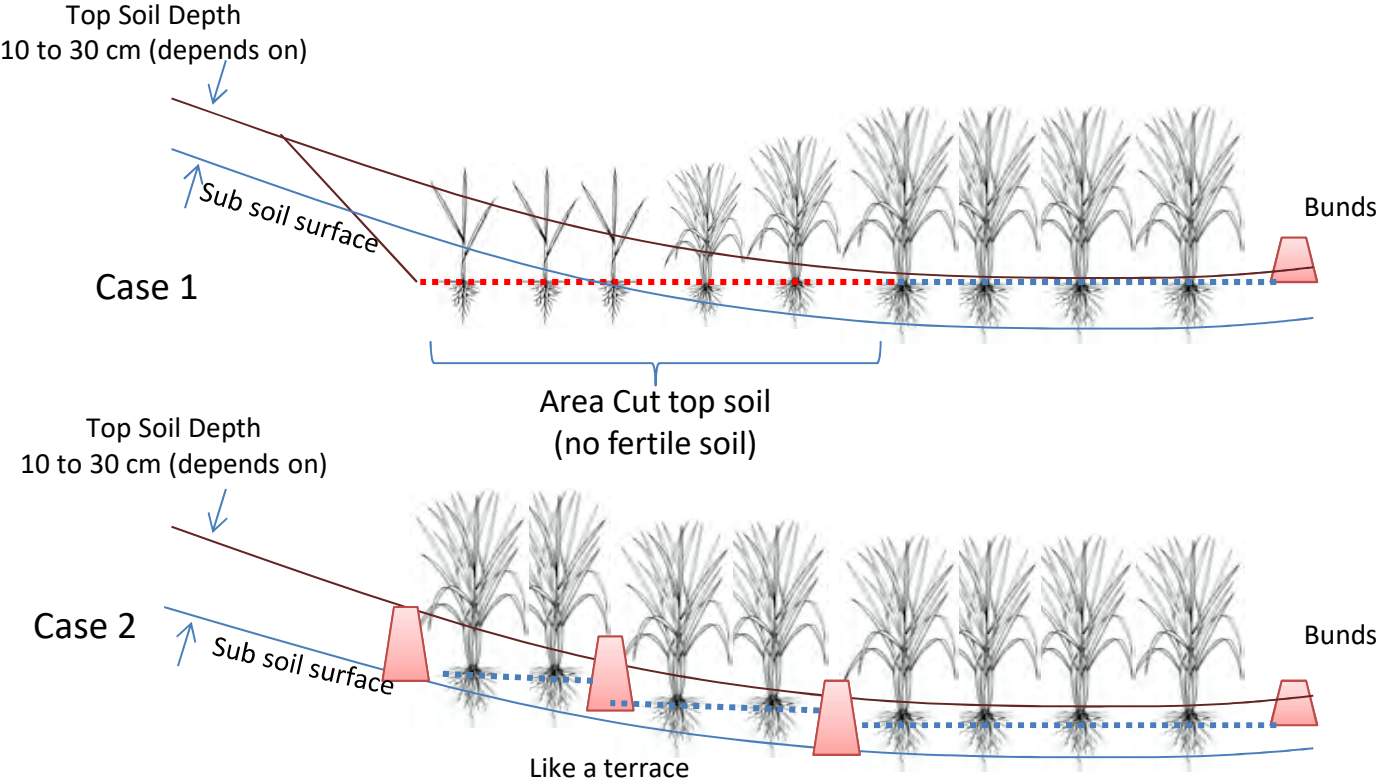
## Tips

1. Case 1: Removal of top soil affects rice growing due less soil fertility. Please look at height of rice.
2. Case 2: Instead of cutting soil on the slope such as case 1, interlocking bunds should be placed. Then Make a terrace. No removal of top soil is very important.



# 7. Temporary Bunds Construction (3) Land levelling by Cutting and Banking

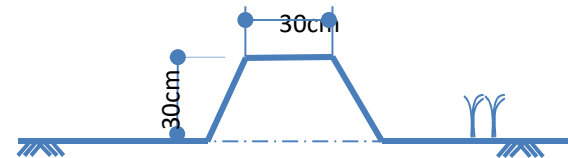
Valley Cross section



# 8. Bunds Construction



1. Bund height should around be 30 cm depending on the area.
2. Soils should be scooped from both of the field.
3. Bunds should be compacted or firmed after hipping the soil
4. Shape of bunds should be trapezoidal as much as possible



# 8. Bunds Construction



## 9. Puddling with legs and hoes



### Purpose

1. To thoroughly mix, soften, and make the soil medium fine and smooth.
2. To eliminate already growing weeds.

### How

1. Saturate the soil by irrigation with water depth 0-5 cm
2. Crash the soil with hoes and legs, animals or power tiller if it is available.



# 9. Puddling with legs and hoes



# 10. Land Levelling (1)



## Purpose

To Improve and enhance easy water management, and uniform nutrient distribution.

## By

Hoe, Flat board, manual leveller, ladder also good

## Tips

- Keep water depth 0-5cm.
- Observe well water, Water tell higher and lower place



# 10. Land Levelling (1)



## 10. Land Levelling (2)



Continues land leveling works year by year is a key factor for good yield.

(not possible to achieve leveled land once)

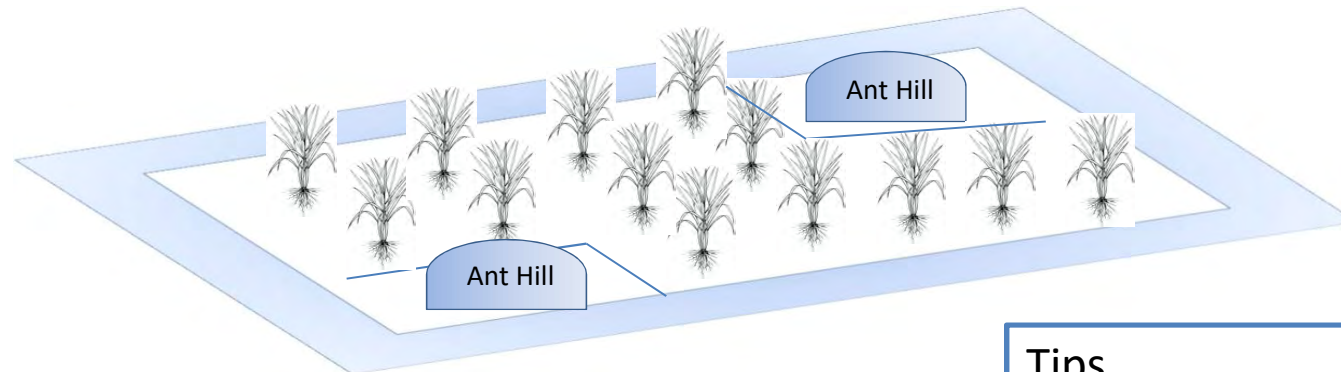


# 10. Land Levelling (2)



Back side

## 10. Land Levelling- Ant Hill (3)



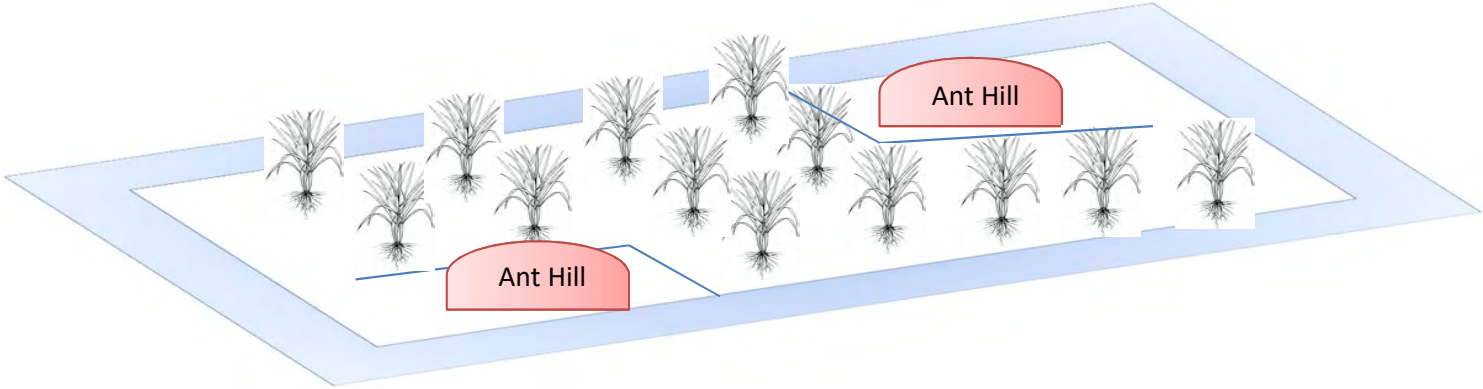
### Tips

Ant hill is being seen in the valley.

Based on our experience. Ant-hill should not be removed because of very low fertility.

Rice was not able to grow well where ant hill was there. (from kensakrom, 2010)

# 10. Land Levelling- Ant Hill (3)





## Now Ready to plant at Katabo (French man)



1. Well levelled plot with interlocking bunds according to the valley slope.
2. This is at 1<sup>st</sup> year. Through the farming activity of the year, you can remove or add some interlocking bunds for the next year if it is necessary.
3. Land levelling is continues work. Make it better than this year for next year.

# Now Ready to plant at Katabo (French man)



Back side

- Seed selection is the first step for rice cultivation.
- The purpose of seed selection is to select heavier seeds for obtaining stronger and healthier seedlings.

RC OST 1-1

# SEED PREPARATION

## Seed selection and Seed soaking

TENSUI RICE  
MOFA-JICA Project

- Seed soaking is the second step of seed preparation for transplanting.
- The purpose of seed soaking is to enable seeds to absorb sufficient water for a period and to have a uniform germination
- Uniform germination is very important in order to obtain uniformly growing seedlings.

Face



RC OST 1-1-1



MOFA/JICA TENSUI RICE

Rice  
Cultivation

# SEED PREPARATION

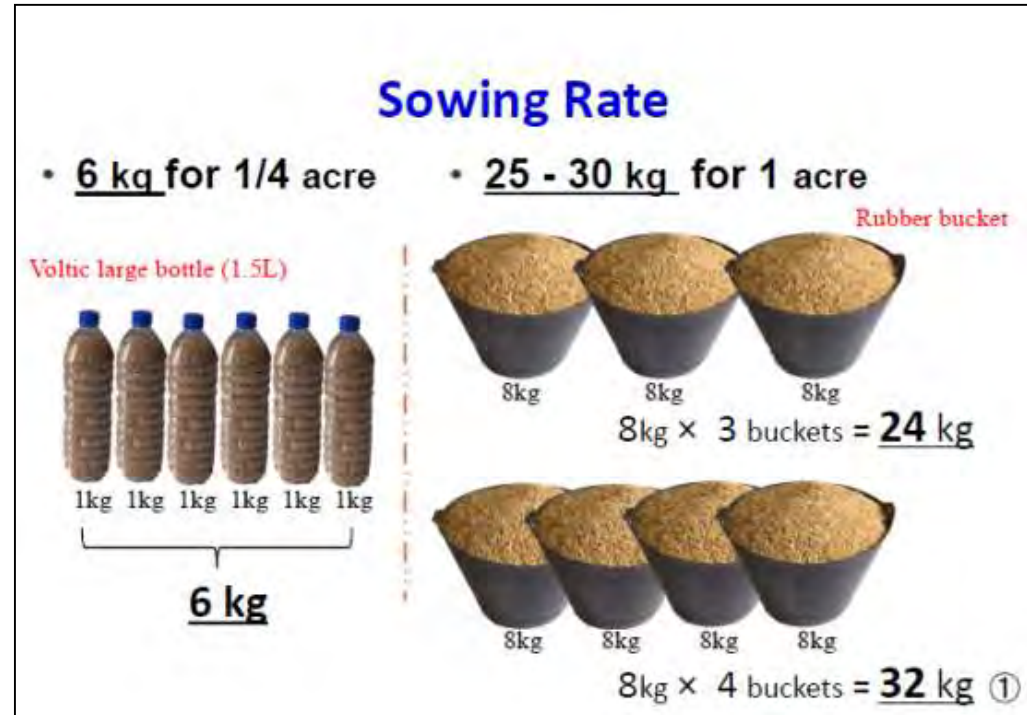
## Seed selection and Seed soaking

Sustainable Development of Rain-fed Lowland Rice Production  
MOFA/JICA TENSUI RICE PROJECT



Back side

- Prepare 6 kg of dry seed for 1/4 acre or 25 - 30 kg for 1 acre.
- Seed for one Voltic large bottle (1.5L) equivalent 1 kg. Therefore, 6 bottles of seeds should be prepared for 1/4 acre.



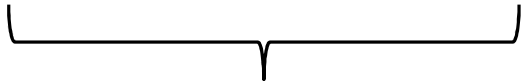
- A full rubber bucket of dry seeds (13%) equivalent 8 kg. Thus, between 3 and 4 buckets of seeds should be prepared for 1 acre.



# Sowing Rate

- 6 kg for 1/4 acre

Voltic large bottle (1.5L)



6 kg

- 25 - 30 kg for 1 acre

Rubber bucket



8kg      8kg      8kg

$$8\text{kg} \times 3 \text{ buckets} = \underline{24 \text{ kg}}$$



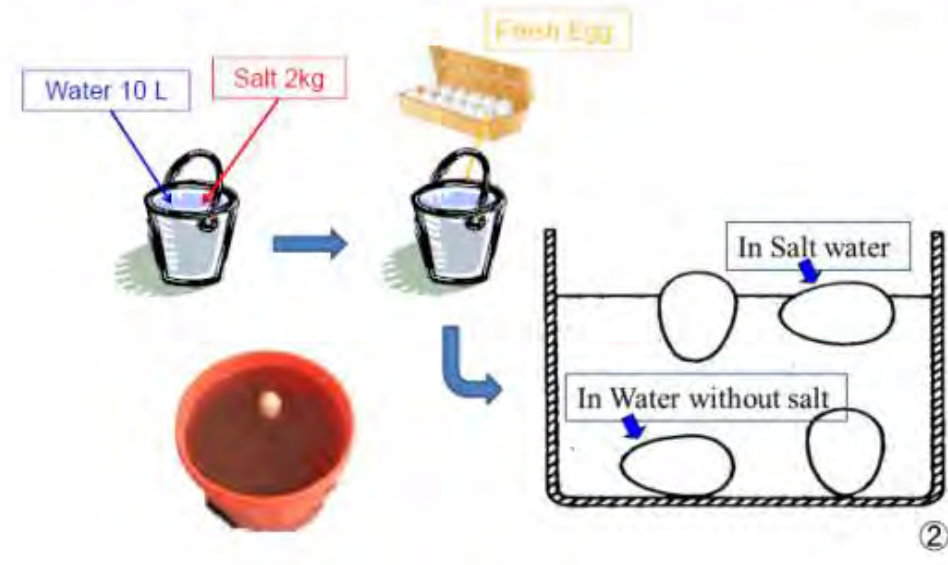
8kg      8kg      8kg      8kg

$$8\text{kg} \times 4 \text{ buckets} = \underline{32 \text{ kg}}$$

## Seed selection by salt water method

1. Measure ten 10 liters of water and 2kg salt.
2. Mix salt and water then stir well.
3. Put the fresh egg in the solution, if the egg float above the water, the solution is correct for seed selection.

### 1. Seed selection by salt water method

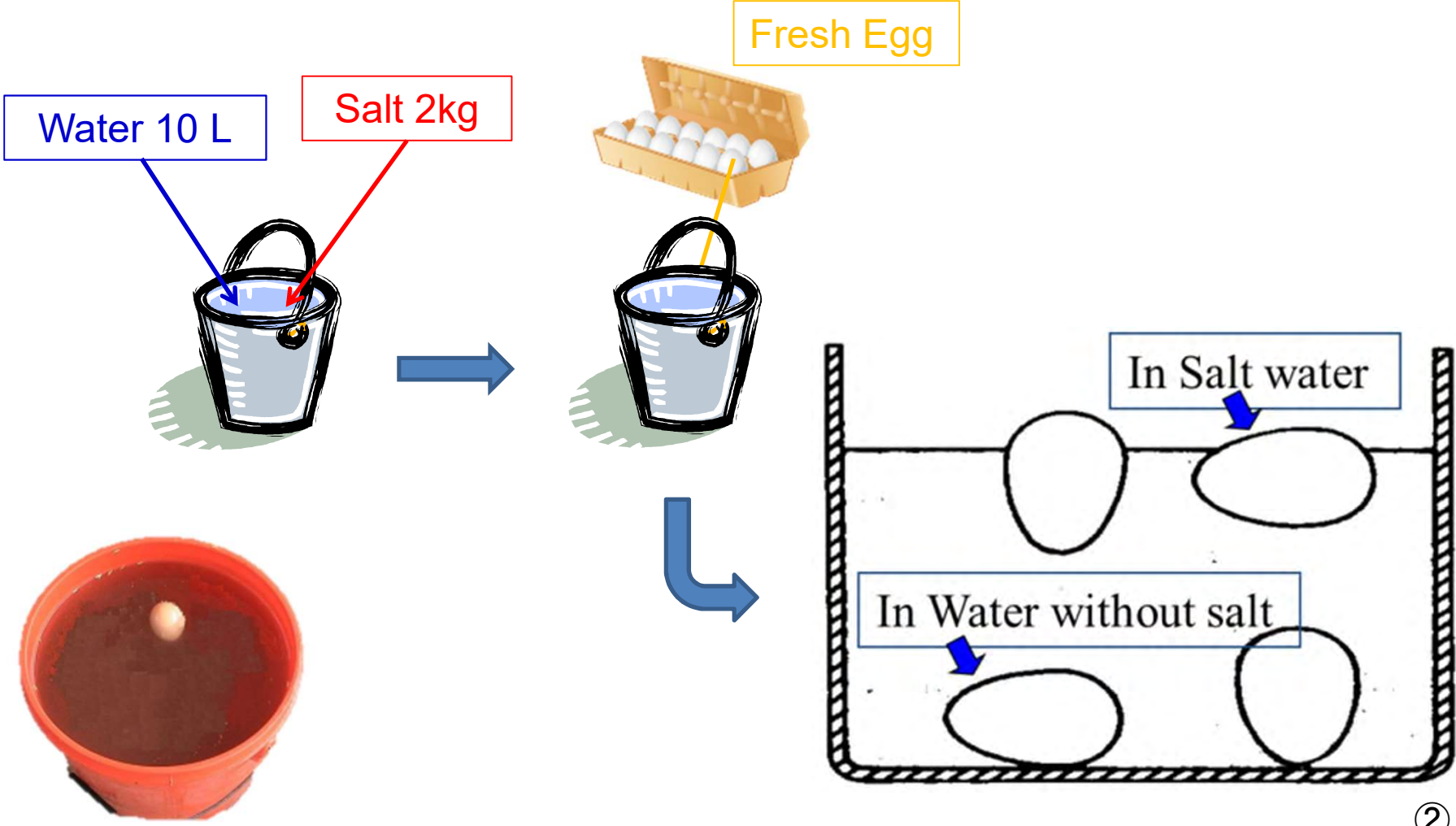


## Purpose of seed selection

To get heavier seeds

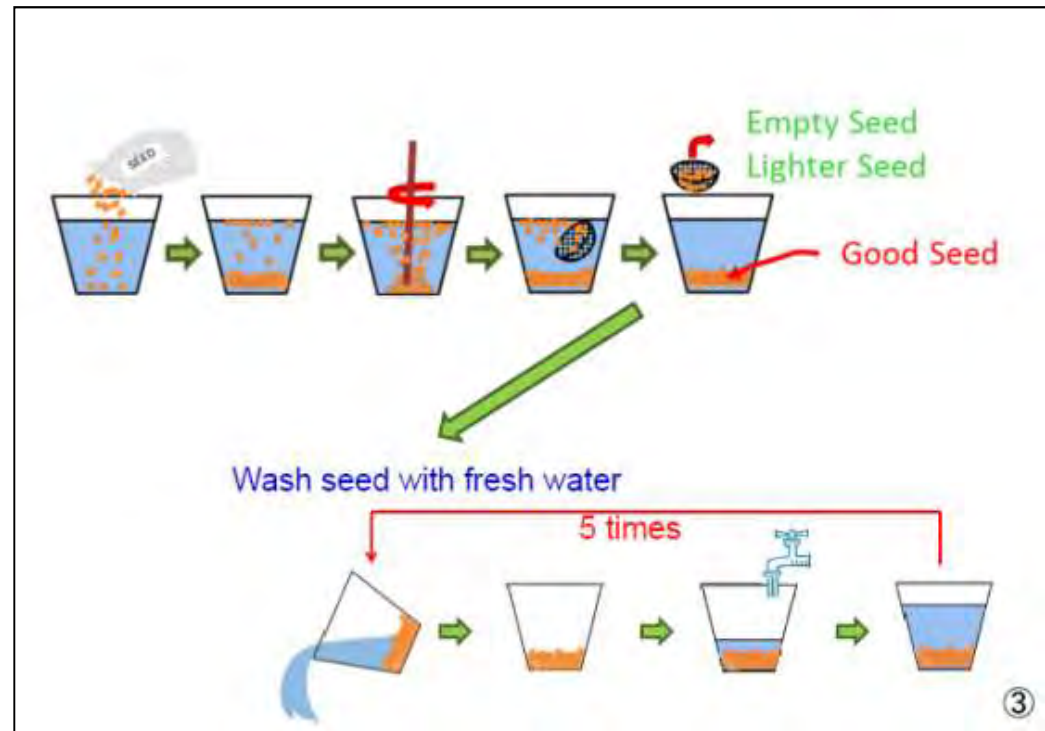
- The heavier seeds normally germinate uniformly and give sufficient nutrients to become healthy seedlings

# 1. Seed selection by salt water method



## Seed selection by salt water method (Cont.)

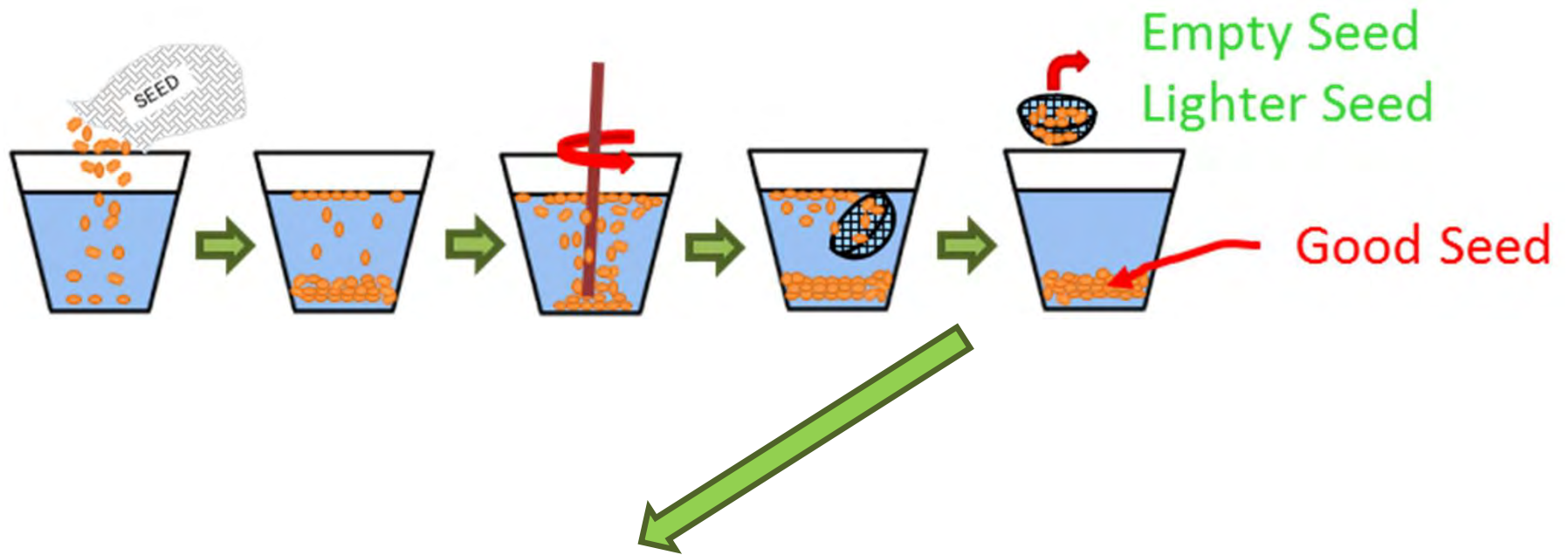
4. Remove the egg and put seeds.
5. Remove the floating seeds.
6. Wash the remaining seeds with fresh water 5 times.
7. Quantity of seeds should be fully submerged into the solution.
8. The solution can be used for several times.



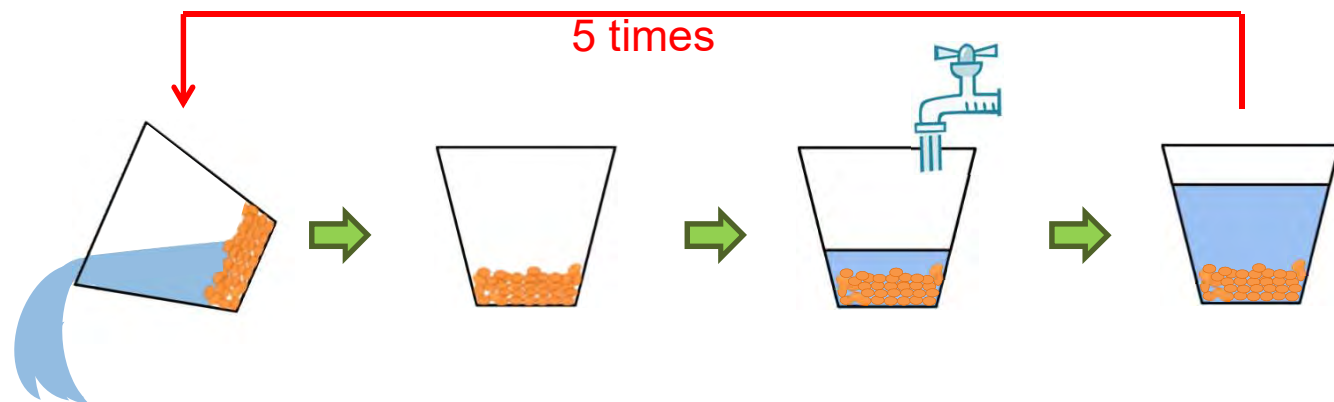
There are several ways of seed selection such as selection by salt water, by normal water and by winnowing, however, the salt water method gives you good result.

Face

RC OST 1-1-1



Wash seed with fresh water





Back side

## Procedure of seed soaking

1. Pour seed in adequate amount of fresh water
2. Change the water every twelve(12) hours
3. Check the condition of seed daily
4. After 3 - 4 days, remove seed from water and dry the seed for half day under a shade

Face

RC OST 1-1-1

## 2. Seeds soaking

For the transplanting method only

For 3 ~ 4 days

Change water twice a day

④

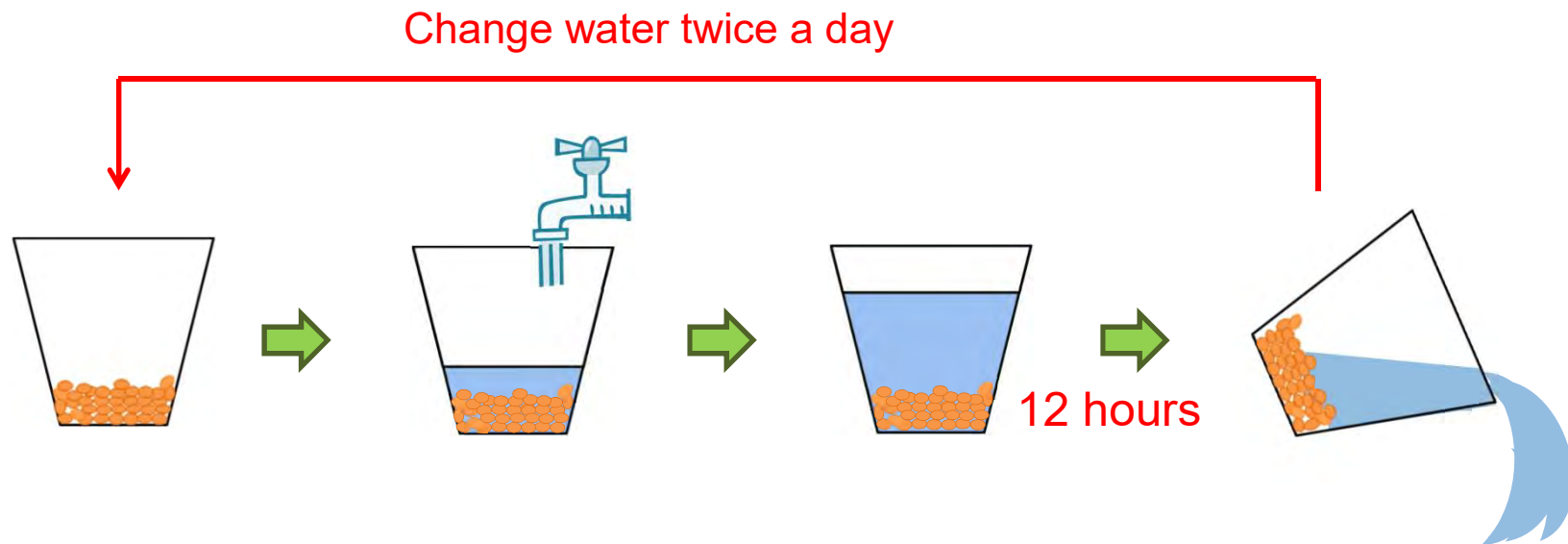
## Purpose of seeds soaking

To put seed in water enough period so that they absorb sufficient water to germinate uniformly

# 2. Seeds soaking

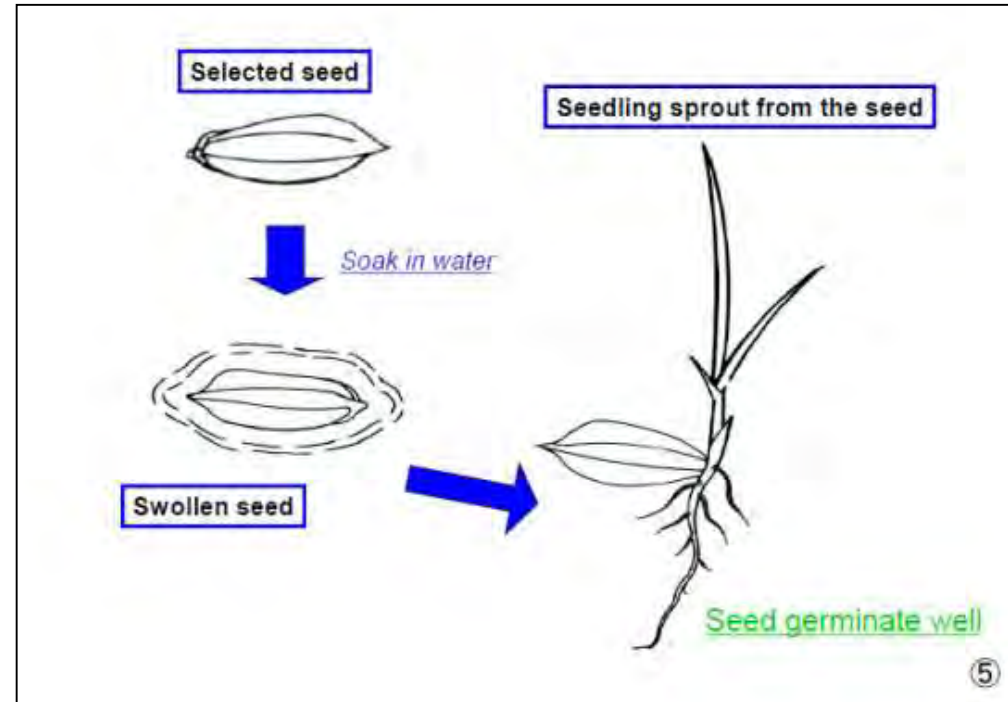
For the transplanting method only

For 3 ~ 4 days





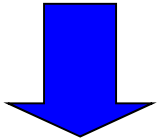
Back side



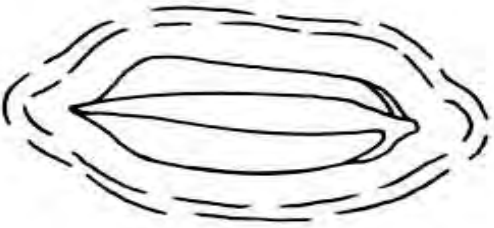
- The purpose of seed soaking is to allow the rice seeds to absorb enough water for uniform germination.
- Uniform germination is very important in order to obtain uniformly growing seedlings.
- Moreover, to have uniformly growing seedlings is important to secure uniform growth of rice plants in main field.

Face

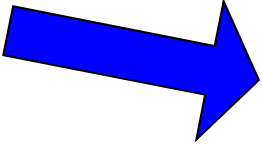
**Selected seed**



Soak in water



**Swollen seed**



**Seedling sprout from the seed**



Seed germinate well

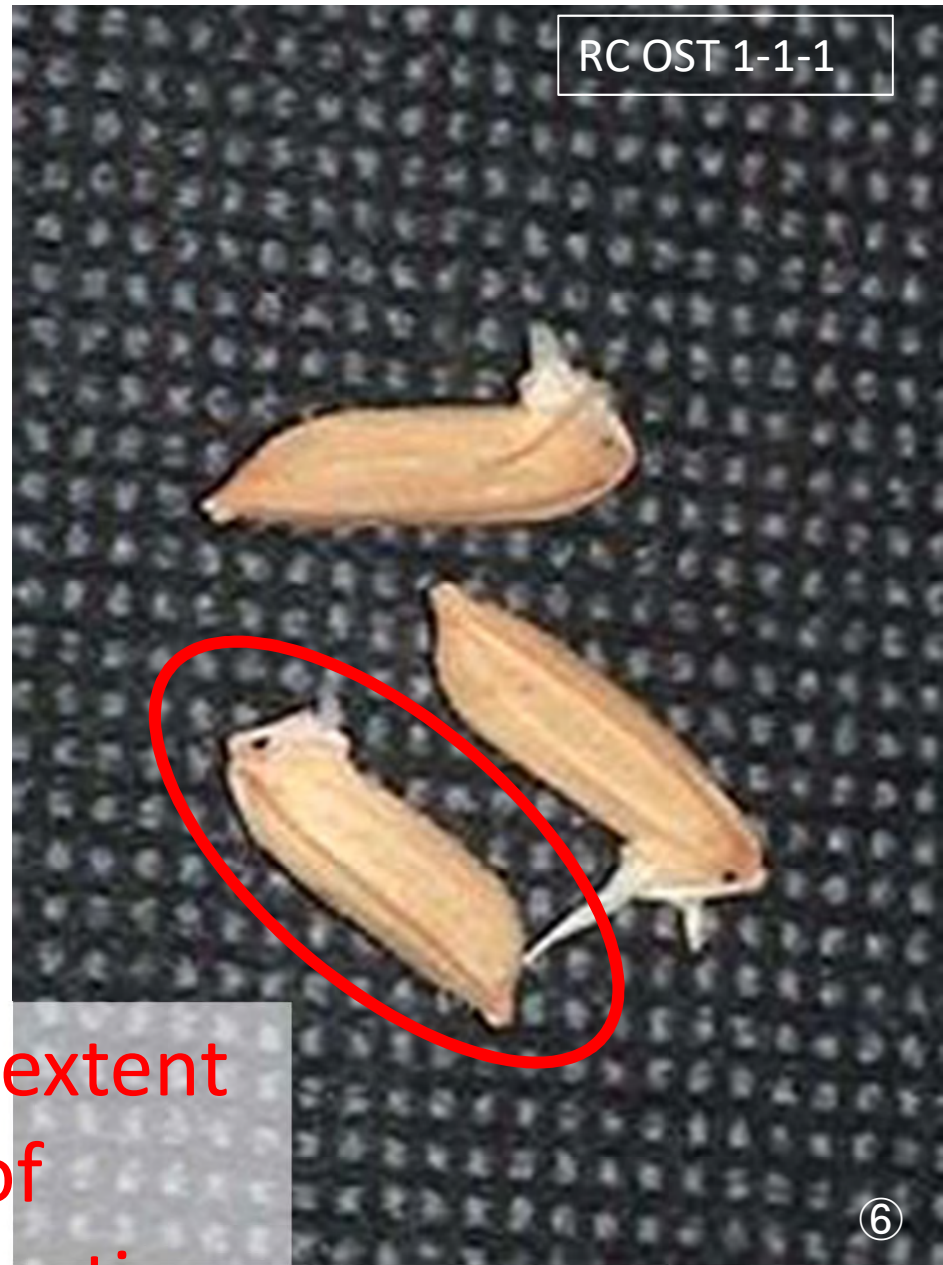
RC OST 1-1-1

Back side

If sprouting is excessive, roots and sprouts of grains are damaged causing injury at the time of sowing.







Good extent  
of  
germination

Back side

# NURSERY PREPARATION AND SOWING

MOFA-JICA Project  
TENSUI RICE PROJECT  
Sustainable Development of Rain-fed Lowland Rice Production



MOFA/JICA TENSUI RICE

# NURSERY PREPARATION AND SOWING

Rice  
Cultivation





Back side

Method of making a wet nursery

1. Select an area where a source of water is reliable.
2. Select a flat area.
3. Plough and make bund.
4. Irrigate and puddle the area.
5. Raise a soil up to 10 – 15 cm height, make nursery beds and level a surface of nursery beds.



Important Quality for Good Nursery

- Nursery beds must be level
- Water in the nursery must be controlled freely by irrigation and drainage systems
- Soil must be fertile to raise healthy seedlings

Face

RC OST 1-2-1



Ploughing and Paddling



Making a Nursery Bed



Levelling

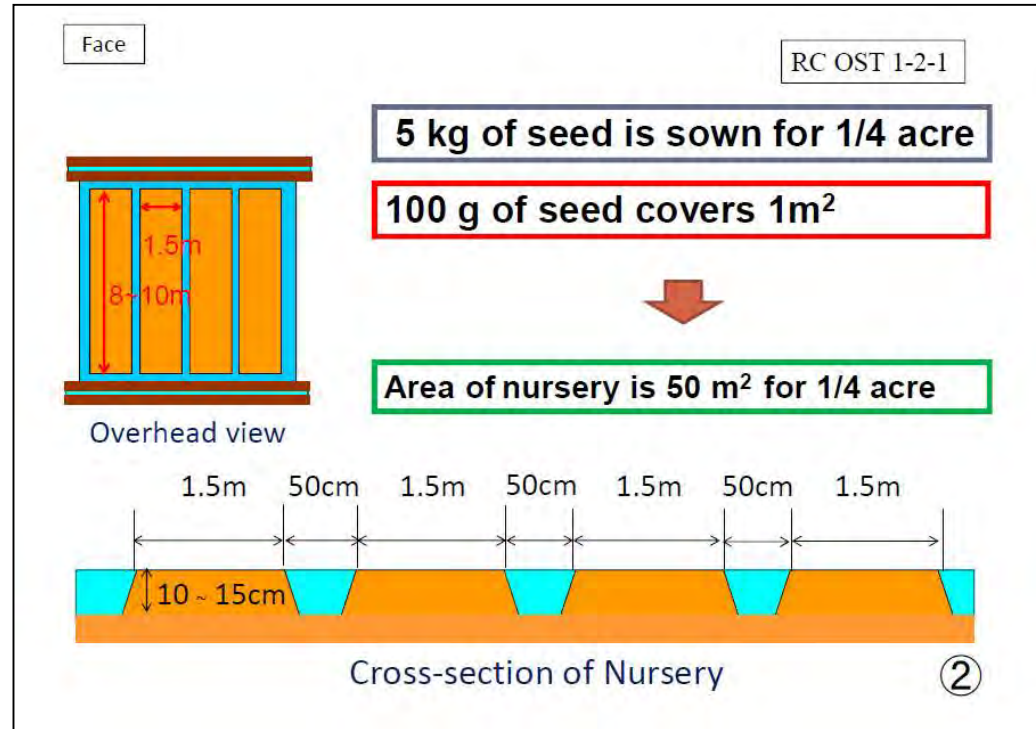


1

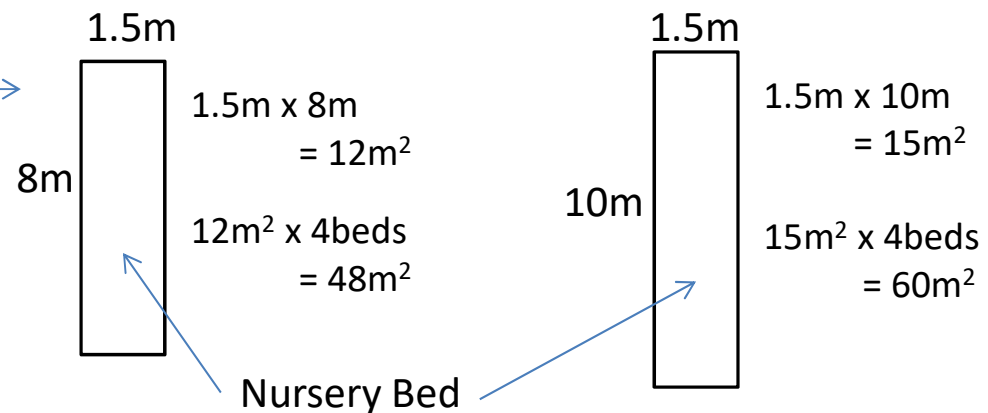
Back side

Method of making a wet nursery

1. 5 kg of seed is sown for 1/4 acre of paddy field.
2. 100 grams of seed covers 1m<sup>2</sup>
3. Therefore, the area of nursery bed is 50m<sup>2</sup> for 1/4 acre of paddy field.
4. If the nursery bed is 1.5-meter wide, 4 of 8~10-meter long nursery bed are required.
5. Arise mud to 10 ~ 15 cm above original level.
6. Level and smooth top of beds.



Example of the size of Nursery Bed





Face

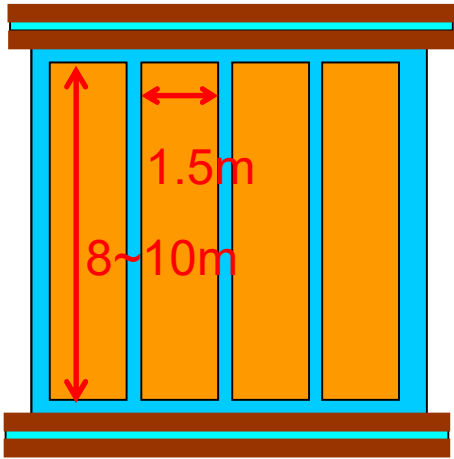
RC OST 1-2-1

**5 kg of seed is sown for 1/4 acre**

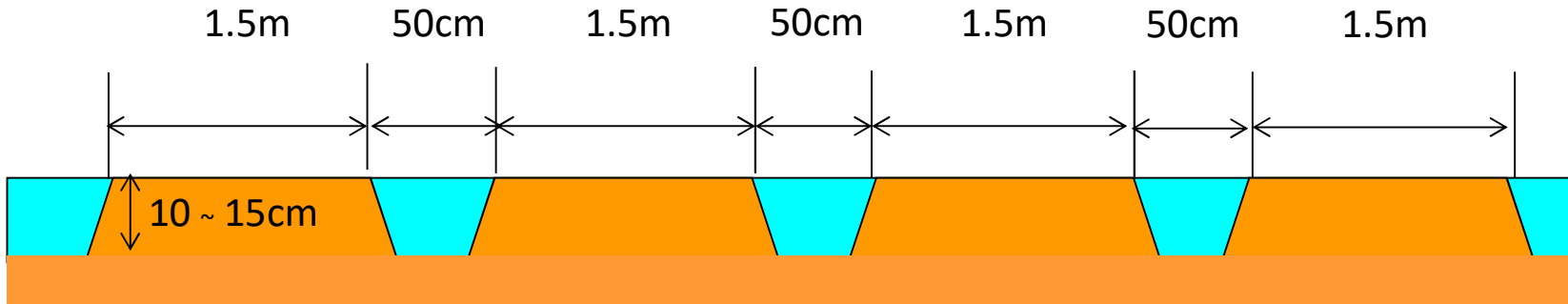
**100 g of seed covers 1m<sup>2</sup>**



**Area of nursery is 50 m<sup>2</sup> for 1/4 acre**



Overhead view



Cross-section of Nursery

Back side

Important technical points on sowing

1. At a rate of 100 grams per 1m<sup>2</sup>, seed is sown on the nursery bed.
2. Broadcast seeds evenly on the nursery bed.
3. Cover seeds with soil well by hand.
4. Cover nursery beds with palm leaves or other material to prevent bird damage.



Divided seed into 2 or 3 portions and sow about 2 or 3 times on the nursery bed for uniform coverage.





Sowing on nursery bed

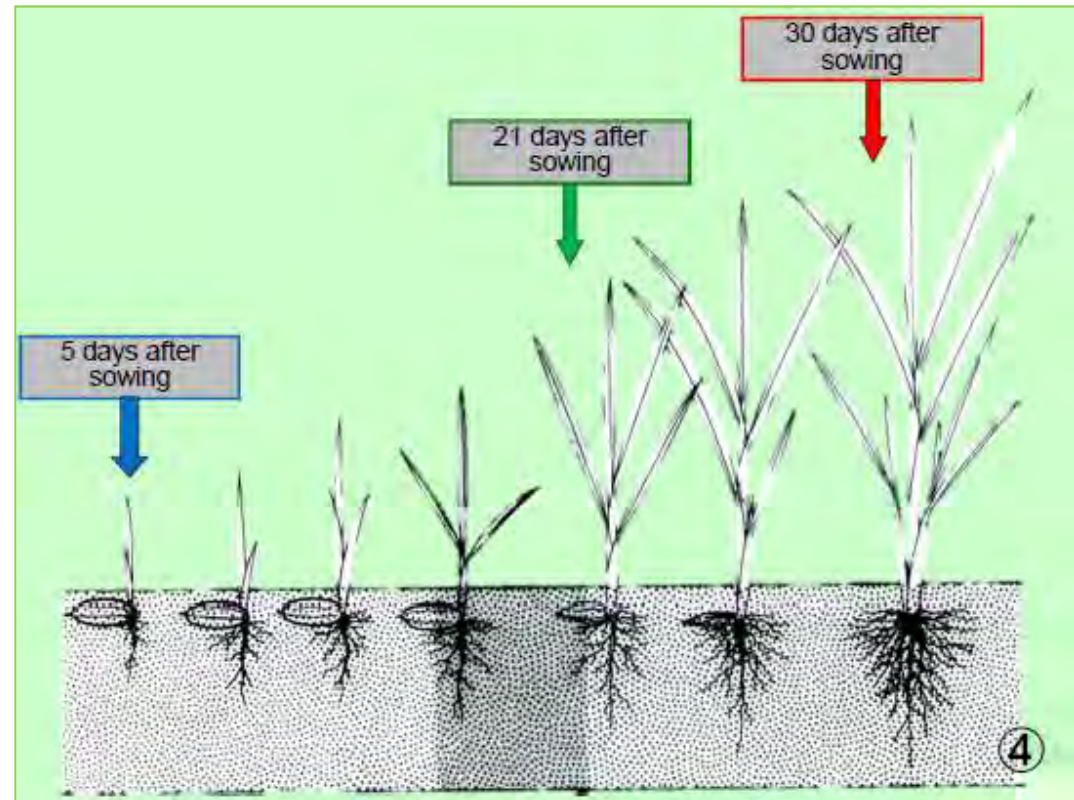


Prevention of bird damage

Back side

### Growth of seedling

1. 5 days after sowing, Seedlings emerge.
2. Although from 14 days after sowing, seedlings can be transplanted, optimum transplanting time is 21 days after sowing.



### **A note of caution**

If disease, for example “Blast”, is developed, fungicide should be sprayed.

If “Bakanae disease” appears, infected seedlings must be removed.



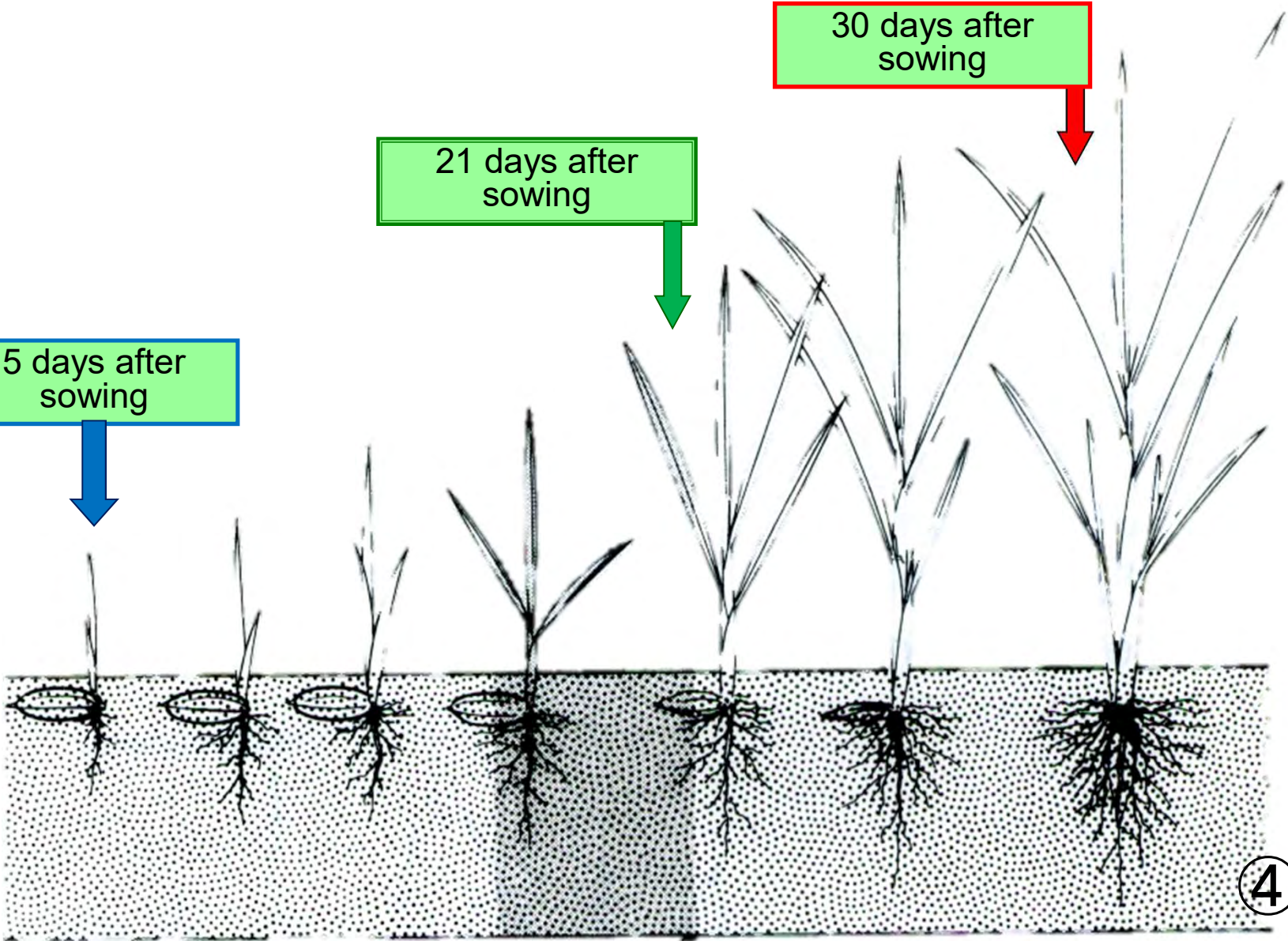
Face

RC OST 1-2-1

5 days after sowing

21 days after sowing

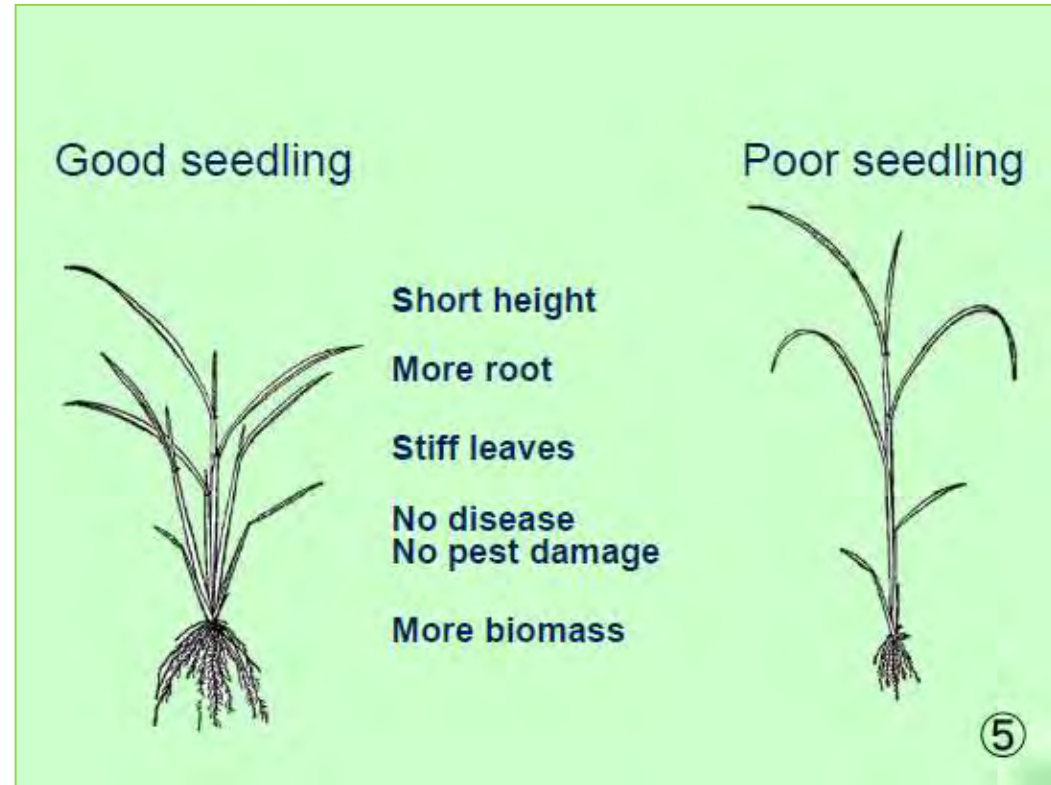
30 days after sowing



Back side

Properties for good seedling

1. Good seedling has short height, more root, stiff leaves and no disease and no pest damage .
2. Also good seedling has more biomass.



**A note of caution**

If sowing rate is higher, seedlings grow poorly and likely to develop fungus diseases.

## Good seedling



**Short height**

**More root**

**Stiff leaves**

**No disease  
No pest damage**

**More biomass**

## Poor seedling





Back side

- Prepare 20 - 25 kg of selected seed per 1 acre or 5 kg per  $\frac{1}{4}$  acre.

RC OST 1-2-2

## Direct Sowing

TENSUI RICE  
MOFA-JICA

- In situations where water is not enough for transplanting, the direct sowing method is selected.
- Also in case of the direct sowing, seeding is done in line.



MOFA/JICA TENSUI RICE

Rice  
Cultivation

# Direct Sowing

Back side

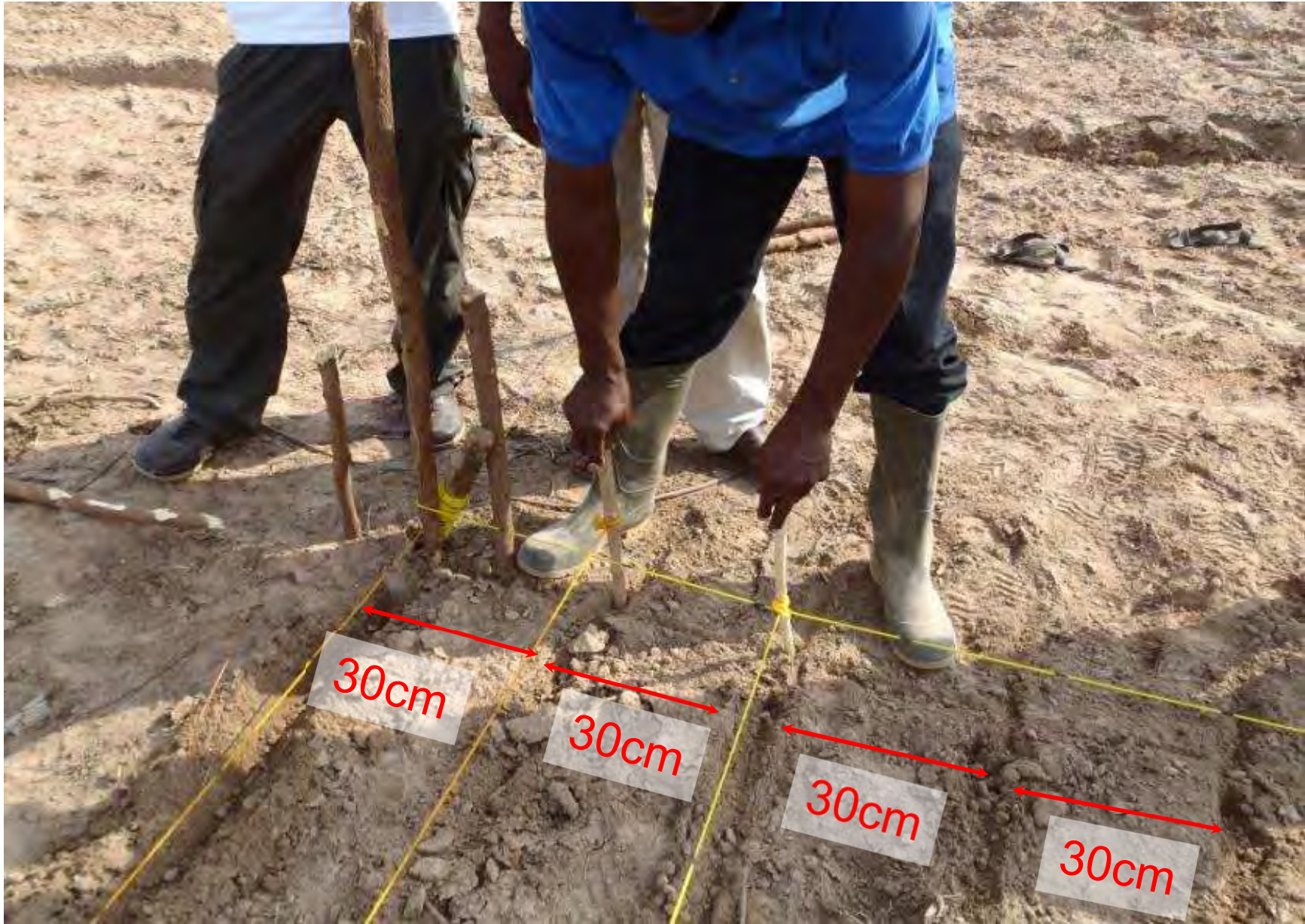
- ▶ String guide ropes in the field at 30 cm interval.





Face

RC OST 1-2-2



Back side

- ▶ Use hoe to create furrows before sowing.
- ▶ Seeding depth: 2 to 3 cm

Face



②



Face

RC OST 1-2-2



Back side

- ▶ Sowing method:  
Drilling
- ▶ Seeding depth: 3 to 4 cm

Face



③



Face

RC OST 1-2-2



Back side

- After sowing, cover seeds with soil well.
- If seeds are not properly covered, they are removed by birds.





Face

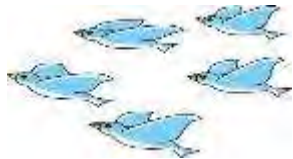


RC OST 1-2-2



Uncovered

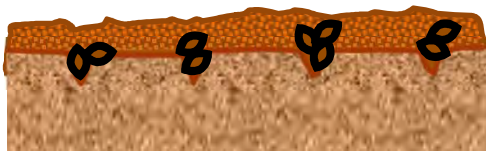
Covered



Damaged



Safe





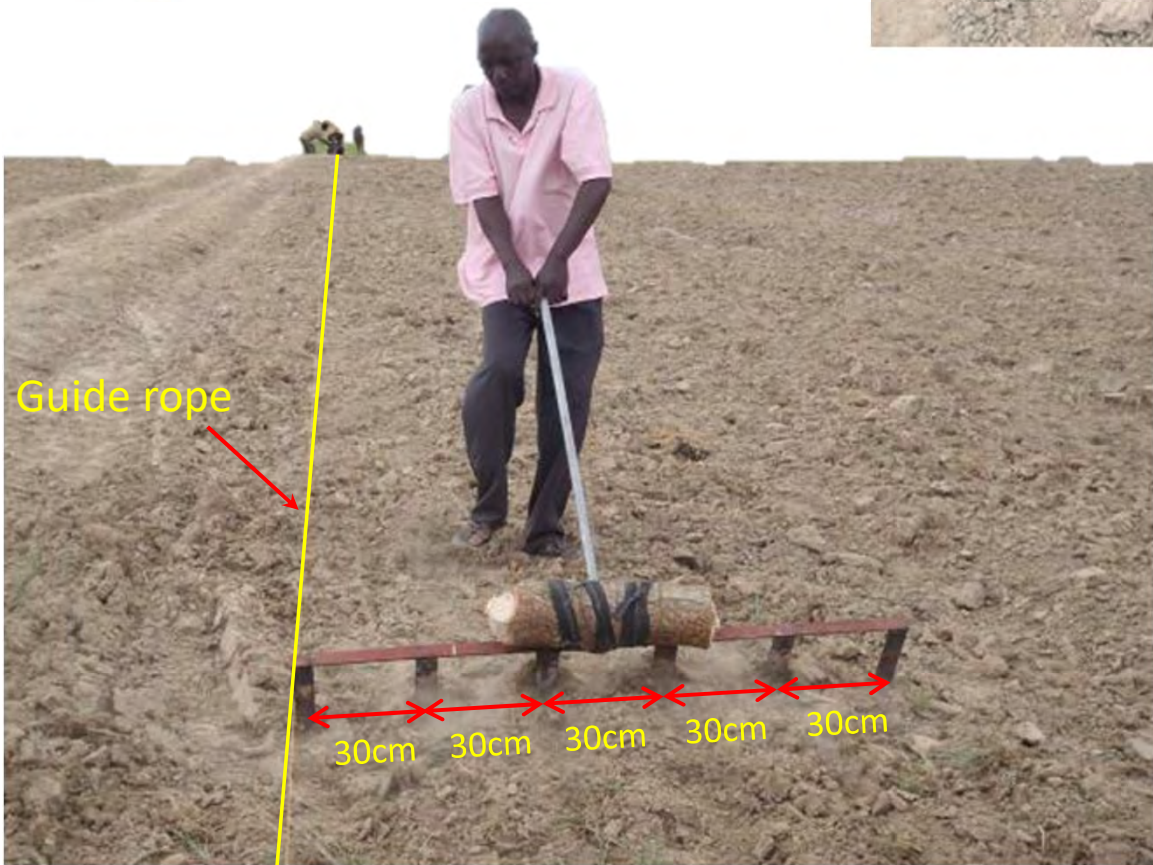
## Back side

- If the drawer is used, working time is reduced.
- When the drawer is used, soil surface should be even and well levelled by harrowing.
- Put a weight on the drawer for easy creation of furrows.



Face

RC OST 1-2-2



Back side

- Sowing time is at the beginning of rainy season.
- Avoid delayed sowing.
- Standing water in the field inhibits germination.

Face



- In case the moisture content of soil is too high or water is standing in the field partially, soak seed in water for two days to acquire higher germination ratio.
- Change water every 12 hours during soaking.



Face

RC OST 1-2-2



## Back side



- Apply pre-emergent herbicide when necessary.
- Apply the herbicide on the same day of sowing or within 2 days after sowing.

Face

### Herbicide

As necessary, apply pre-emergent herbicide.

- *Pendimethaline* (ACTIVUS 500 EC)



Volume of ACTIVUS : 1L / acre  
Volume of water : 80L / acre

Volume of ACTIVUS : 300 mL / 1/4 acre  
Volume of water : 30 L / 1/4 acre

⑦

- When using pre-emergent type herbicide, seed must be covered well with soil to prevent damage to emerging seedlings.
- If soil is too dry, the herbicide will not be effective and therefore avoid spraying in dry soil.
- ❑ The dilution ratio and spray volume are different from chemical to chemical.



# Herbicide

As necessary, apply pre-emergent herbicide.

- *Pendimethaline* (ACTIVUS 500 EC)

Volume of ACTIVUS : 1L / acre

Volume of water : 80L / acre



Volume of ACTIVUS : 300 mL / 1/4 acre

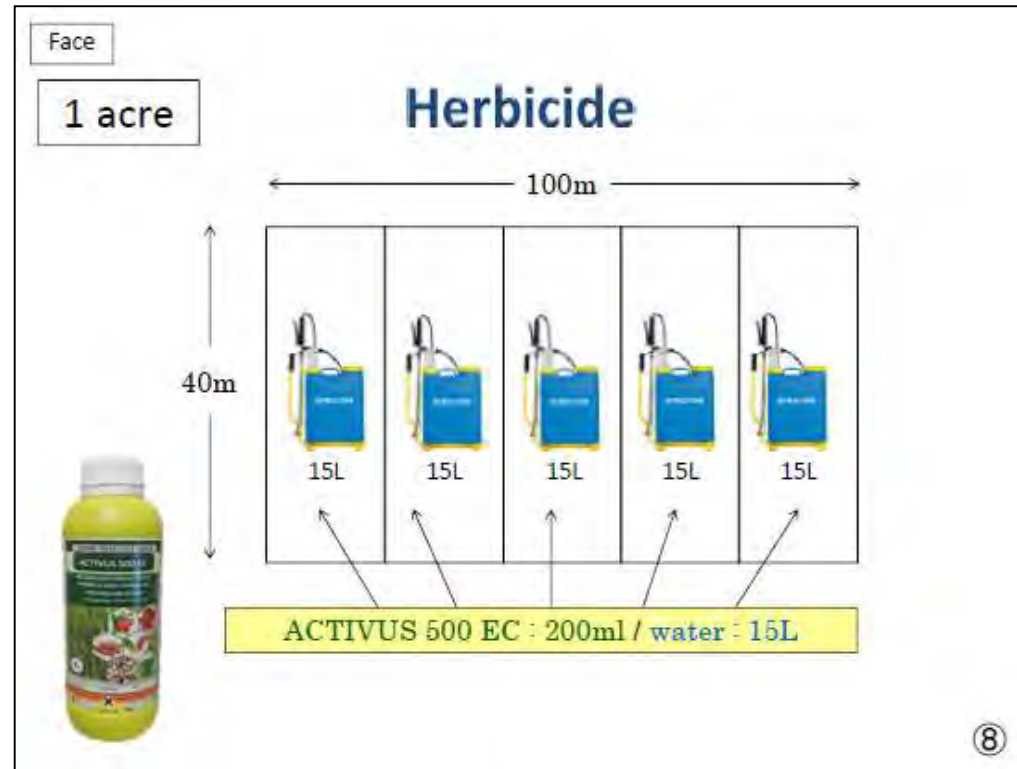
Volume of water : 30 L / 1/4 acre

Back side

## Method of spraying the herbicide

[Example] ACTIVUS 500EC

- Prepare 80 litres of water and 1 litre of the herbicide for 1 acre.



- First mix 15 litres of water and 200 mL of the herbicide and spray it to 1/5 of 1 acre field.
- Then mix another 15 litres of water and 200 mL of the herbicide and spray it to next 1/5 of the field.
- Repeat it 3 more times.

Face

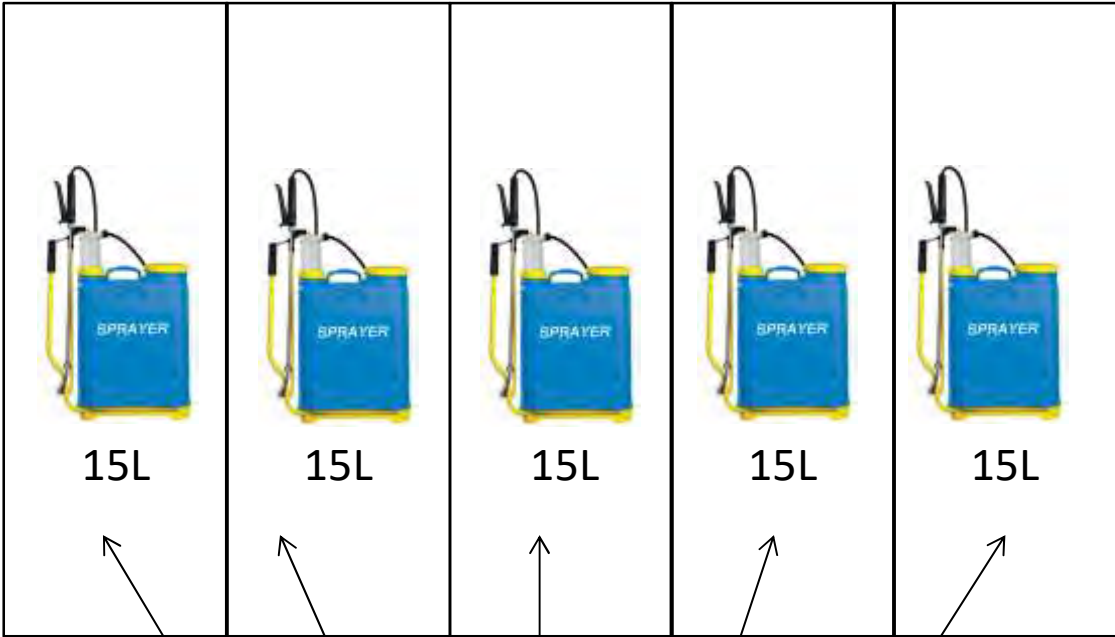
RC OST 1-2-2

1 acre

# Herbicide

← 100m →

40m



ACTIVUS 500 EC : 200ml / water : 15L

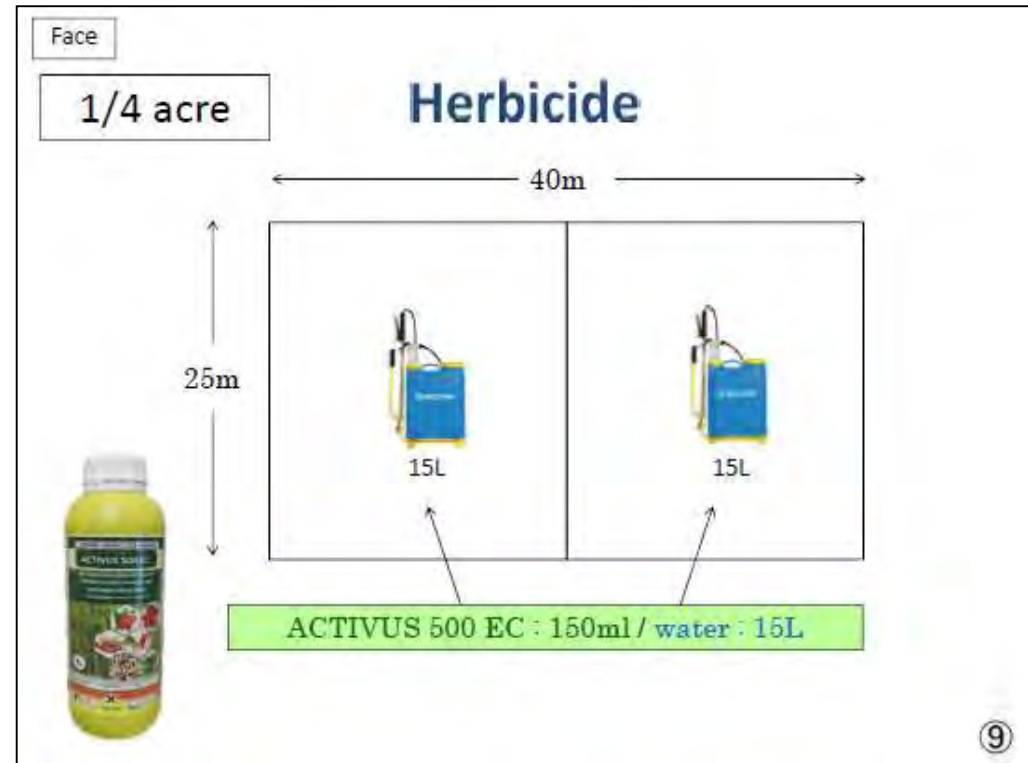


Back side

## Method of spraying the herbicide

[Example] ACTIVUS 500EC

- Prepare 80 litres of water and 250 mL of the herbicide for 1/4 acre.



- First mix 15 litres of water and 150 mL of the herbicide and spray it to the first half of a 1/4 acre field.
- Then mix another 15 litres water and 150 mL of the herbicide and spray it to the other half of the field.

Face

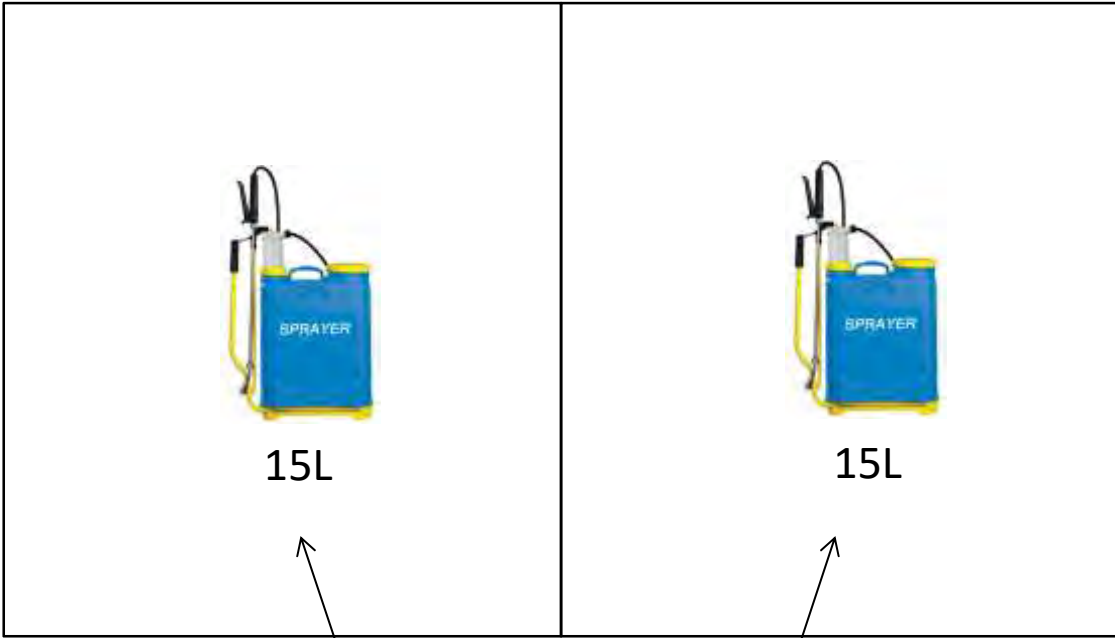
RC OST 1-2-2

1/4 acre

# Herbicide

← 40m →

↑ 25m ↓



ACTIVUS 500 EC : 150ml / water : 15L



Back side

## MERITS OF TRANSPLANTING

- It is easy to arrange the number of hills per area to attain planned number of panicles.
- Good and strong seedlings can be selected.
- Transplanted seedlings grow faster and compete well with weeds.
- Weeding can be easier because push weeder can be utilized.
- Right amount of seed is used.
- Growing period can be shorter compared to direct sowing.

Face

## Transplanting

MOFA-JICA Project  
TENSUI RICE PROJECT  
Sustainable Development of Rain-fed Lowland Rice Production





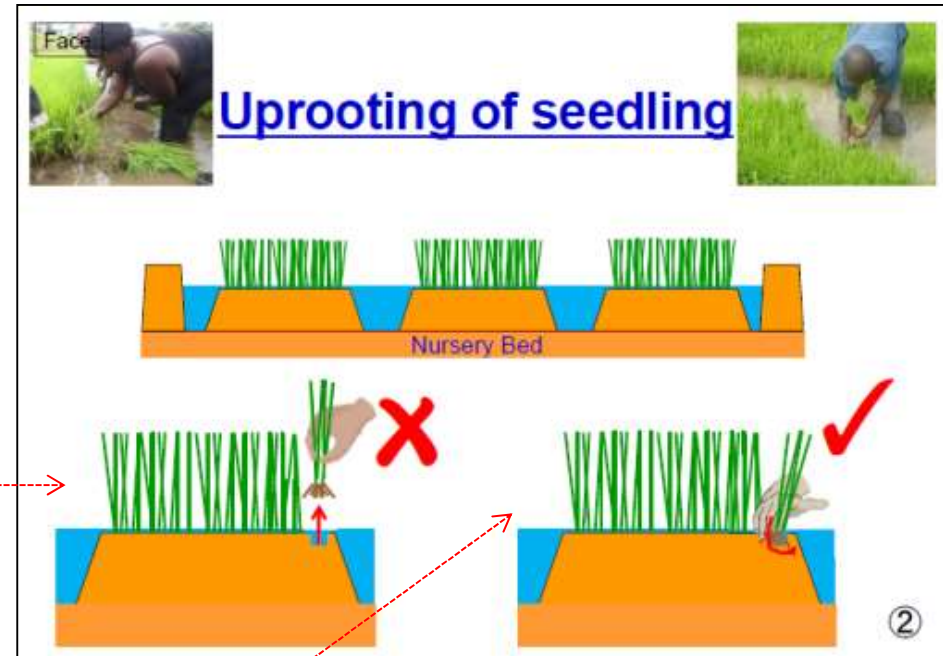
# Transplanting



1

Back side

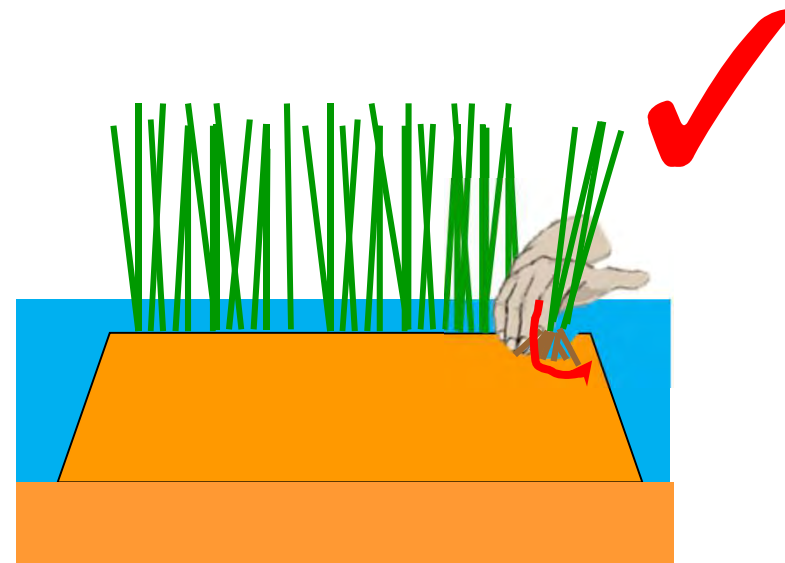
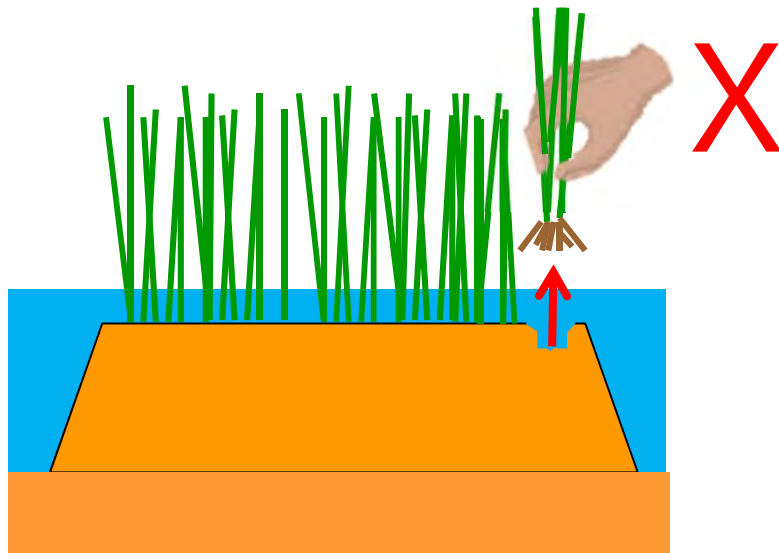
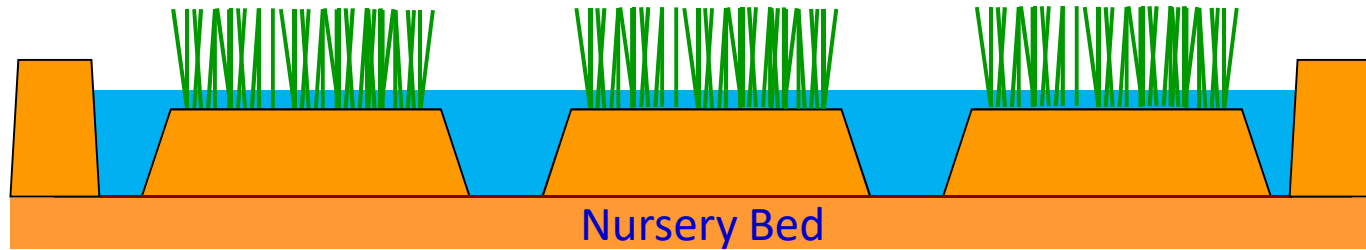
1. Water the surface of nursery bed to soften soil before uprooting.
2. Remove seedlings from the nursery bed gently and carefully taking care not to damage roots.
3. Do not pull out seedlings from the nursery bed. Remove seedlings with a ball of soil.



### The important point

- Ensure minimum damage of roots during uprooting.

# Uprooting of seedling





Back side

- Seedlings are bundled in proper size.
- Do not leave uprooted seedlings more than one day.
- Do not transplant older seedlings such as the one past more than 1 month after sowing.





Face

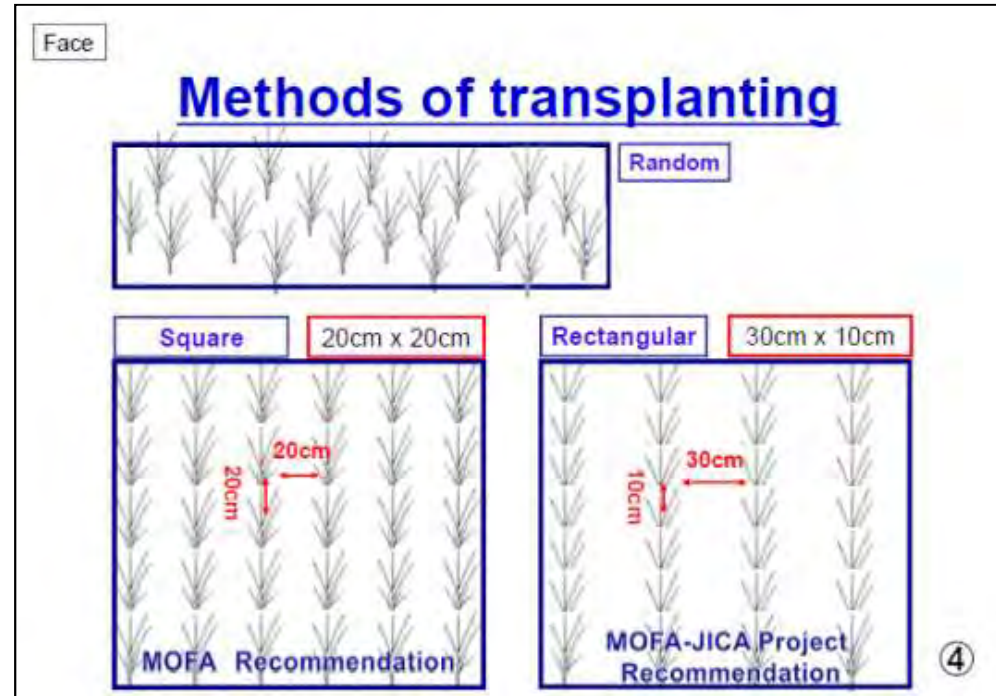


RC OST 1-3



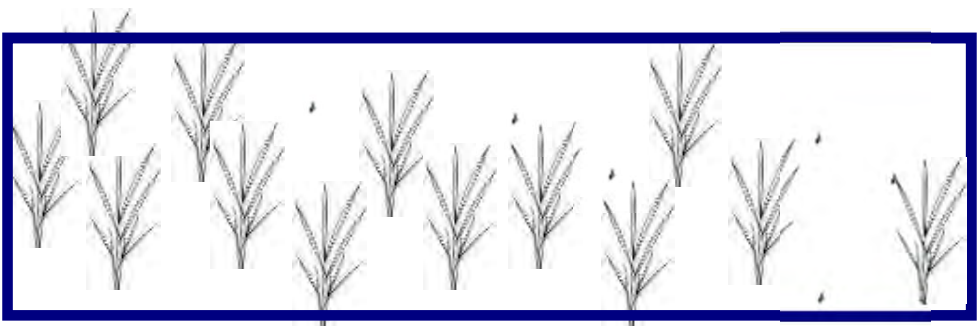
Back side

- Merit of Row planting
  1. Crop management after transplanting is easier.
    - i. Weeding
    - ii. Pest management
    - iii. Fertiliser application
  2. Optimum planting density can be cultivated and sufficient panicle number is also assured.
- Method of transplanting is divided into Random planting and Row planting.
- Moreover, Row planting is separated into Square planting and Rectangular planting.

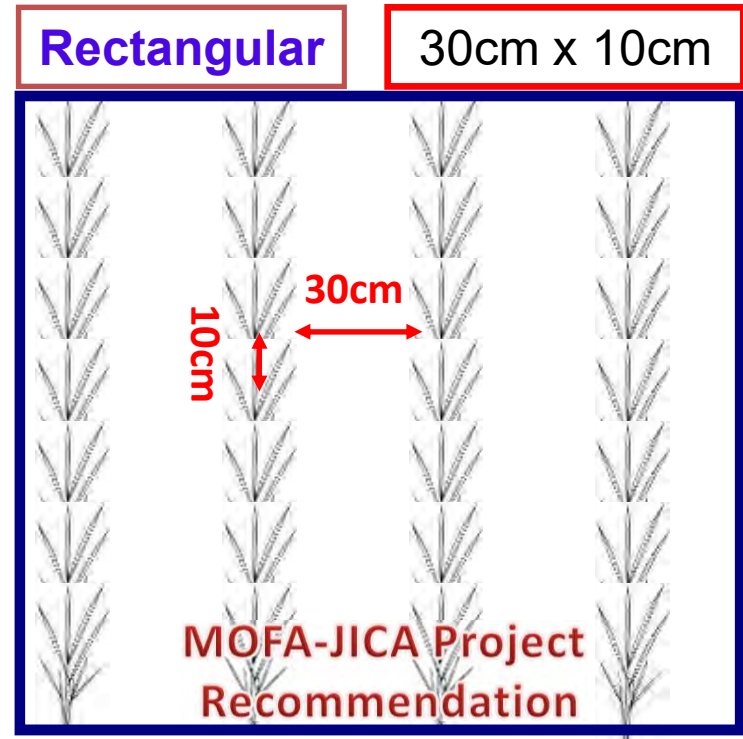
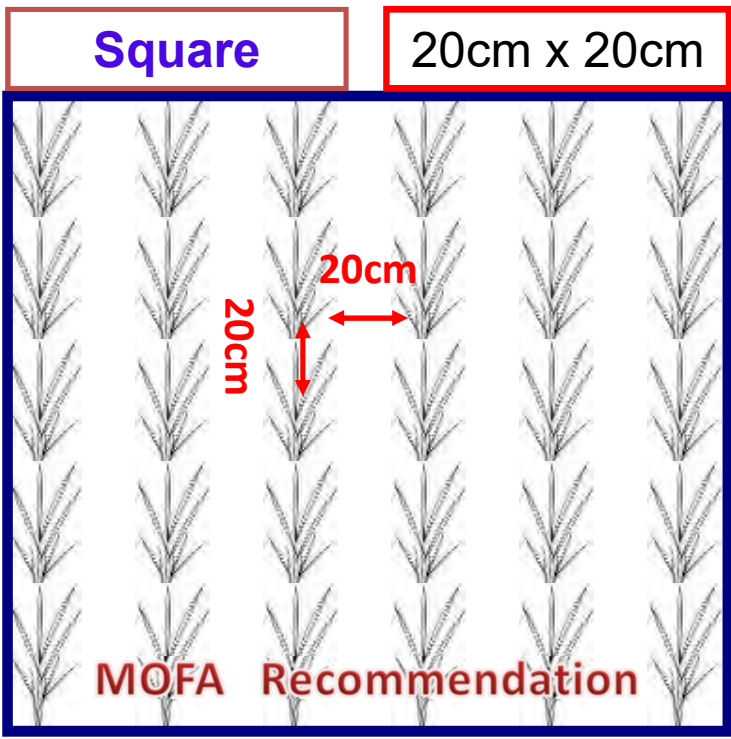


1. Random transplanting
2. Row transplanting
  - ① Square planting
  - ② Rectangular planting

# Methods of transplanting



Random

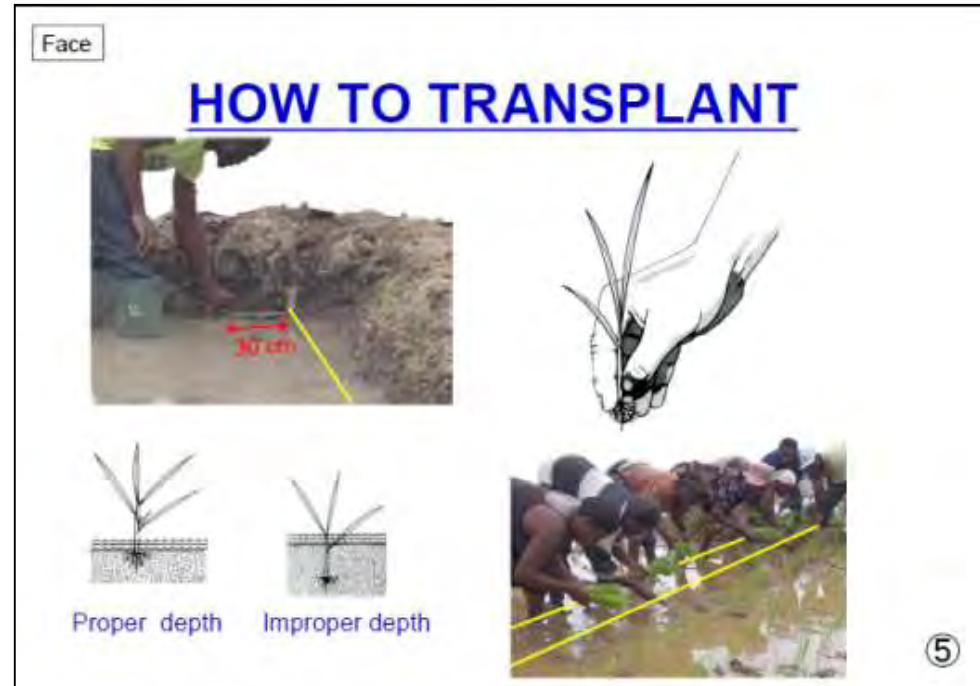




Back side

## HOW TO TRANSPLANT

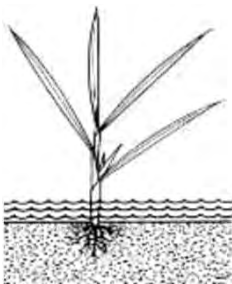
- Use a guide rope for transplanting.
- Seedlings are planted in line according to the guide rope.
- Hold seedlings closer to the base as possible..
- Transplant at most four (4) and not less than three (3) seedlings at a hill.
- Plant the seedlings 2 - 3 cm deep in soil.



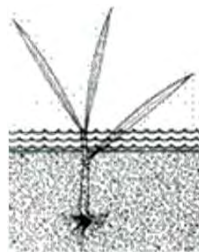
- Row distance is 30 cm and hill distance is 10 cm.
- In case of Certified Seed Production, Row distance is 30 cm and hill distance is 15 cm.



# HOW TO TRANSPLANT



Proper depth

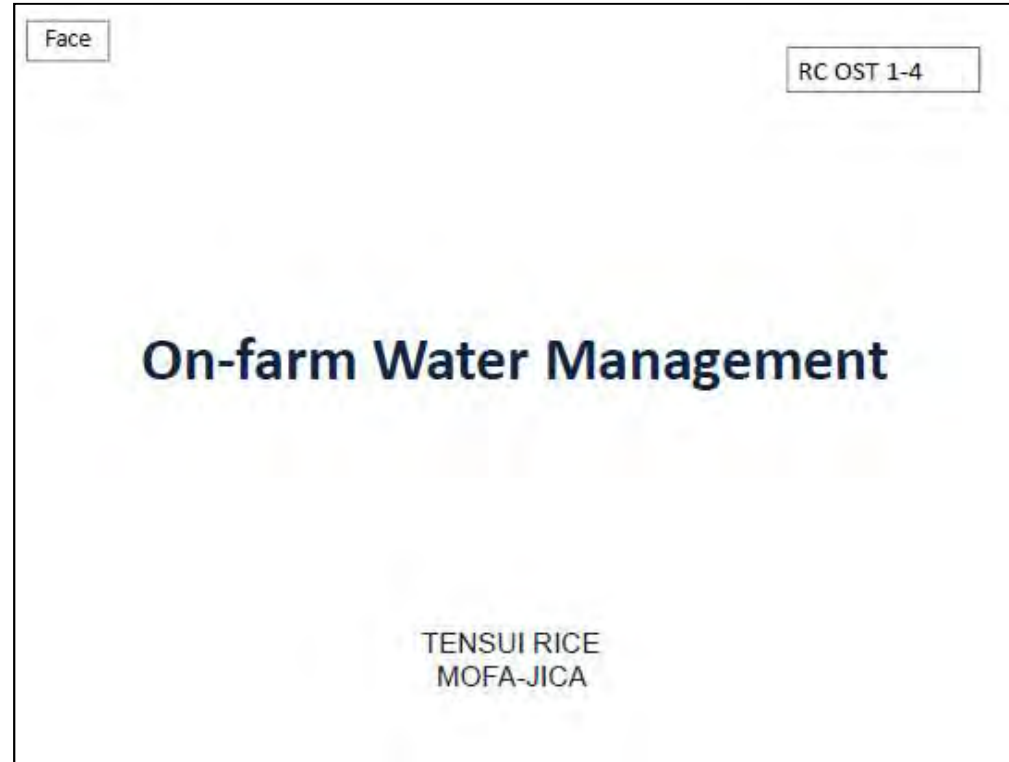


Improper depth





Back side



- Required water level depends on the each growth stage of rice plant.



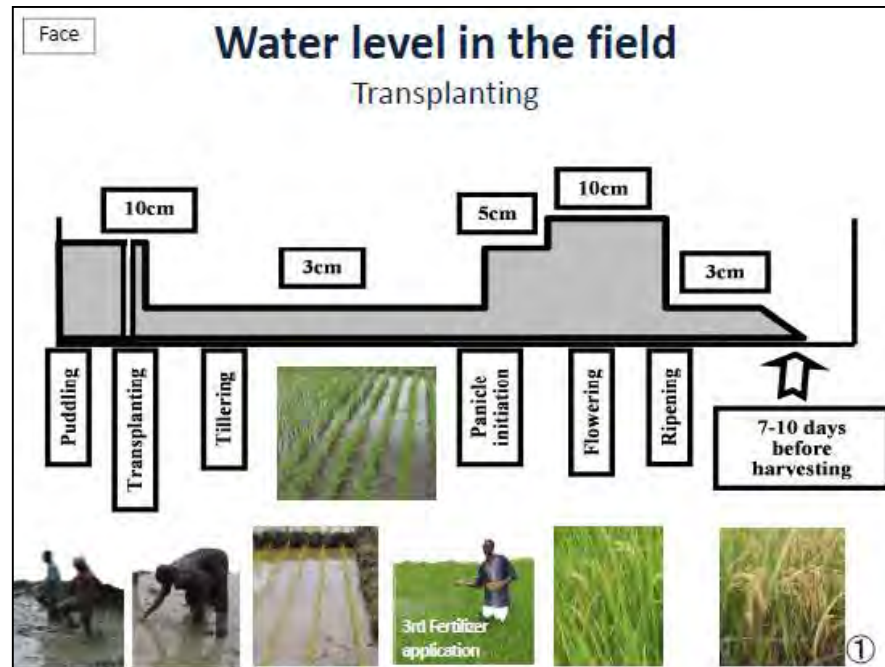
MOFA/JICA TENSUI RICE

Rice  
Cultivation

# On-farm Water Management

### Back side

- Under the rain-fed condition, on-farm water management is not easier as compared to the irrigation condition.
- However, it is important to understand an ideal way of on-farm water management and to carry out optimum water management as much as possible to maintain good growth condition.



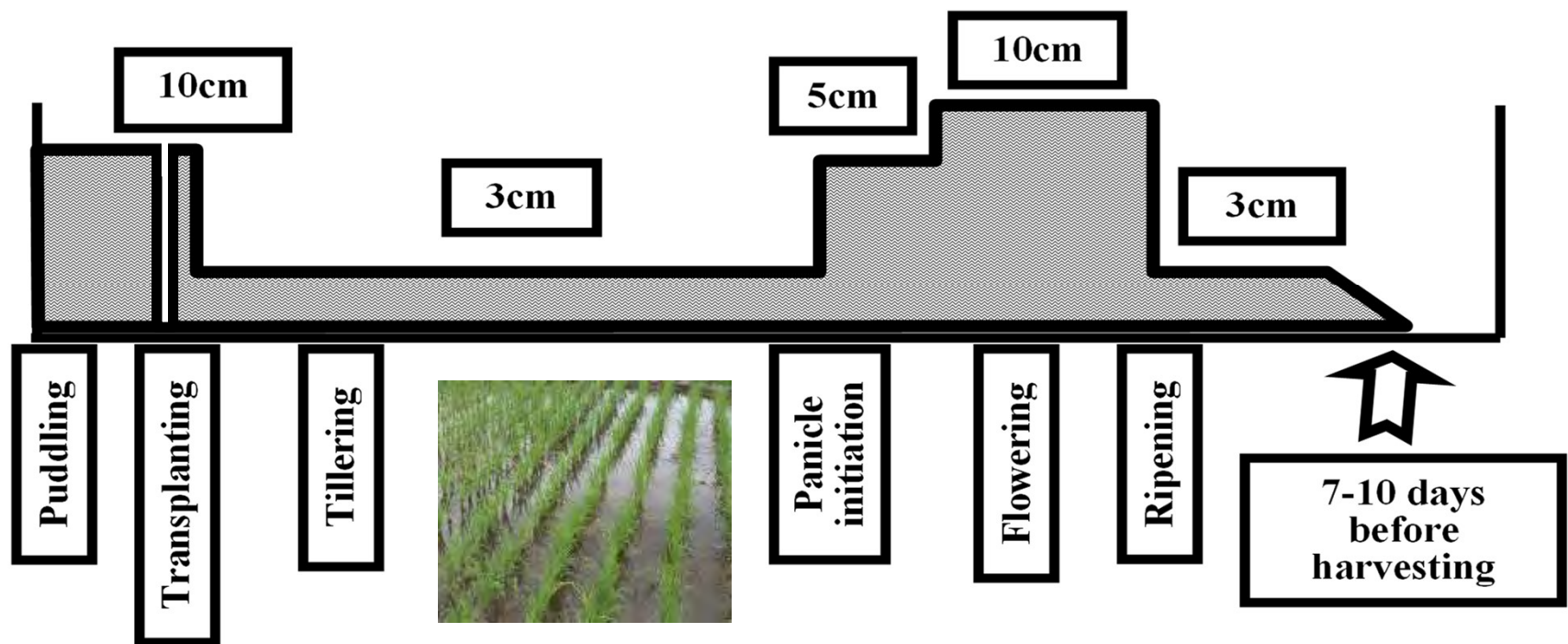
1. Maintain 10 cm depth of water at paddling and drain water during planting.
2. maintain 10 cm depth of water again for a few days after transplanting in order to protect the seedlings from wilting.
3. After that maintain 3 cm depth of water up to panicle initiation stage (at 3<sup>rd</sup> fertiliser application time).
4. Maintain 5 cm depth of water between panicle initiation stage and heading time.
5. After heading time maintain 10 cm depth of water for 2 weeks.
6. Then maintain 3cm depth of water for 1 week and drain 7 or 10 days before harvesting.

Face

RC OST 1-4

# Water level in the field

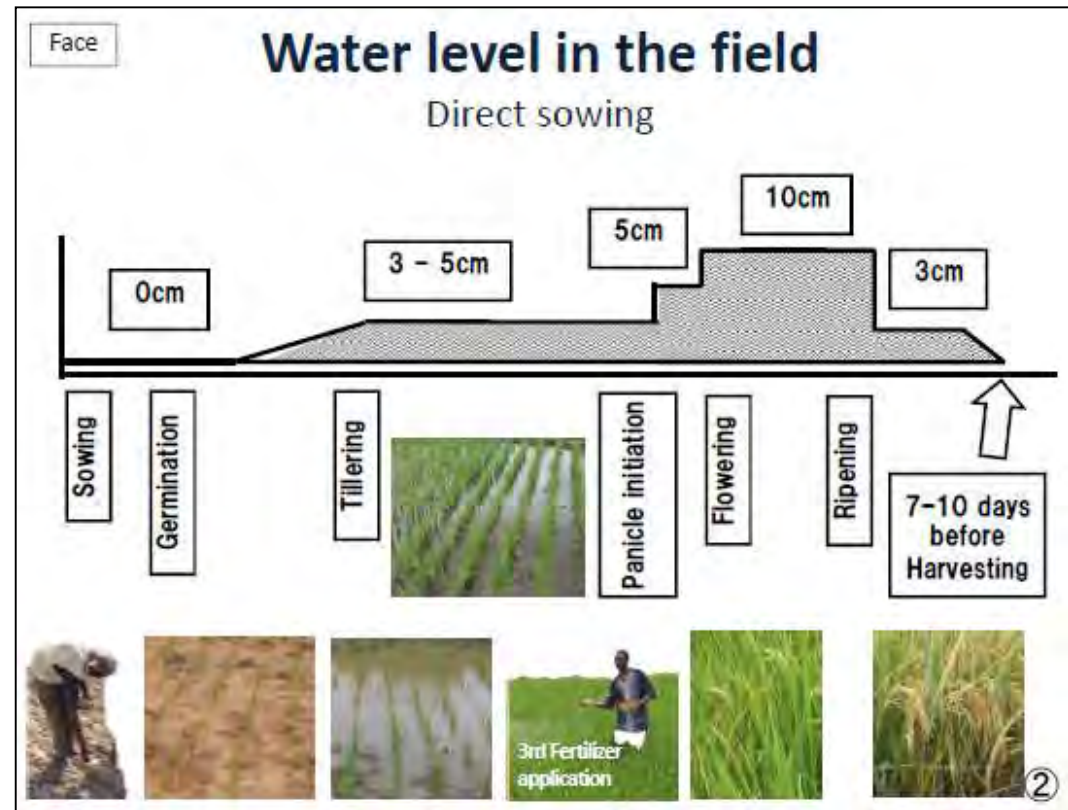
## Transplanting



①

## Back side

- In direct sowing cultivation, on-farm water management is more difficult than that in transplanting cultivation.
- However, it is important to understand an ideal way of on-farm water management and to try to collect and keep water in the field as much as possible for maintaining good growth condition.

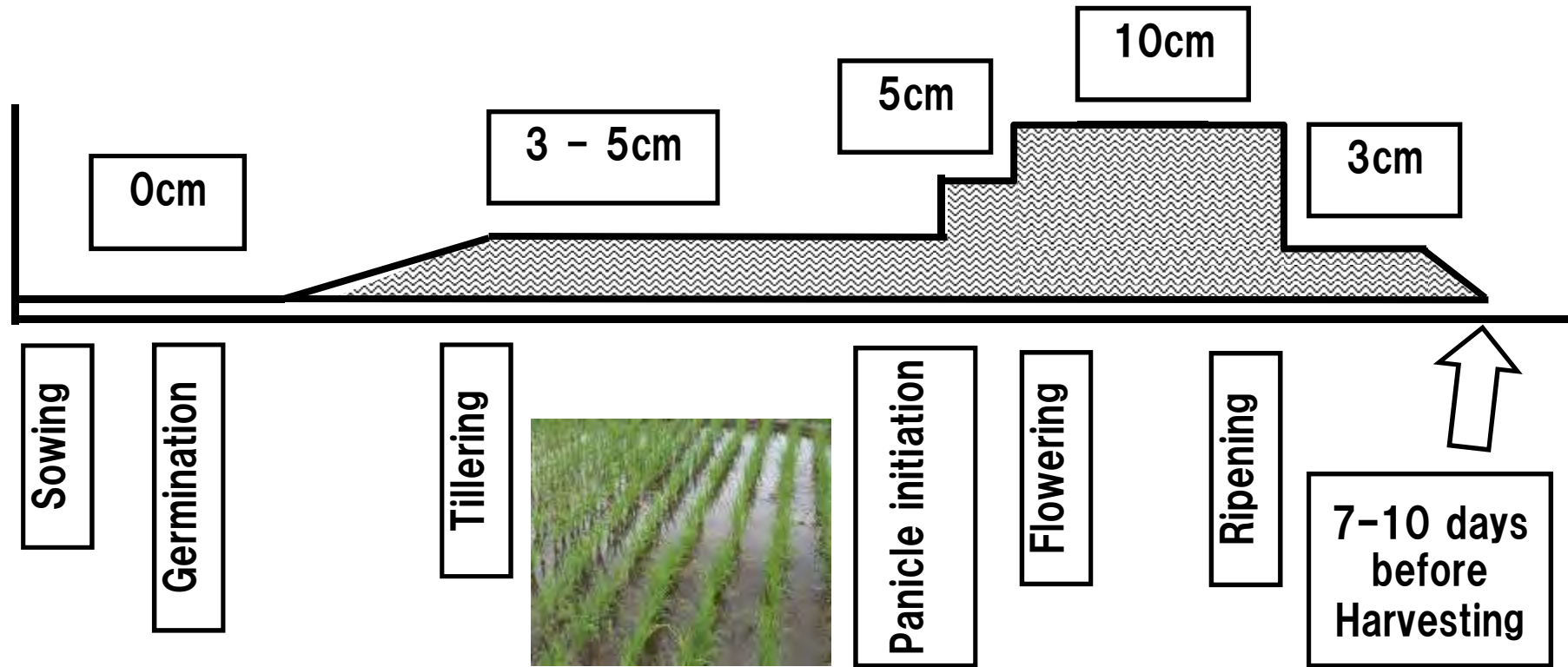


1. Increase water level gradually after germination.
2. Keep 3 – 5 cm depth of water up to panicle initiation stage (at 3<sup>rd</sup> fertiliser application time).
3. Keep 5 cm depth of water between panicle initiation stage and heading time.
4. After heading time keep 10 cm depth for 2weeks.
5. Then keep 3cm for 1 week and drain 1 week or 10 days before harvesting.



# Water level in the field

Direct sowing



Sowing

Germination

Tillering



Panicle initiation

Flowering

Ripening

7-10 days before Harvesting



# Discuss with the farmers:

- What is Farm management?
- How do you manage Demo-plot and your own plot as business venture?

FM-OST-1

Sustainable Development of Rain-fed Lowland Rice Production

JICA

MOFA/JICA TENSUI RICE PROJECT

**Farm management is fun!!**

How do you manage Demo-plot and your own plots as business venture?

Farm Management

Page 1(Front)

Sustainable Development of Rain-fed Lowland Rice Production  
MOFA/JICA TENSUI RICE PROJECT



MOFA/JICA TENSUI RICE

# Farm management is fun!!

Farming  
Management

How do you manage Demo-plot and  
your own plots as business venture?

# Discuss with the farmers:

- Explain the cycle of Farm management. After one cropping season ends, a new season will start upon the review of the previous season.
- Repeating this cycle will keep improving your Farm management skill!







# Discuss with the farmers

- Do you know the demand in the market?  
Aromatic? Non-aromatic?

1. Let's get information!

Which type of rice is most liked by buyers?



Page 3(Front)

## 1. Let's get information!

**Which type of rice is most liked by buyers?**



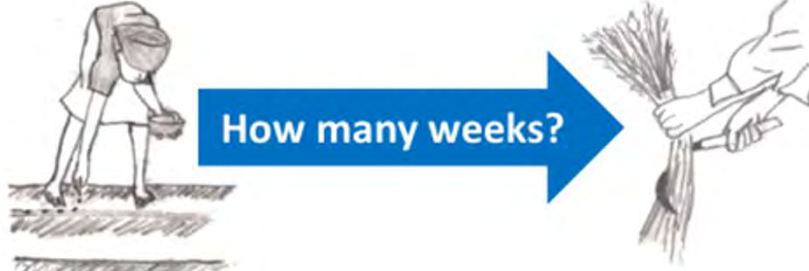
# Discuss with the farmers

- Do you know how long it takes for the variety you are growing to come to maturity?

Example: Jasmine 85,  
120-130 days (18 weeks)  
from sowing to  
harvesting.

**1. Let's get information!**

**Which variety is convenient in terms of cultivation period?**



How many weeks?

Page 4(Front)

## 1. Let's get information!

**Which variety is convenient in terms of cultivation period?**



**How many weeks?**

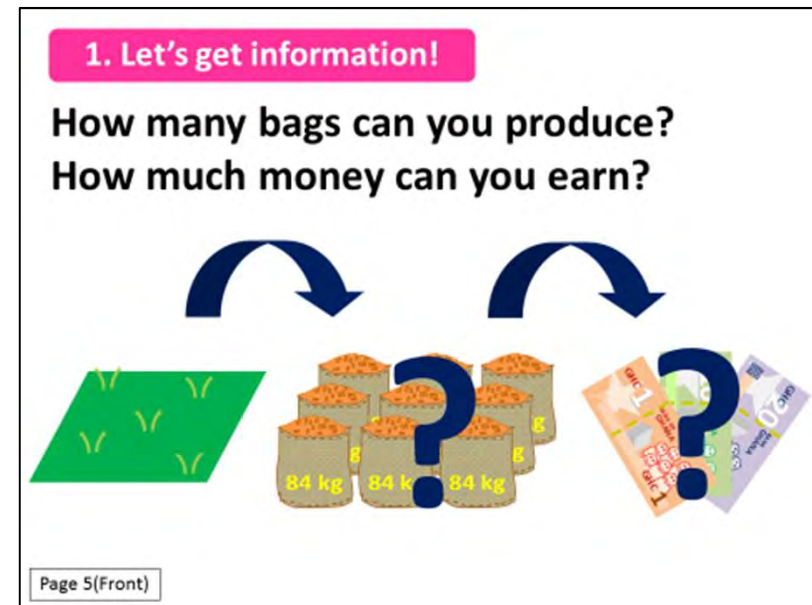


# Discuss with the farmers:

- Do you know how many bags you can harvest per unit area of the variety you want to grow?
- Do you know how much money you can earn from production of the variety you want to grow?

Yes or no, if you don't know, try to find the answers.

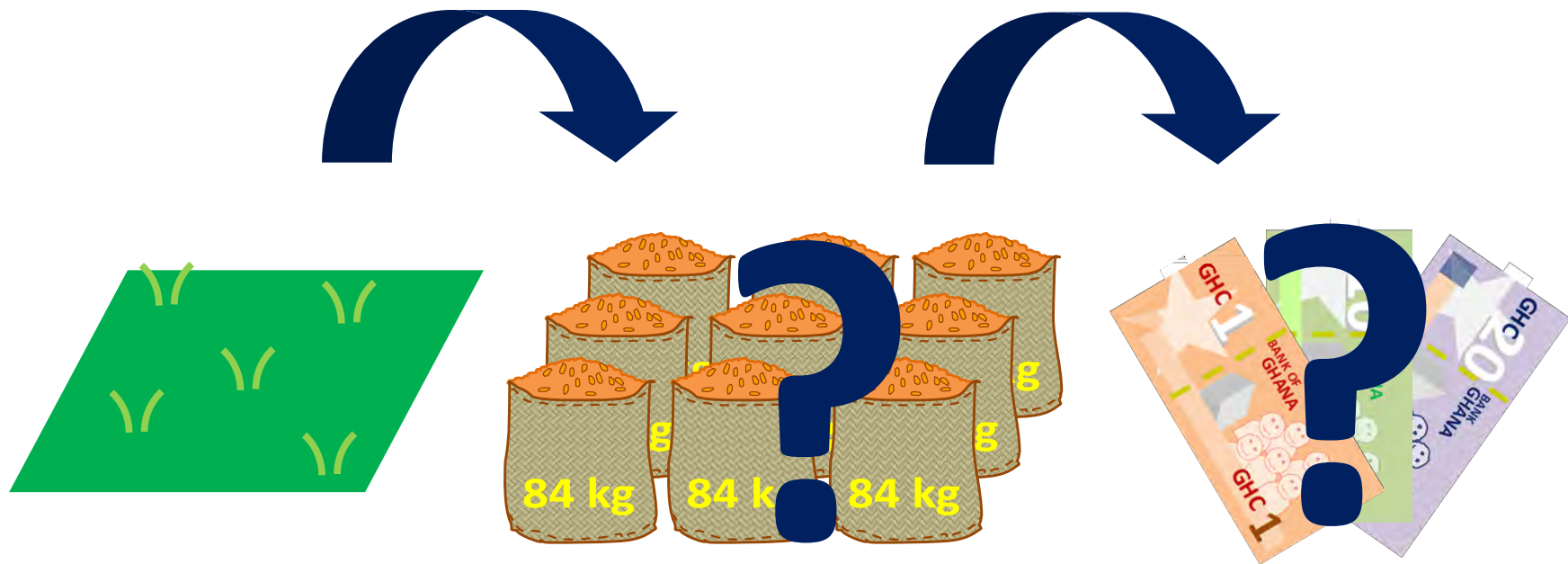
With all such information (market preference, characteristics of the varieties you want to grow, expected income), you can compare several varieties and take a decision!





## 1. Let's get information!

**How many bags can you produce?**  
**How much money can you earn?**



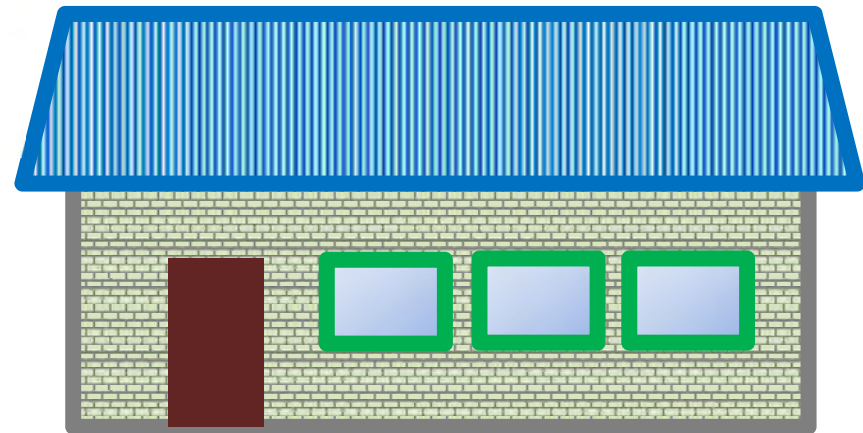
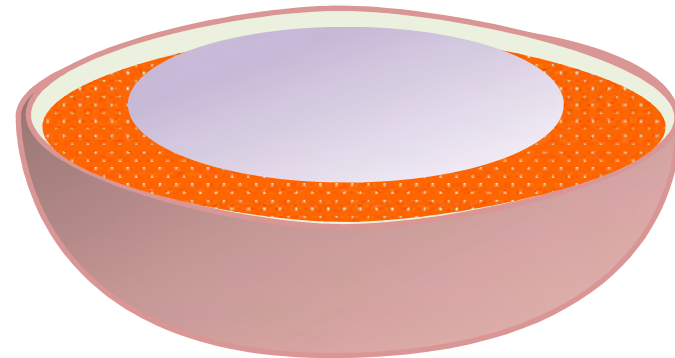
# Discuss with the farmers:

- Education for children?
- Building a house?
- Food?
- What else?



2. Let's set a target!

What is your dream?



# Discuss with the farmers:

- To make your dream come true, how much do you need?

**2. Let's set a target!**

**How much do you need?**



Page 7(Front)

## 2. Let's set a target!

# How much do you need?





# Discuss with the farmers:

- To earn the money for your dream, how much do you need to produce?
- To produce the targeted yield, how many acres do you need to cultivate?

**2. Let's set a target!**

**What is the target yield and area size you need to cultivate?**

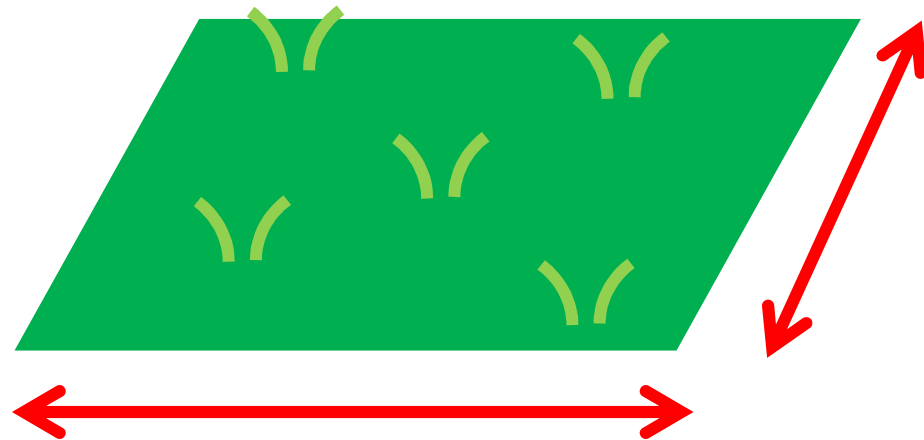
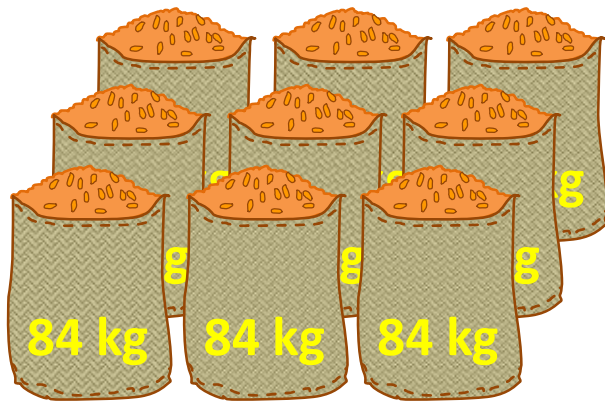


The diagram illustrates the relationship between crop yield and cultivation area. On the left, there are ten bags of grain, each labeled '84 kg'. On the right, there is a green rectangular field with yellow sprouts growing in it. Red double-headed arrows indicate the length and width of the field, representing the area to be cultivated.

Page 8(Front)

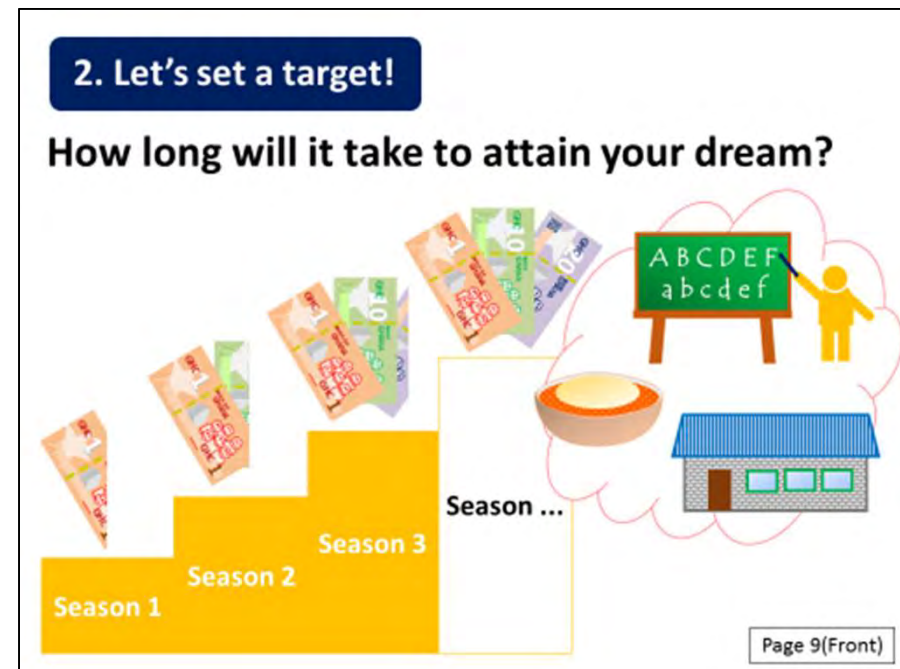
## 2. Let's set a target!

**What is the target yield and area size you need to cultivate?**



# Discuss with the farmers:

- How long will it take to make the dream come true?
- How many seasons/year can you cultivate rice?
- How much can you earn in each cropping season?



## 2. Let's set a target!

# How long will it take to attain your dream?




# Discuss with the farmers:

- What are the necessary inputs needed to cultivate unit area?
- Encourage farmers to cost each inputs and calculate the total

**3. Let's make a plan!**

**Let's budget what you want to do!**

| Items | Unit | Quantity | Unit cost (GHC) | Sub-total |
|-------|------|----------|-----------------|-----------|
|       |      |          |                 |           |
|       |      |          |                 |           |
|       |      |          |                 |           |
|       |      |          |                 |           |
|       |      |          |                 |           |
|       |      |          |                 |           |
| TOTAL |      |          |                 |           |



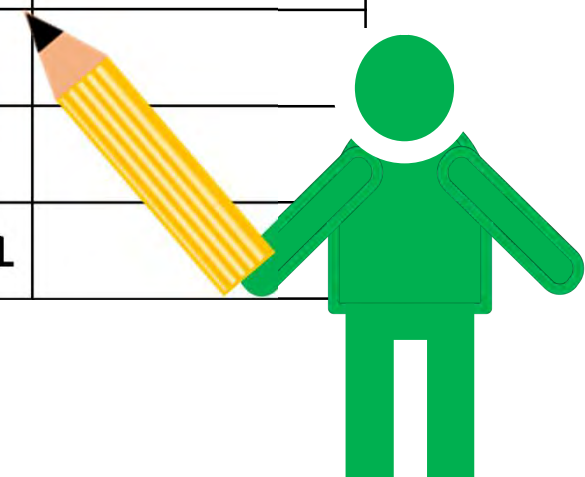
Page 10(Front)



### 3. Let's make a plan!

# Let's budget what you want to do!

| Items        | Unit | Quantity | Unit cost (GHC) | Sub-total |
|--------------|------|----------|-----------------|-----------|
|              |      |          |                 |           |
|              |      |          |                 |           |
|              |      |          |                 |           |
|              |      |          |                 |           |
|              |      |          |                 |           |
|              |      |          |                 |           |
| <b>TOTAL</b> |      |          |                 |           |



# Discuss with the farmers:

- What do you have, what you don't have?
- How do you make up for what you don't have?



3. Let's make a plan!

But our resources are limited...



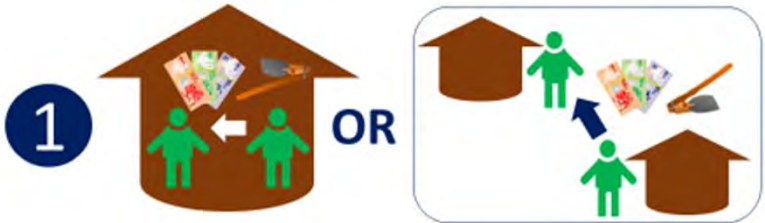
# Discuss with the farmers:

1: Get loan from family members or village members

2: Make use of micro-finance, take inputs from block-farm programme (MOFA)

**3. Let's make a plan!**

How do you make up for what you don't have?

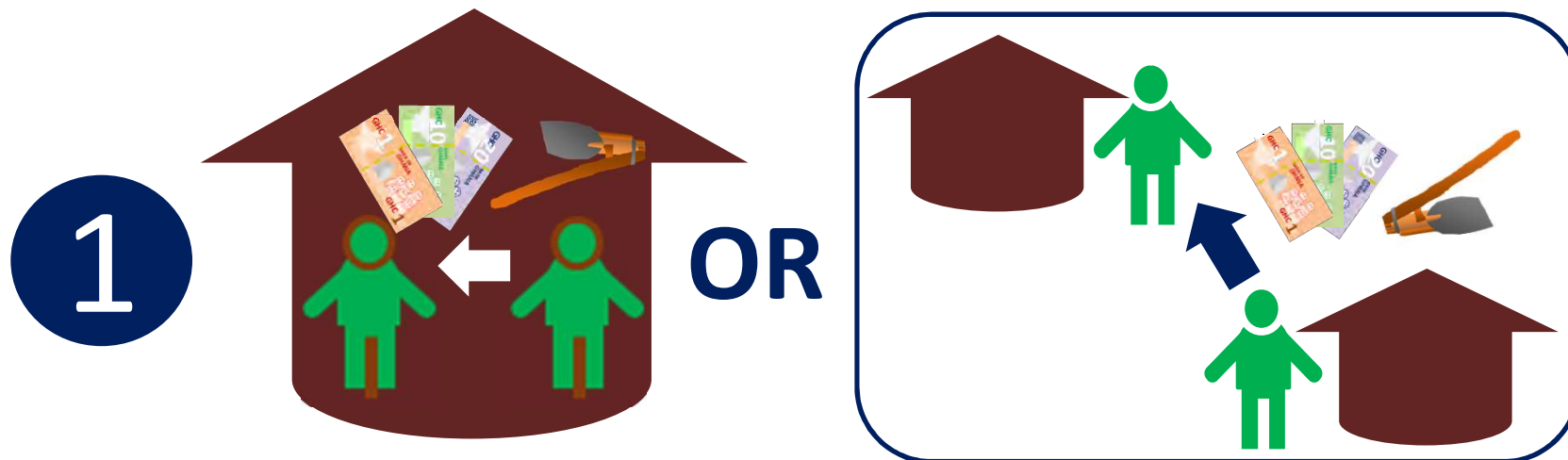
**1**  **OR**

**2** Micro-finance??  
Block-farm programme??

Page 12(Front)

### 3. Let's make a plan!

How do you make up for what you don't have?



**2** Micro-finance??

Block-farm programme??



# Discuss with the farmers:

- What are advantages of working in a group (“Noaboa system” in Ashanti, “Lagm-gbai, lagm-gbiba” in Northern)?

1. Cooperative work (no cash payment except for food)
2. Group input acquisition (saving transportation cost)
3. Group accessing to tractor services (strengthening bargaining power, only for Northern region)
4. Equipment/tools sharing
5. Group marketing (strengthening bargaining power, saving transportation cost, etc.)

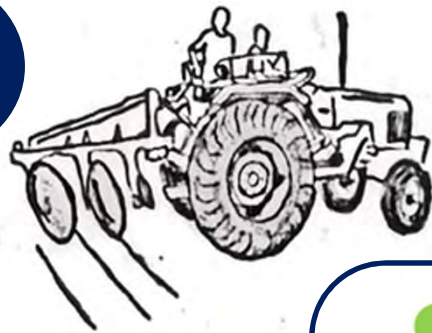
- Ideal number should be 8-15 members per group



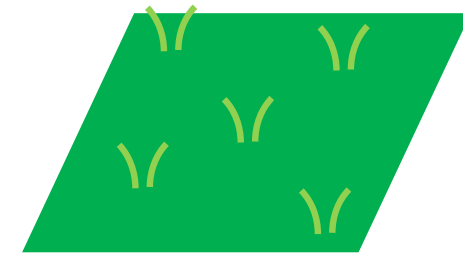
### 3. Let's make a plan!

How do you make up for what you don't have?

3



Tractor access



Demo-plot management



Input procurement



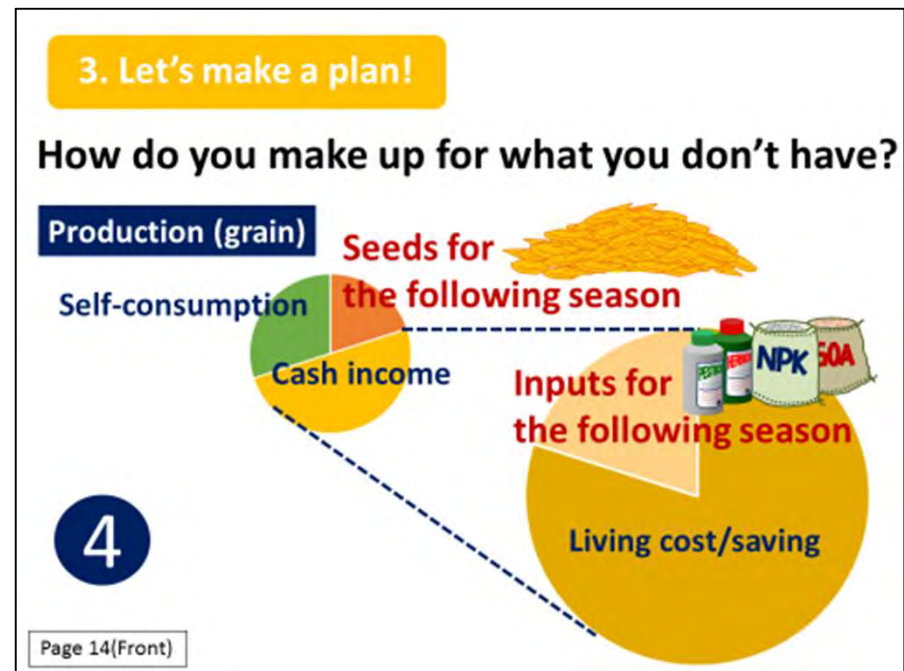
Leader



Marketing

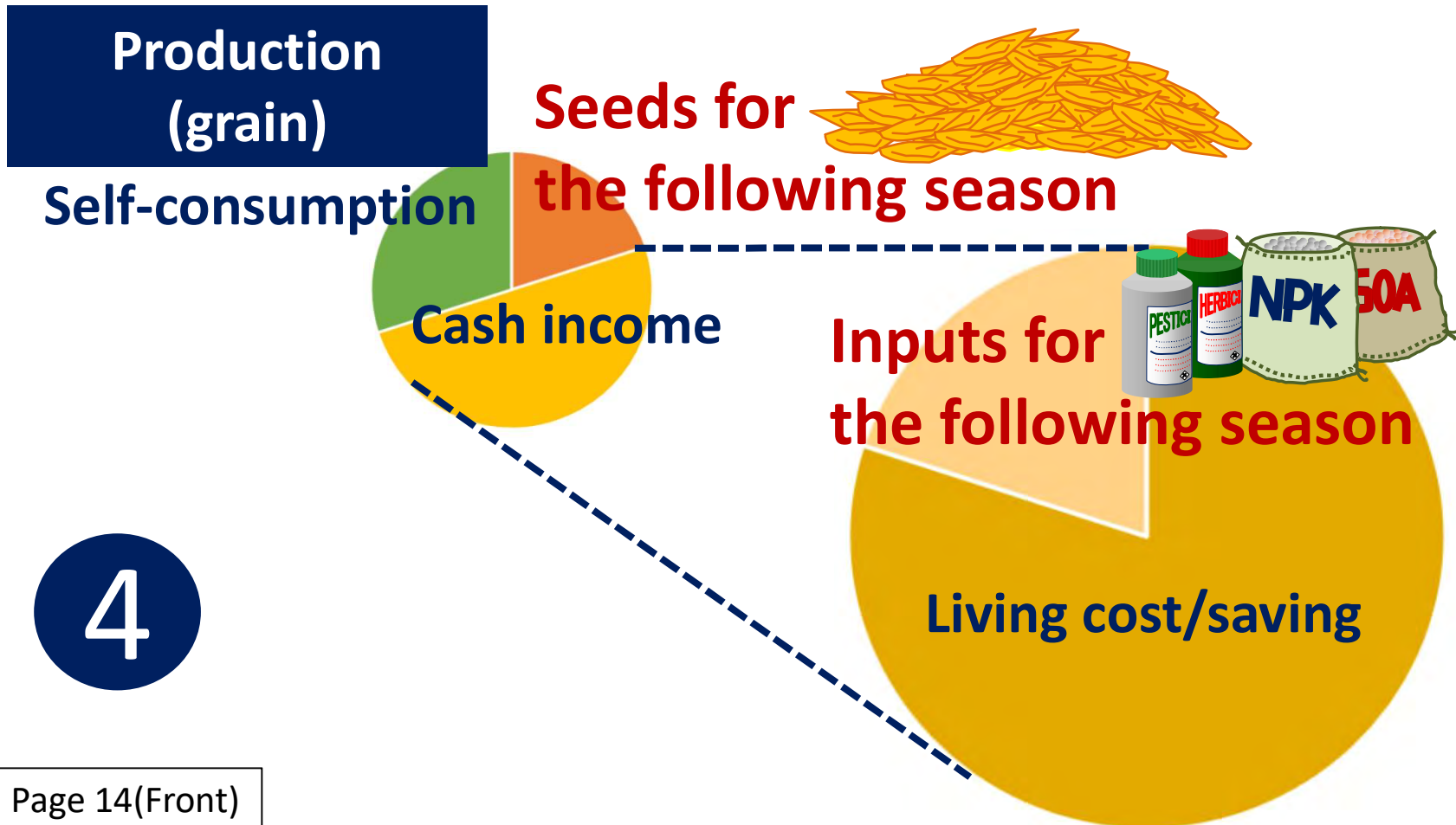
# Discuss with the farmers:

- How do you increase saving?
- Are you saving any portion of your income?
- Then, spend income to purchase inputs for the following season to cope with yearly price increase!



### 3. Let's make a plan!

## How do you make up for what you don't have?





# Discuss with the farmers:

- Do you know which inputs are needed for each activity?
  - See Sample action plan
- Do you know when you should carry out each activity?
  - See Sample action plan and

Rice cropping calendar

– Let's prepare Action plan!

-Action plan format can be used

3. Let's make a plan!

Action plan and Rice cropping calendar

| Field work             | Time frame | Tool and inputs                 |
|------------------------|------------|---------------------------------|
| Land clearing          | 3 weeks    | Cutlass                         |
| Seed preparation       | 1 week     | Seeds, salt, egg, bucket, sieve |
| Sowing                 | Week 0     | String, stick, hoe              |
| Transplanting          | 3 weeks    | gardenline                      |
| Weeding                | 5-10 weeks | Push weeder                     |
| Fertilizer application | 5-10 weeks | Fertilizer, container, scale    |
| Harvesting             | 19 weeks   | Sickle                          |

Sample action plan

Rice cropping calendar

Let's prepare Action plan!

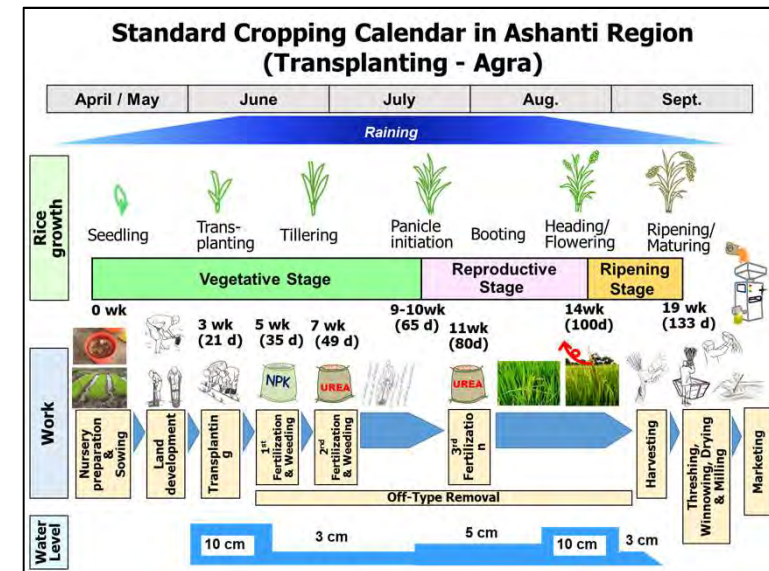


### 3. Let's make a plan!

## Action plan and Rice cropping calendar

| Field work             | Time frame | Tool and inputs                 |
|------------------------|------------|---------------------------------|
| Land clearing          | 3 weeks    | Cutlass                         |
| Seed preparation       | 1 week     | Seeds, salt, egg, bucket, sieve |
| Sowing                 | Week 0     | String, stick, hoe              |
| Transplanting          | 3 weeks    | gardenline                      |
| Weeding                | 5-10 weeks | Push weeder                     |
| Fertilizer application | 5-10 weeks | Fertilizer, container, scale    |
| Harvesting             | 19 weeks   | Sickle                          |

Sample action plan



Rice cropping calendar

Let's prepare Action plan!

# Discuss with the farmers:

- Record keeping should start when you begin purchasing inputs.
- Use Farm record keeping book or sheet to record costs.

4. Let's implement!

Start recording your expenditure

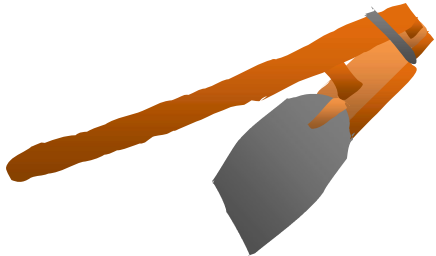
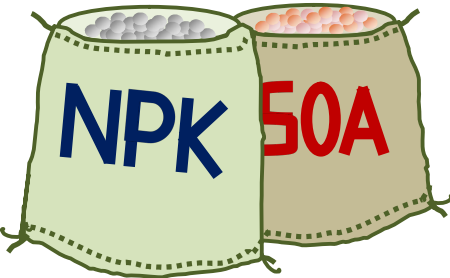
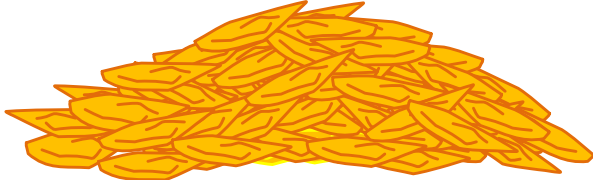


The illustration shows various farm inputs and tools: a green field with yellow seedlings, a pile of yellow corn cobs, two bags of fertilizer labeled 'NPK' and '50A', two bottles of pesticides labeled 'PESTICID' and 'HERBICID', and a wooden-handled hoe. Below these items are three sample pages from a farm record keeping book or sheet, showing tables and charts for recording expenses.

Page 16(Front) Farm record keeping book or sheet

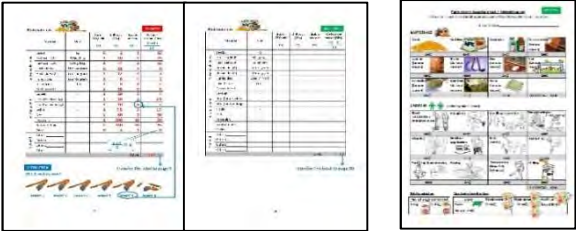
# 4. Let's implement!

## Start recording your expenditure



Page 16(Front)

Farm record keeping book or sheet



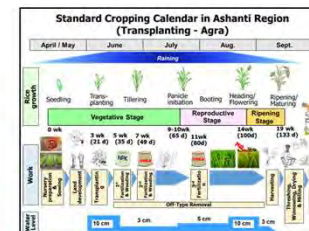
# Discuss with the farmers:



- Start cultivation, following Action plan and Rice cropping calendar

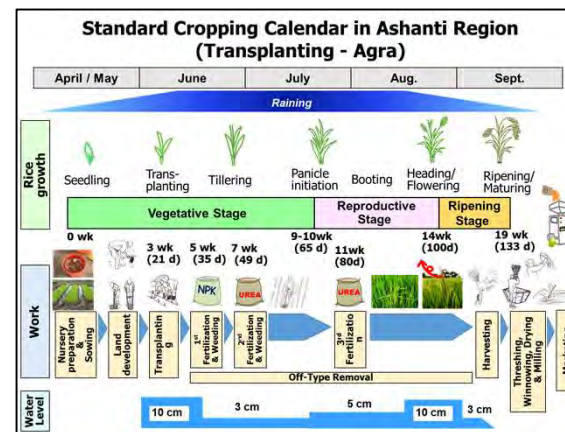
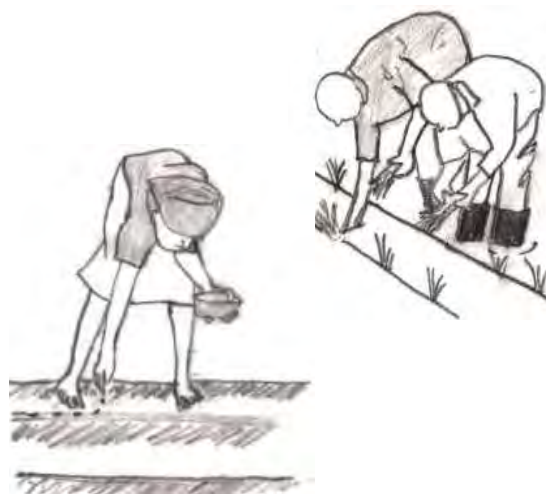
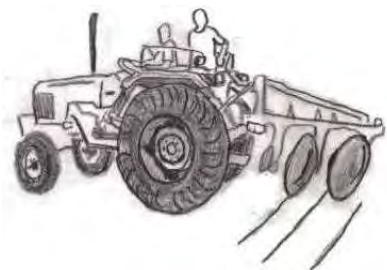
## 4. Let's implement!

### Start cultivation



# 4. Let's implement!

## Start cultivation







# Discuss with the farmers:

- Continue to follow Action plan and Rice cropping calendar

4. Let's implement!

## Apply post-harvest techniques

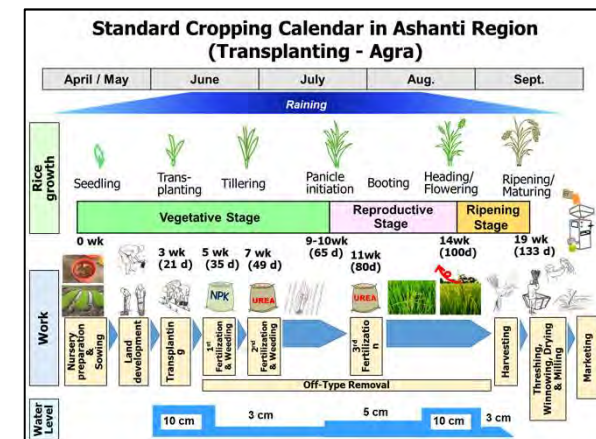
|                         | April / May | June             | July                      | Aug.               | Sept.            |
|-------------------------|-------------|------------------|---------------------------|--------------------|------------------|
| <b>Rainfall</b>         | Raining     |                  |                           |                    |                  |
| <b>Rice Growth</b>      | Seeding     | Transplanting    | Tillering                 | Panicle initiation | Booting          |
|                         |             |                  |                           | Heading            | Flowering        |
|                         |             |                  |                           | Grain filling      | Harvesting       |
| <b>Vegetative Stage</b> |             |                  | <b>Reproductive Stage</b> |                    |                  |
|                         | 0 wk        | 3 wk (21 d)      | 5 wk (35 d)               | 7 wk (49 d)        | 9-10wk (63-70 d) |
|                         |             |                  |                           | 11wk (77 d)        | 13wk (91 d)      |
| <b>Work</b>             | Land prep   | Seedling nursery | Transplanting             | Harvesting         | Post-harvest     |
| <b>Water</b>            | 10 cm       | 5 cm             | 5 cm                      | 6 cm               | 10 cm            |

Page 18(Front)

Action plan/Rice cropping calendar

## 4. Let's implement!

# Apply post-harvest techniques



# Discuss with the farmers:

- Who is your customer?
  - 1: Food vendors/retailers/processors (only for Northern) in your community
  - 2: Direct consumers
  - 3: Market women from outside of the community
  - 4: Contracted consumers
  - 5: Who else?
- At which timing do you want to sell?

Just after harvesting? Yes or no?  
If no, storage is needed.
- At what price do you want to sell?

Keep in mind that sales should be higher than cost of production

4. Let's implement!

Do marketing

To food vendors?

To processors?

To processors?

To retailers?

Page 19(Front)



## 4. Let's implement!

# Do marketing



To food vendors?



To processors?



To retailers?

# Discuss with the farmers:

- How much was your sales?
- Refer to Farm record keeping book or sheet.

4. Let's implement!

Record your sales

**GH¢ ?**



**GH¢ ?**



Page 20(Front) Farm record keeping book or sheet

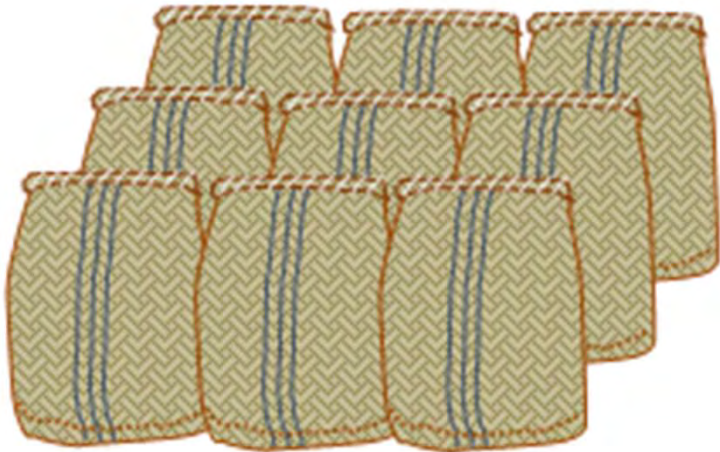




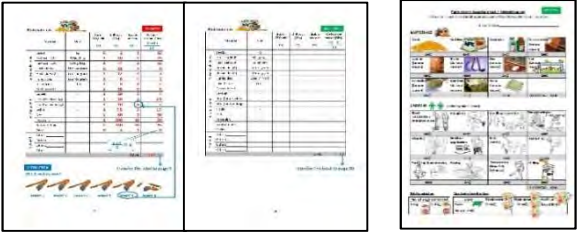
4. Let's implement!

Record your sales

**GH¢ ?**



**GH¢ ?**



# Discuss with the farmers:

- At the end of the implementation stage, refer to your record in Farm record keeping book or sheet
- Then, compare total costs and total sales, and find the difference (= profit or loss)

Page 21(Back)

5. Let's review!

Confirm the profit or loss

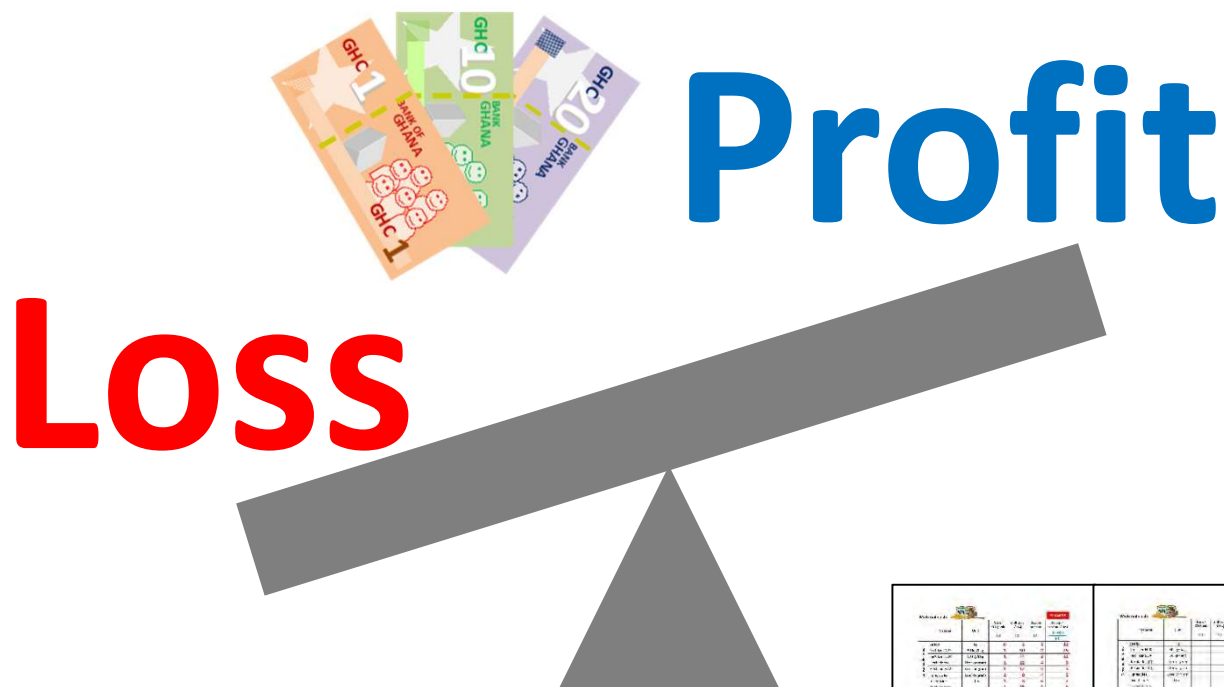
**Loss**

**Profit**

Page 21(Front) Farm record keeping book or sheet

## 5. Let's review!

# Confirm the profit or loss



# Discuss with the farmers:

- Is your profit equal to your planned target per season or per year?

5. Let's review!

Did you attain your planned target?

Profit = ?

Season 1 Season 2 Season 3 Season ...

Page 22(Front)

## 5. Let's review!

# Did you attain your planned target?





# Discuss with the farmers:



- 1: Go back to the Action plan
  - Was the application of each activity carried out timely?
  - Did you follow all the recommended activities?
- 2: Go back to Farm record keeping sheet
  - Did you overspend for inputs and labour?
- 3: Does your profit depend on quality of the produces or not?  
If yes, keep improving the quality. If no, store rice and sell it later when prices are high
- 4: Correct the wrong and do the good more

## 5. Let's review!

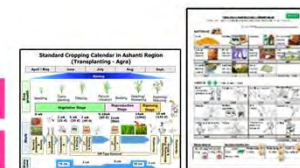
GOOD?

Loss

WRONG?

Action plan/Rice cropping calendar

Farm record keeping sheet



## 5. Let's review!

What went good? What went wrong?

**GOOD?**

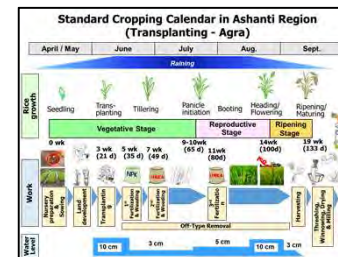
**Profit**

**Loss**

**WRONG?**

Action plan/Rice cropping calendar

Farm record keeping sheet



# Discuss with the farmers:

Congratulations! You can start from “1. Let’s get information!” at the beginning of the following cropping season

*Let’s become rich by ourselves,  
Kakra Kakra (Ashanti)...  
Biela Biela (Northern)...  
little by little (English)...  
sukoshi-zutsu (Japanese)...*



## 5. Let's review!

Plan for the following season



Back side

- This training material is targeting rice farmers those who apply either transplanting or direct sowing.
- It is recommended that this material be used by AEA at on-site training or meeting with farmers.



Face



## 1<sup>st</sup> Onsite Training

- ◆ Land Development
- ◆ Rice Cultivation
- ◆ Farm Management

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- 1<sup>st</sup> on-site training shall be conducted before main cropping season and includes 3 training topics;
  1. Land development and preparation,
  2. Rice cultivation (seed preparation, sowing etc.), and
  3. Farm management





MOFA/JICA TENSUI RICE

# 2<sup>nd</sup> Onsite Training

- ◆ Rice Cultivation
- ◆ Farm Management and Support System

Rice  
Cultivation

Farming  
Management

Land  
Development

Extension

Other

- Fertilisers are food for plants, they contain important mineral nutrients.
- Apply fertilizers when the soil does not supply enough nutrients.

## Fertilizer management

TENSUI RICE  
MOFA-JICA Project



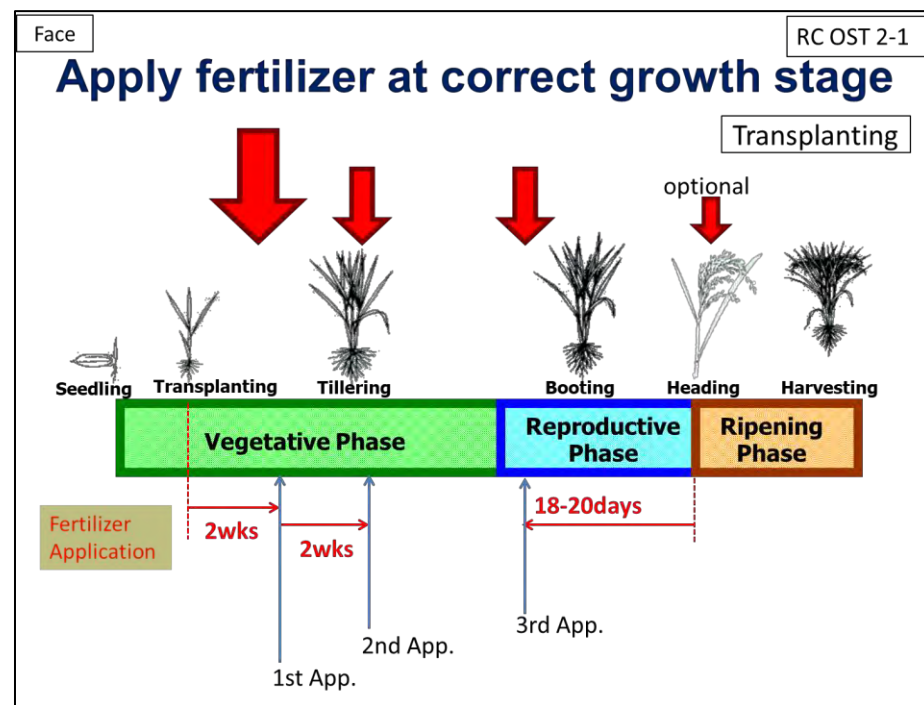
MOFA/JICA TENSUI RICE

# Fertilizer management

For On-Site Training  
revised June 2018

Back side

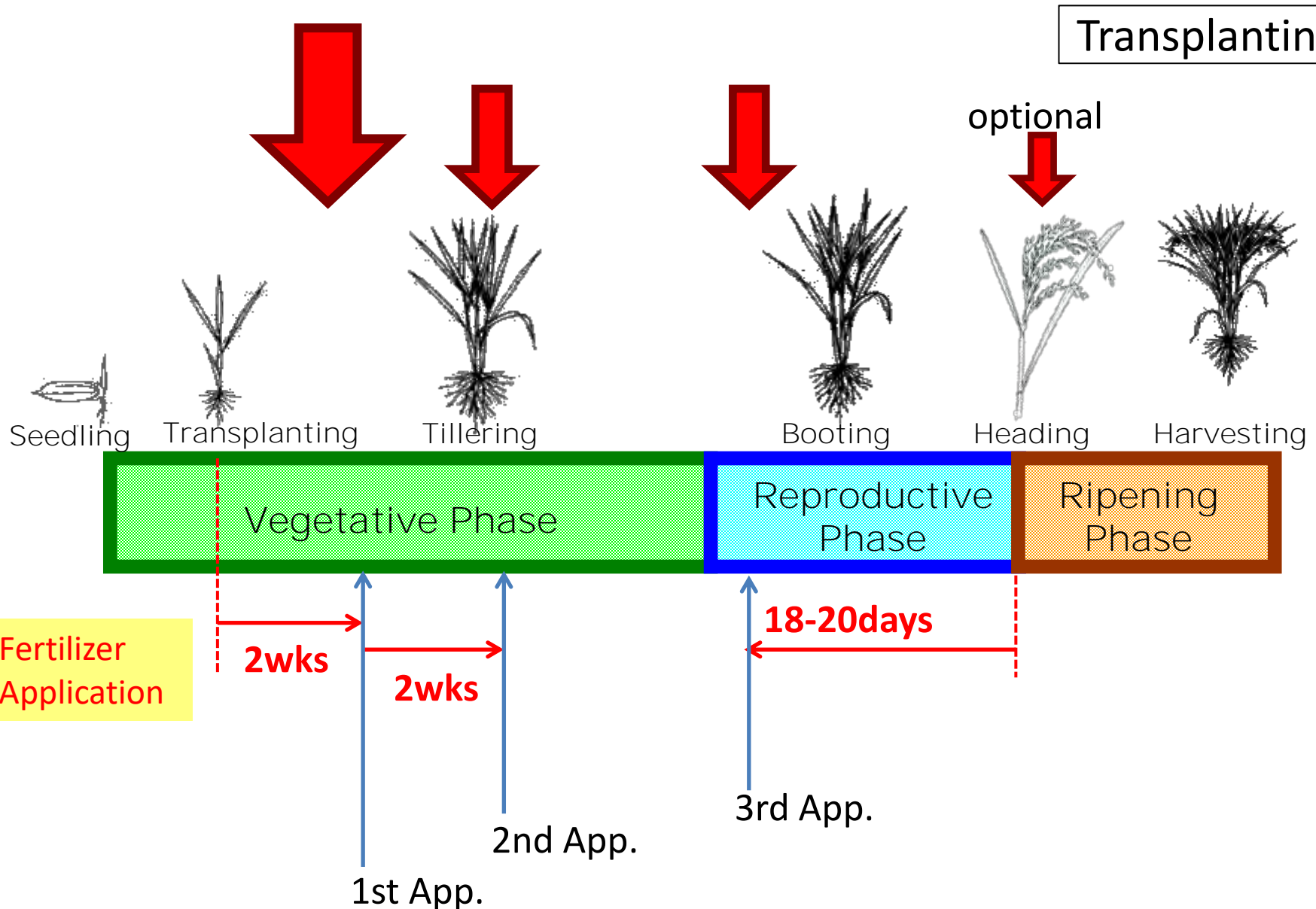
Fertilizer is applied 3 times at particular times according to growth stage.



## In Transplanting

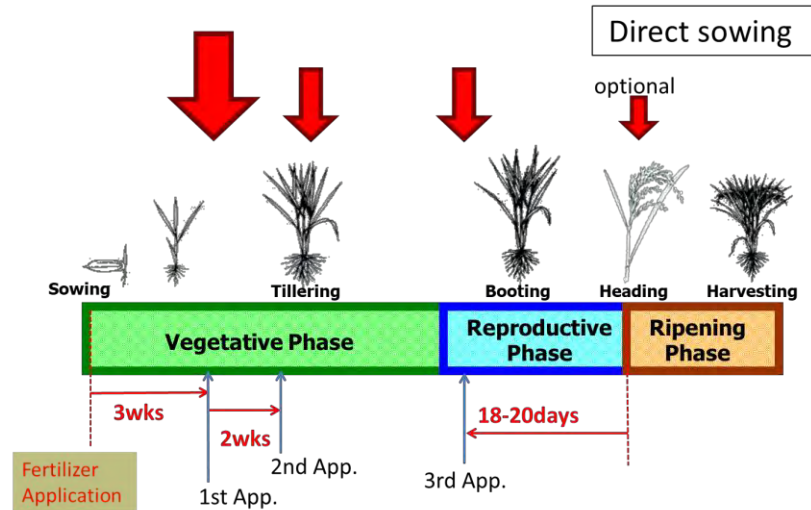
- 1st application is done 2 weeks after transplanting.
- 2nd application is done 2 weeks after 1st application.
- 3rd fertilizer is applied at 18 – 20 days before heading.(in general)
- Decide the exact timing of 3<sup>rd</sup> fertilizer application by observing young panicles

# Apply fertilizer at correct growth stage





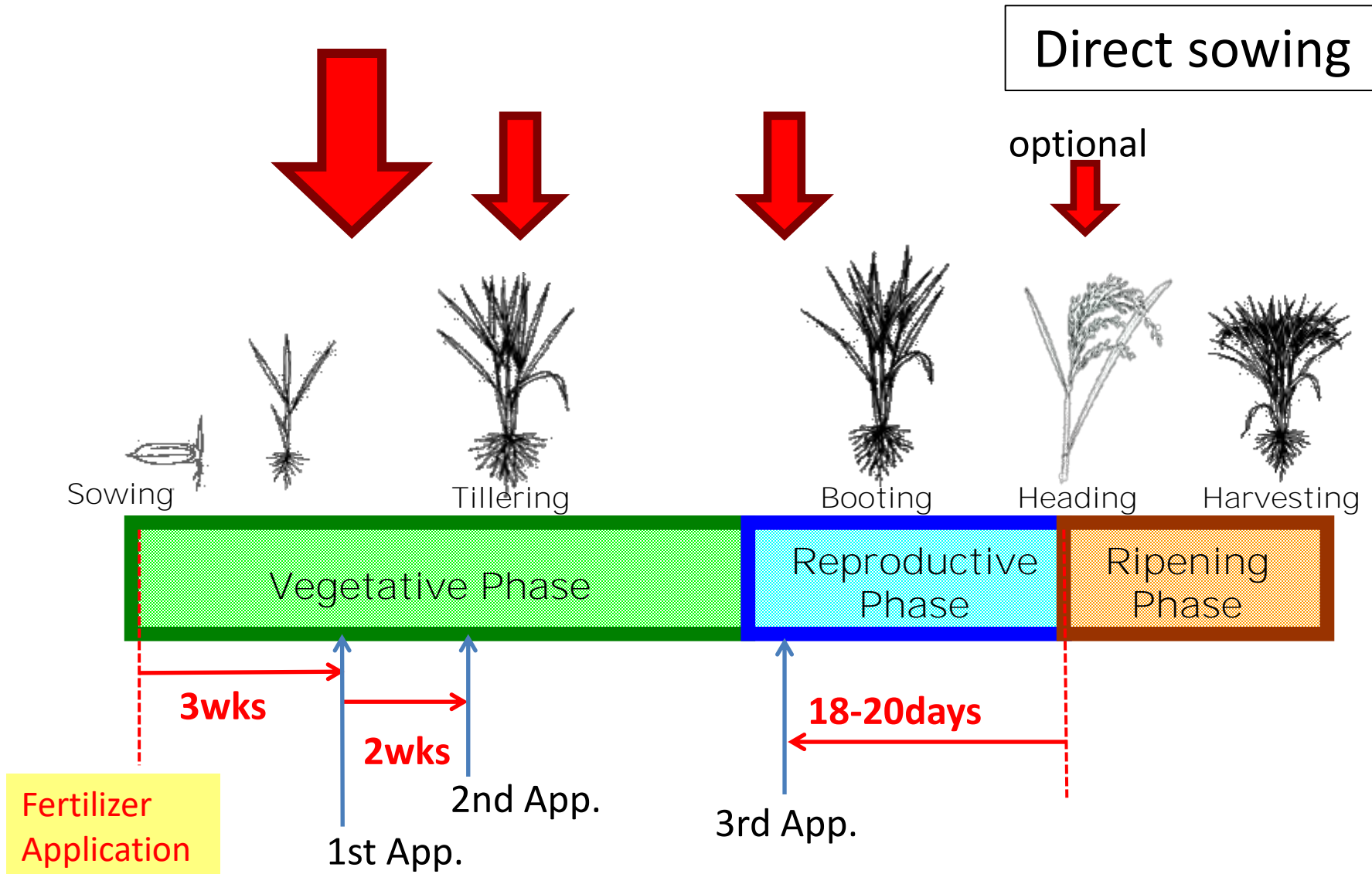
## Apply fertilizer at correct growth stage



## In Direct Sowing

- 1st application is done 3 weeks after sowing.
- 2nd application is done 2 weeks after 1st application.
- Note that the timing of 1st and 2nd fertilizer application is different in case of transplanting.
- 3rd fertilizer is applied at 18 – 20 days before heading.(in general)
- Decide the exact timing of 3<sup>rd</sup> fertilizer application by observing young panicles.

# Apply fertilizer at correct growth stage



## Back side

- 1st application is done by N-P-K (15-15-15).
- 2<sup>nd</sup> and 3<sup>rd</sup> application are done by either Urea or SoA (Ammonium Sulfate).

Face

## Amount of fertilizer application (60 - 30 - 30)

For 1/4 acre (1,000 m<sup>2</sup>)

| Frequency             | 1 <sup>st</sup>  | 2 <sup>nd</sup> | 3 <sup>rd</sup> |
|-----------------------|------------------|-----------------|-----------------|
| Type of fertilizer    | N-P-K (15-15-15) | Urea (N:46%)    |                 |
| Amount of application | 20 kg            | 3 kg            | 3 kg            |

or

| Frequency             | 1 <sup>st</sup>  | 2 <sup>nd</sup> | 3 <sup>rd</sup> |
|-----------------------|------------------|-----------------|-----------------|
| Type of fertilizer    | N-P-K (15-15-15) | SOA (N:21%)     |                 |
| Amount of application | 20 kg            | 7 kg            | 7 kg            |

## TIPS:

- If the different type of fertiliser whose concentration of each element is different from NPK(15-15-15), Urea (N:46%) or SoA(N:21%) is applied, the amount of application must be calculated to adjust the nitrogen application level of each application. Therefore, you would better consult with AEA in charge of your community.

# Amount of fertilizer application (60 - 30 - 30)



For 1/4 acre (1,000 m<sup>2</sup>)

| Frequency             | 1 <sup>st</sup>     | 2 <sup>nd</sup> | 3 <sup>rd</sup> |
|-----------------------|---------------------|-----------------|-----------------|
| Type of fertilizer    | N-P-K<br>(15-15-15) | Urea (N:46%)    |                 |
| Amount of application | 20 kg               | 3 kg            | 3 kg            |

or

| Frequency             | 1 <sup>st</sup>     | 2 <sup>nd</sup> | 3 <sup>rd</sup> |
|-----------------------|---------------------|-----------------|-----------------|
| Type of fertilizer    | N-P-K<br>(15-15-15) | SOA (N:21%)     |                 |
| Amount of application | 20 kg               | 7 kg            | 7 kg            |

## Measurement of fertilizer

- If a scales are not available, buckets, tins, empty bottles etc. can be used instead of scales.
- Ask AEA or person who has scales to measure the weight of a full container of fertiliser in advance.

## How to measure the weight of NPK (15-15-15)



= 10 kg

Rubber bucket



= 2 kg

Tin of tomato paste  
(Size: 2.2kg)

20 kg



20 kg



- When NPK is filled up the height of 1.5 cm - 2 cm below the upper end of the small black rubber bucket, it equivalents to 10kg.
- 1.5 -2 cm is almost same length of a thumbnail.
- When NPK is filled up to the line of a tin, it equivalents to 2 kg.

Ask farmers how to measure 20 kg of NPK by using bucket or tin.





# How to measure the weigh of NPK (15-15-15)



**= 10 kg**

Rubber bucket



**= 2 kg**

Tin of tomato paste  
(Size: 2.2kg)

**20 kg**



**20 kg**



# How to measure the weigh of Urea (N:46%)



**= 1.5 kg**

Tin of tomato paste  
(Size: 2.2kg)

**3 kg**



➤ When Urea is filled up to the line of a tin, it equivalents to 1.5 kg.

Ask farmers how to measure 3 kg of Urea by using tin.



Face

# How to measure the weigh of Urea (N:46%)

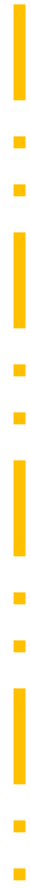


Urea



= 1.5 kg

Tin of tomato paste  
(Size: 2.2kg)



3 kg



Face

# How to measure the weigh of SOA (N:21%)



= 2.5 kg

Tin of tomato paste  
(Size: 2.2kg)



7 kg

➤ When SOA is filled up to the line of a tin, it equivalents to 2.5 kg.

Ask farmers how to measure 7 kg of SOA by using tin.



# How to measure the weight of SOA (N:21%)



= 2.5 kg

Tin of tomato paste  
(Size: 2.2kg)



7 kg



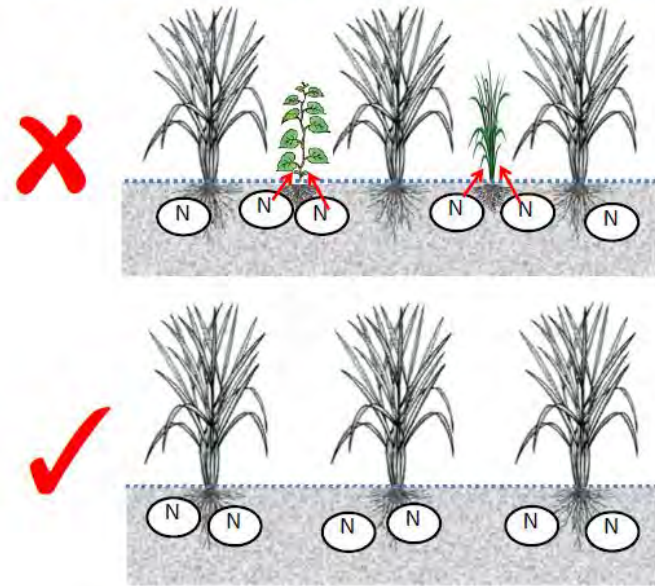


## Back side

- When fertilizer is applied, field should be free from weeds.
- Some types of weeds have higher nutrient absorption ability than the rice.

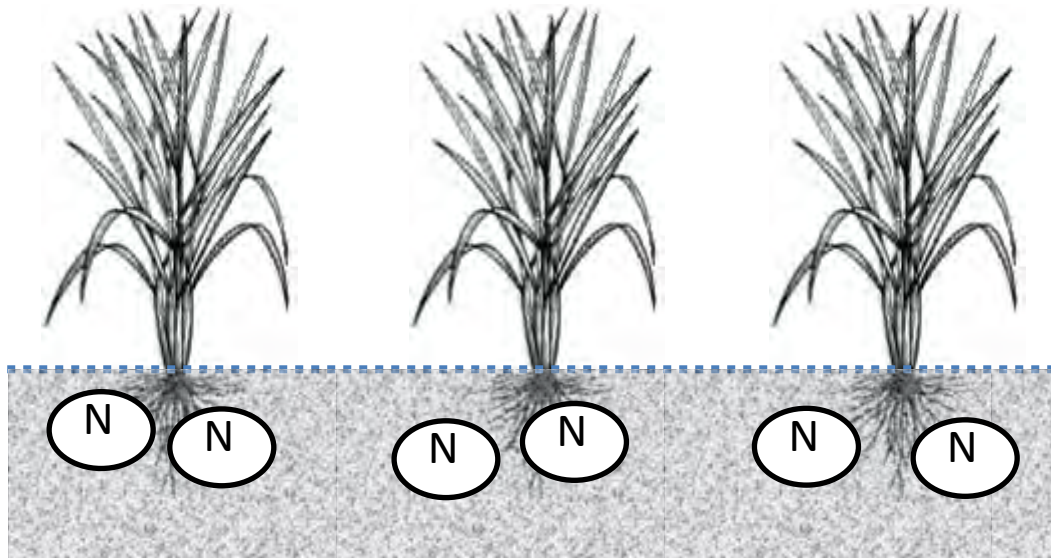
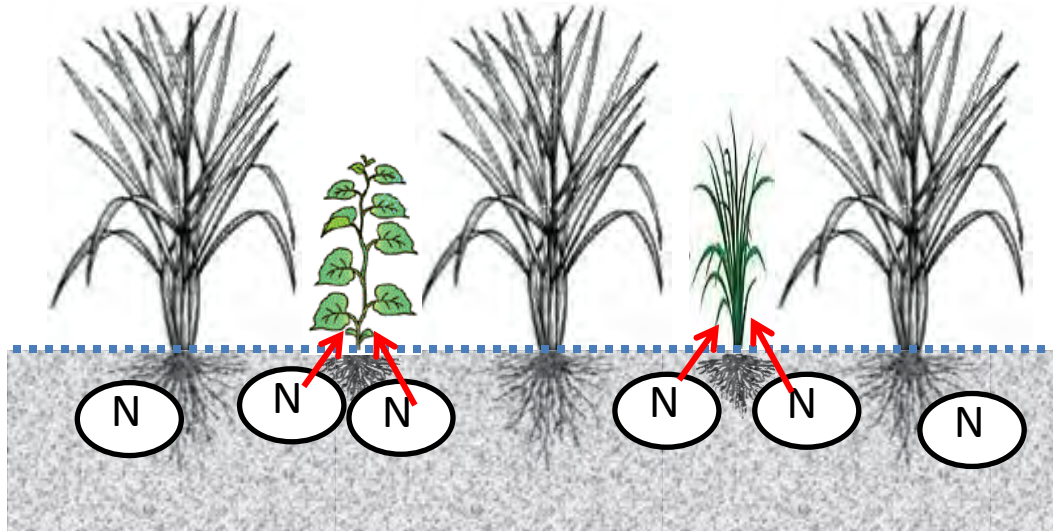
## Face

### Ensure the field free from weeds



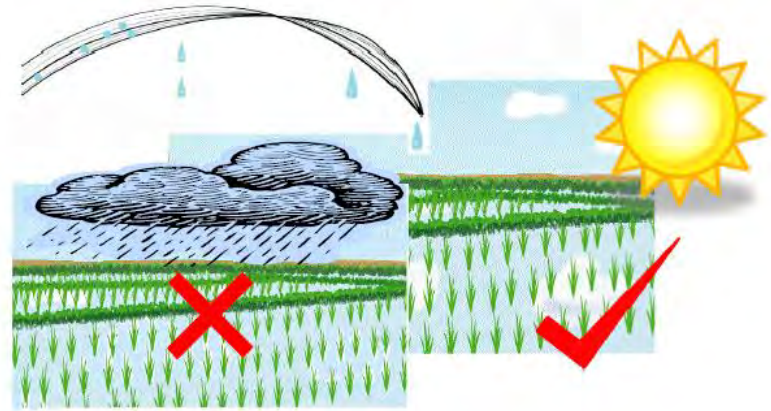


# Ensure the field free from weeds



- When it is raining or immediately after rain, fertiliser should not be applied.
- If the grain of fertiliser is wet, it becomes soft and sticks to other, which becomes difficult to spread evenly.
- If leaves are wet, grains of fertiliser stick to leaves and leaves are damaged.

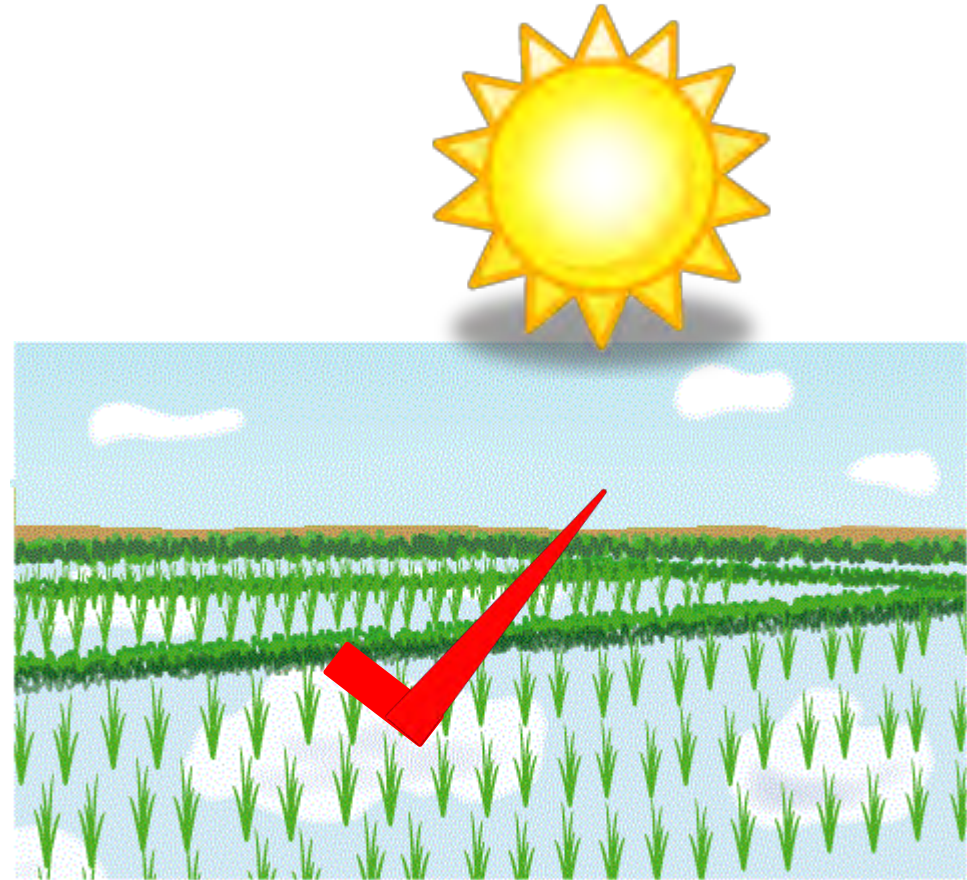
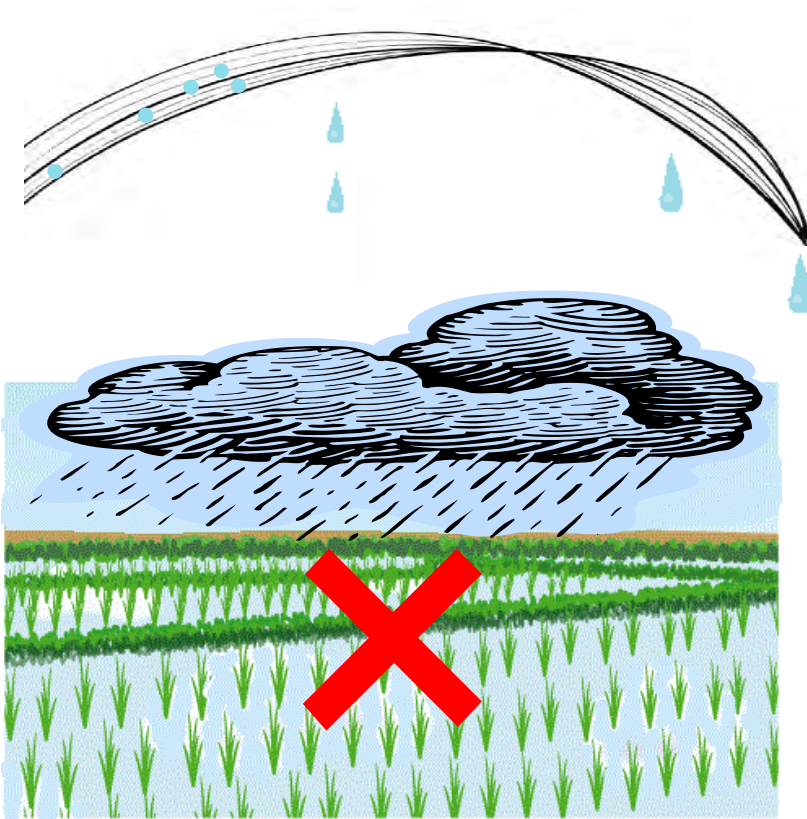
**Do not apply fertilizers when leaves are wet**







# Do not apply fertilizers when leaves are wet



Back side



- Weeding is essential key technology not only in rice cultivation, but also in other crops cultivation.





MOFA/JICA TENSUI RICE

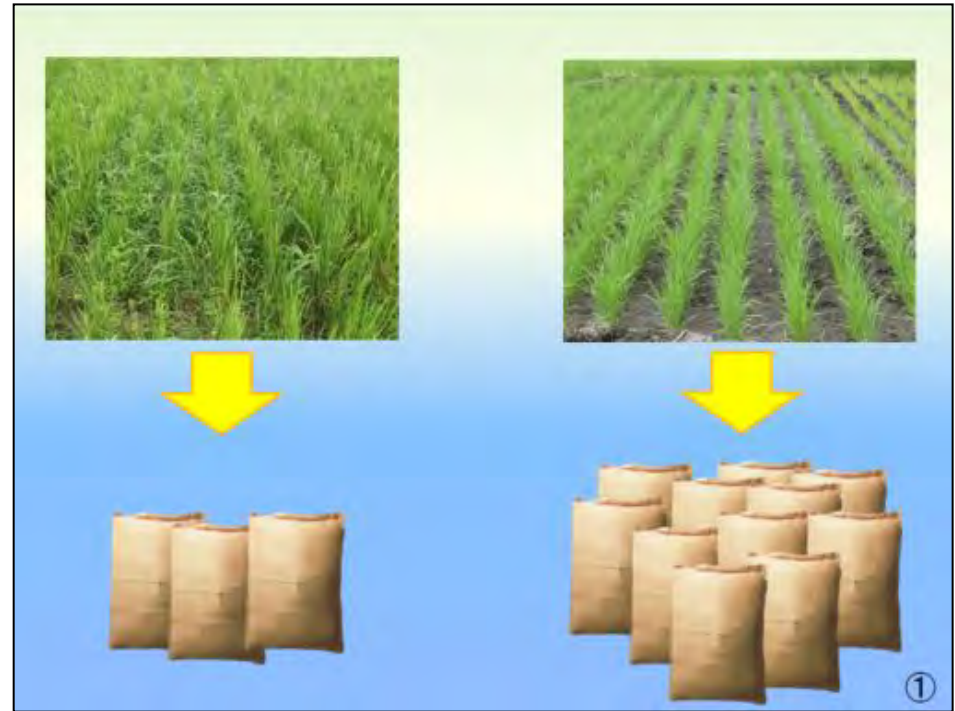
Rice  
Cultivation

# Weed Control

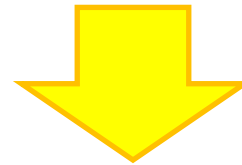
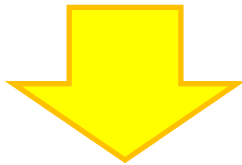


Sustainable Development of Rain-fed Lowland Rice Production  
MOFA/JICA TENSUI RICE PROJECT

Back side



- The rate of yield reduction from harmful weeds is tremendous.
- The yield declines significantly without weed control.







- Weeding must be done at least 2 times.
  - 1st weeding : 2 weeks after trans planting
  - 2nd weeding: 2 weeks after 1st weeding
- It is desirable to carry out 1st and 2nd weeding at the same time as fertiliser application.

# Weed Control

## Transplanting

Trans planting



1st Weeding



2nd Weeding



2 weeks



2 weeks



Back side



- Adjust the depth of water to a few centimetres.
- Push the weeder ahead moving it back and forth.



# Weeding by Push Weeder

Back side

## In case of direct sowing

- Seeds of weeds germinate at the same time as those of rice.
- The number of weed in the rice field increases year by year.



- Weeding must be done at least 2 times.
  - 1st weeding : 3 weeks after sowing
  - 2nd weeding: 2 weeks after 1st weeding
- Pre-emergence type herbicide is effective in the field in which water is not standing but soil moisture is higher.



# Weed Control

Direct sowing

Sowing



1st Weeding



2nd Weeding



3 weeks

2 weeks

Back side

- Weeding must be done when the size of weeds is smaller.
- Larger weed biomass means growth of rice has been negatively affected.



- At least 2 times  
*At the same time as 1st and 2nd fertilizer application (Transplanting)  
3 weeks and 5 weeks after sowing (Direct sowing)*
- First weeding must be done by hoe in direct sowing.
- Regardless of the above, weeding must be done as necessary.



Control weeds before it is too late!

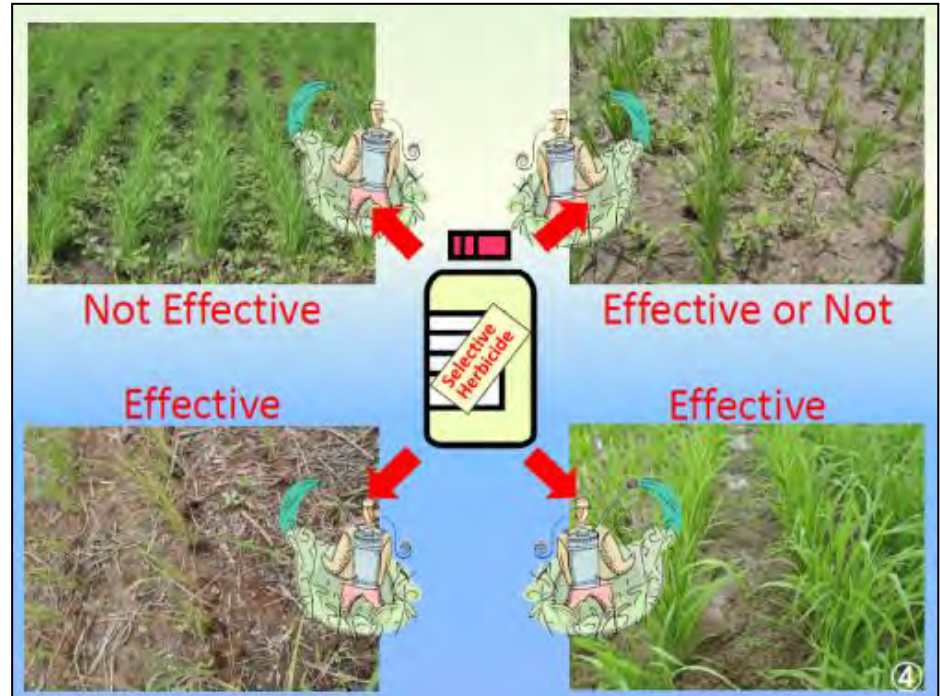




Back side

## Selective herbicide

- Selective herbicide is not effective against larger size weeds.
- For example, *Propanil* works well against weeds with only three (3) or less leaves.



## If selective herbicide is used;

- The herbicide containing 2,4-D must NOT be applied in first weeding.
- Concentration of the herbicide must be proper.
- Adequate volume of spray must be ensured.
- Do NOT rely on the herbicide application alone.



Not Effective



Effective or Not



Effective



Effective



Back side



- Agro Chemicals (Herbicide, Insecticide, Fungicide, etc.) are POISONUS.





MOFA/JICA TENSUI RICE

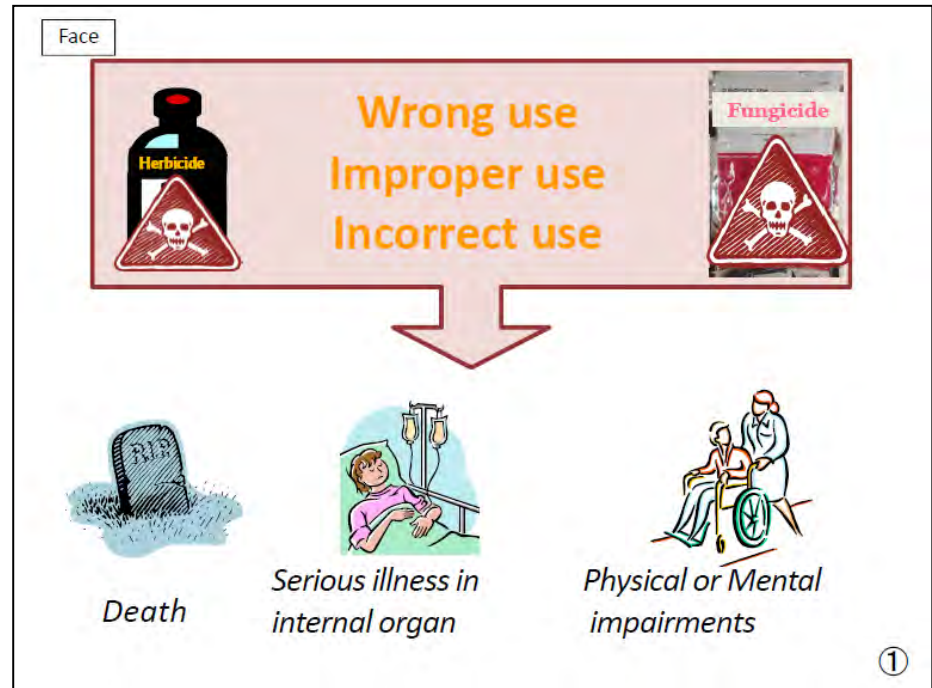
Rice Cultivation

# Chemical Control (General)





Back side



- Wrong, improper and incorrect usage of agro chemicals cause serious problem on people's health.

*[Death, Serious illness in internal organ, Physical or Mental impairments, etc.]*

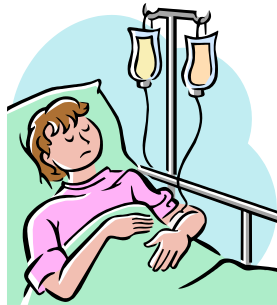
**Wrong use**  
**Improper use**  
**Incorrect use**



The central graphic features a large, light-brown downward-pointing arrow. Inside the top part of this arrow, there is a light-brown rectangular area containing three items: on the left, a black bottle labeled 'Herbicide' with a skull and crossbones warning sign; in the center, the text 'Wrong use', 'Improper use', and 'Incorrect use' in orange; and on the right, a package labeled 'Fungicide' with a skull and crossbones warning sign.



*Death*



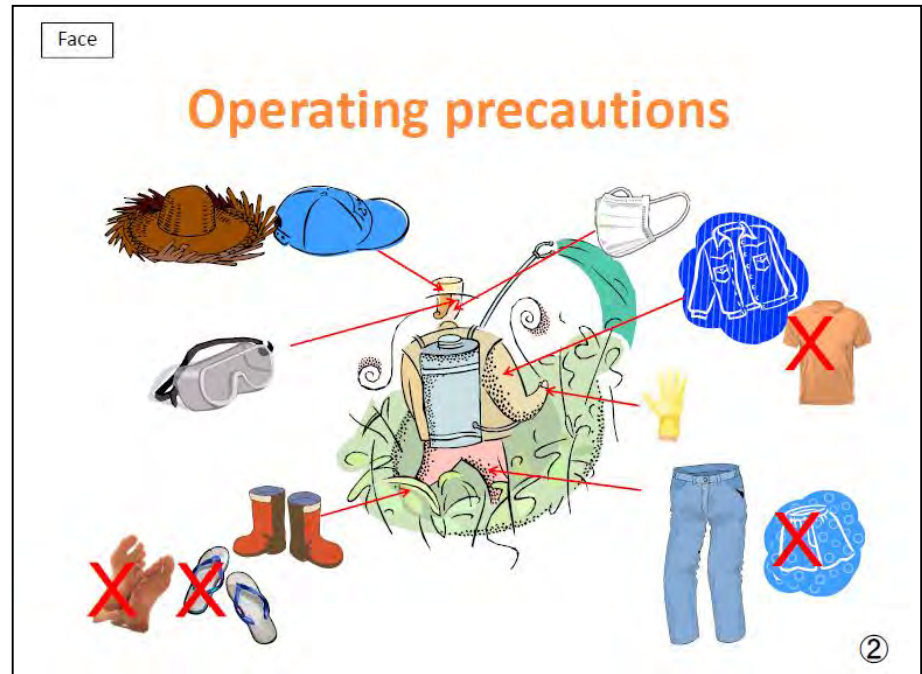
*Serious illness in internal organ*



*Physical or Mental impairments*

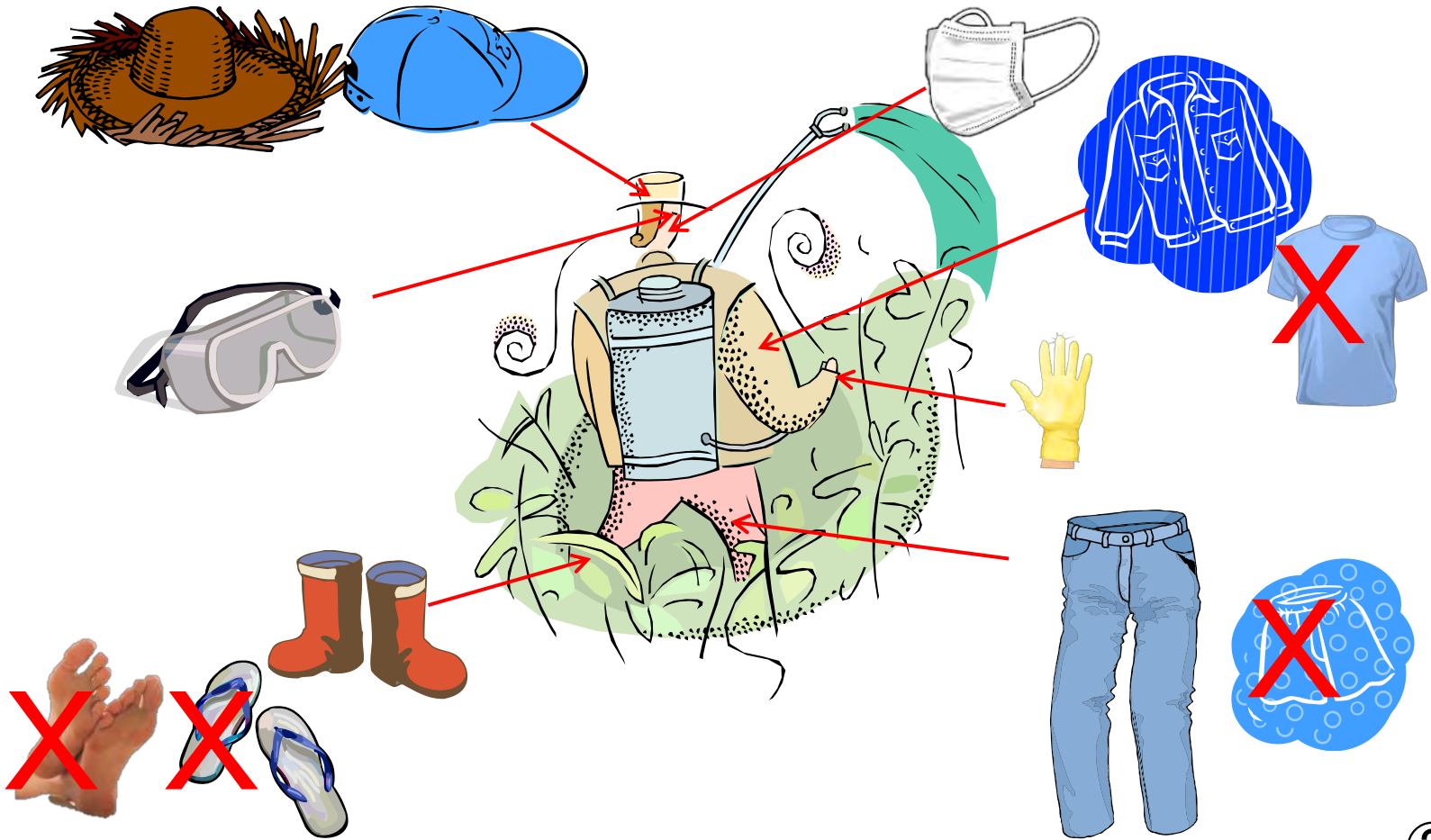
Back side

- Operators must wear long-sleeved clothes, trousers, boots, gloves, mask, cap or hat and goggles to protect their body.



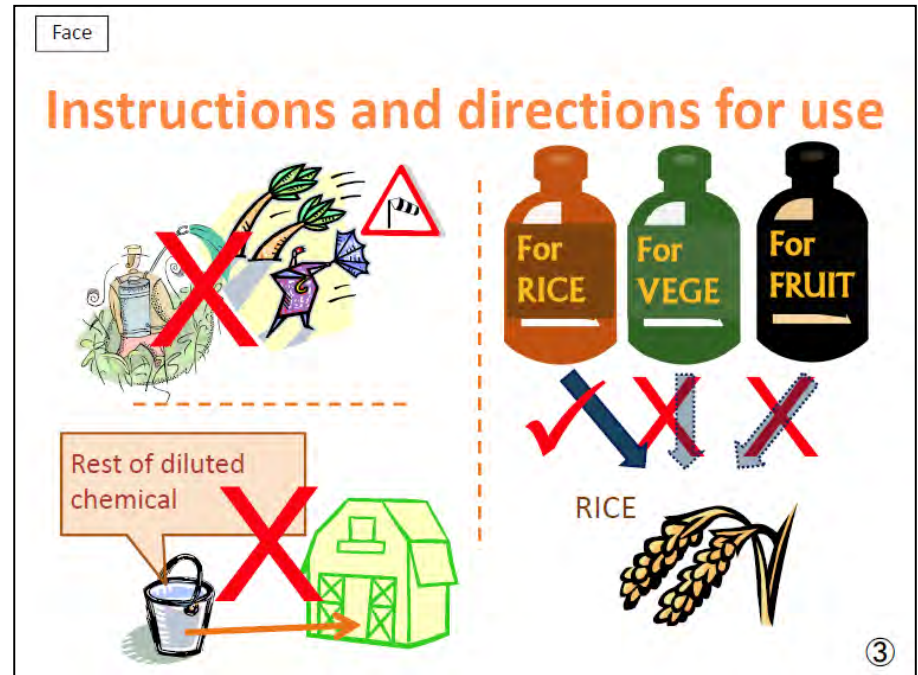
- If the body of operator is not protected, chemicals enter the body through the mouth, nose and skin.
- Also eyes, nose and skin can be damaged.
- Agro chemical dilution must not be carried out by bare hand.

# Operating precautions



Back side

- When the wind is strong, chemicals application should be avoided.
- Diluted chemicals should be applied all in same day.



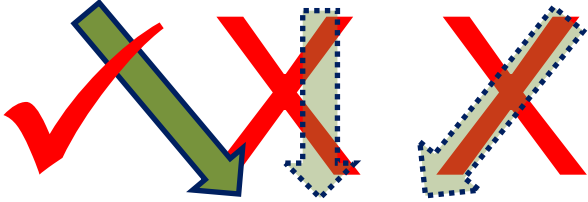
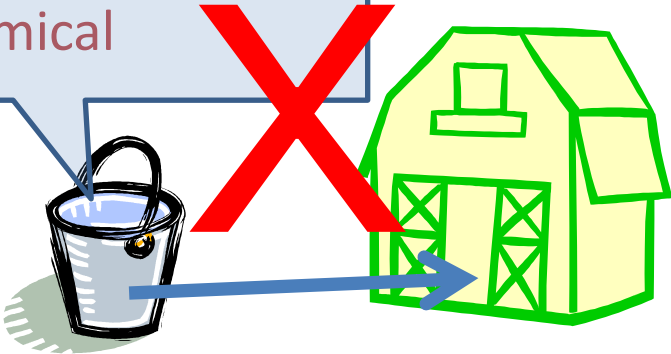
- When agro chemicals are applied on rice, select chemicals for rice only.



# Instructions and directions for use



Rest of diluted chemical

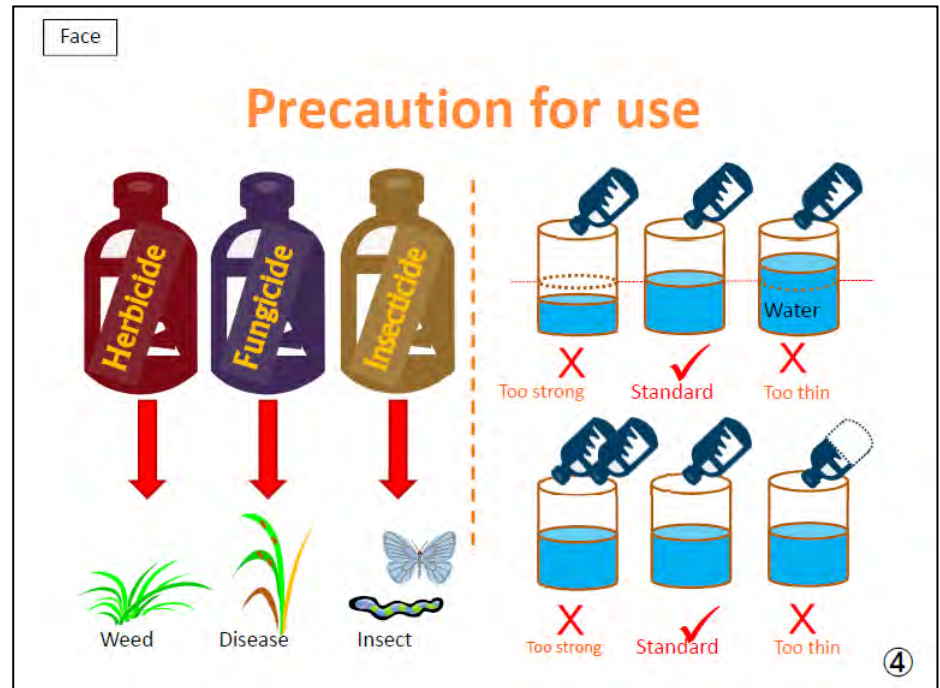


RICE



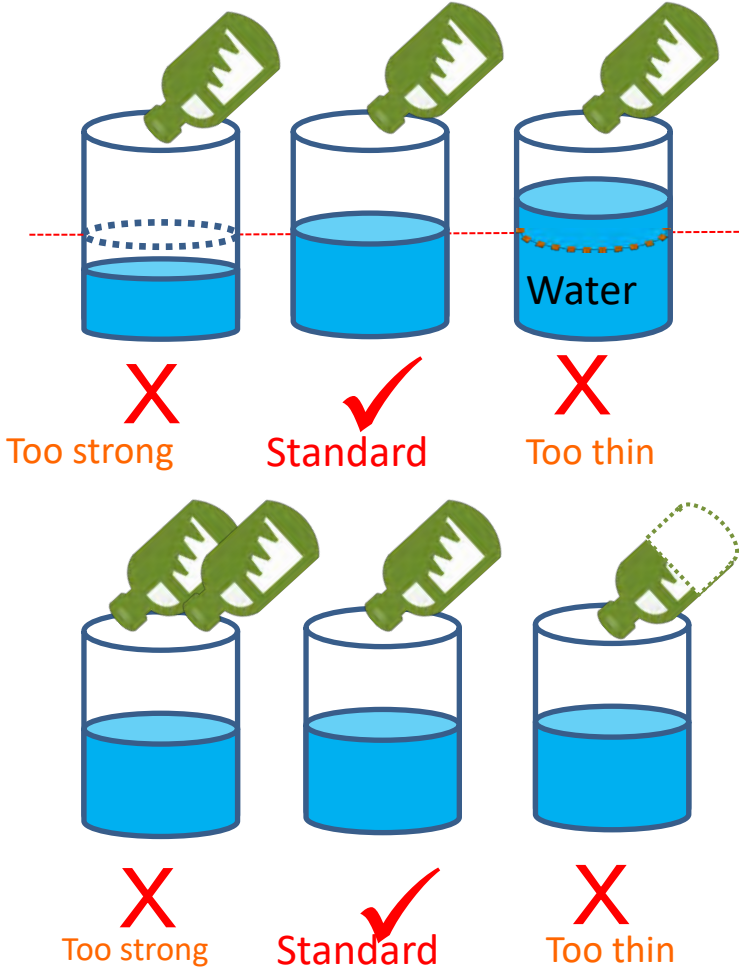
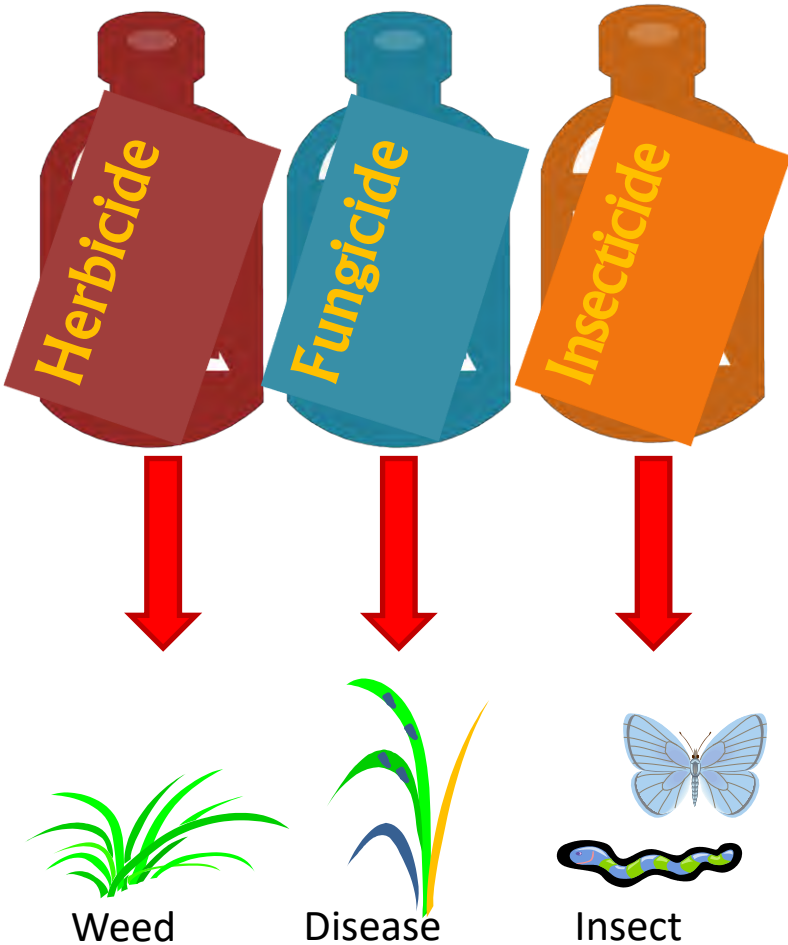
Back side

- ◆ Selection of chemicals
- ◆ Dilution ratio
- ◆ Dosage of chemicals
- ◆ Timing of application
- ◆ etc.



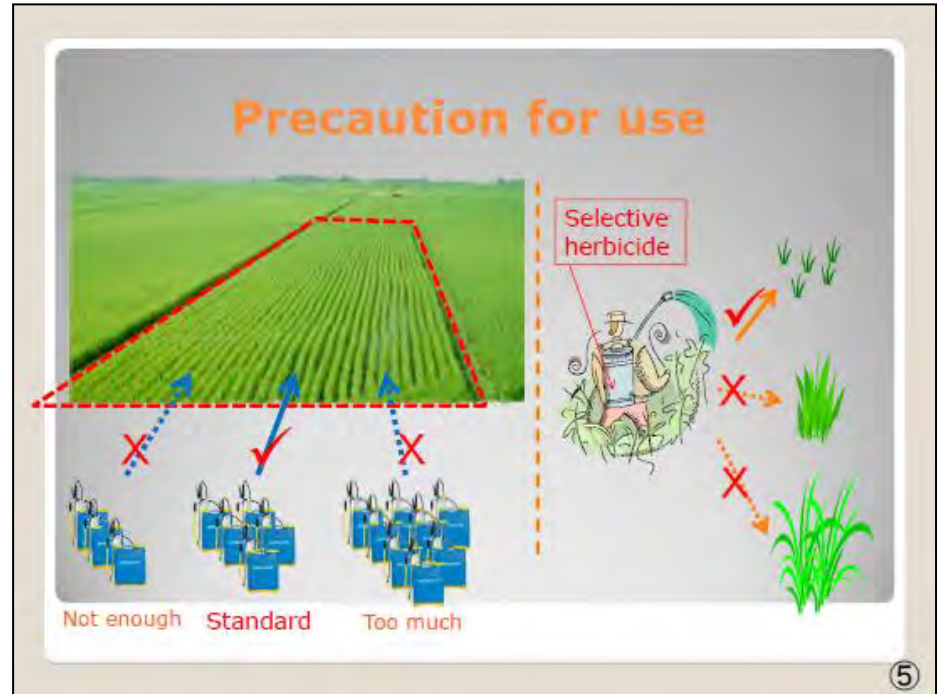
- Inadequate or inappropriate application of Agro Chemicals are ineffective in preventing and controlling diseases, pests and weeds.

# Precaution for use



Back side

- ◆ *Dosage of dilution*
- ◆ *Timing of application*
- ◆ *etc.*



- ◆ Enough but not too much volume of the dilution must be sprayed.
- ◆ Selective herbicide is effective only against small size weeds.

# Precaution for use



X



Not enough

✓



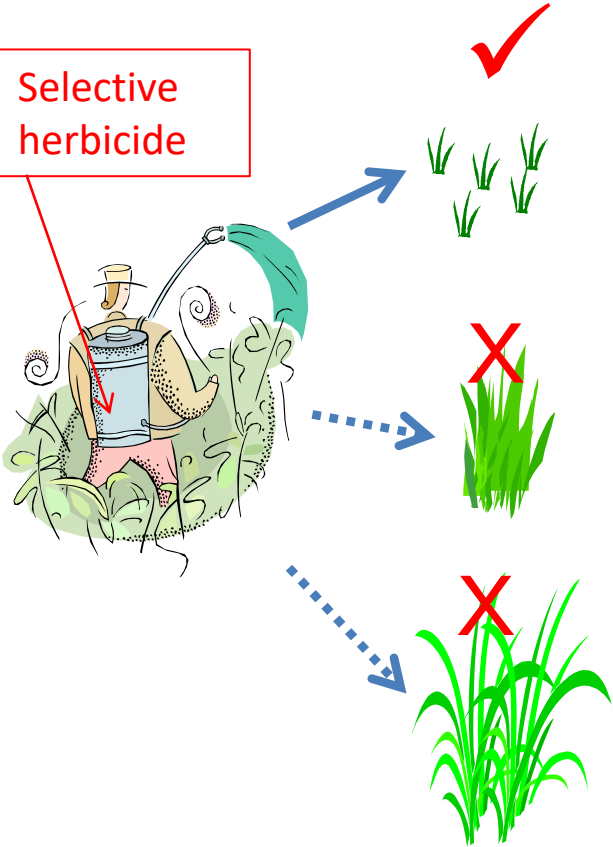
Standard

X



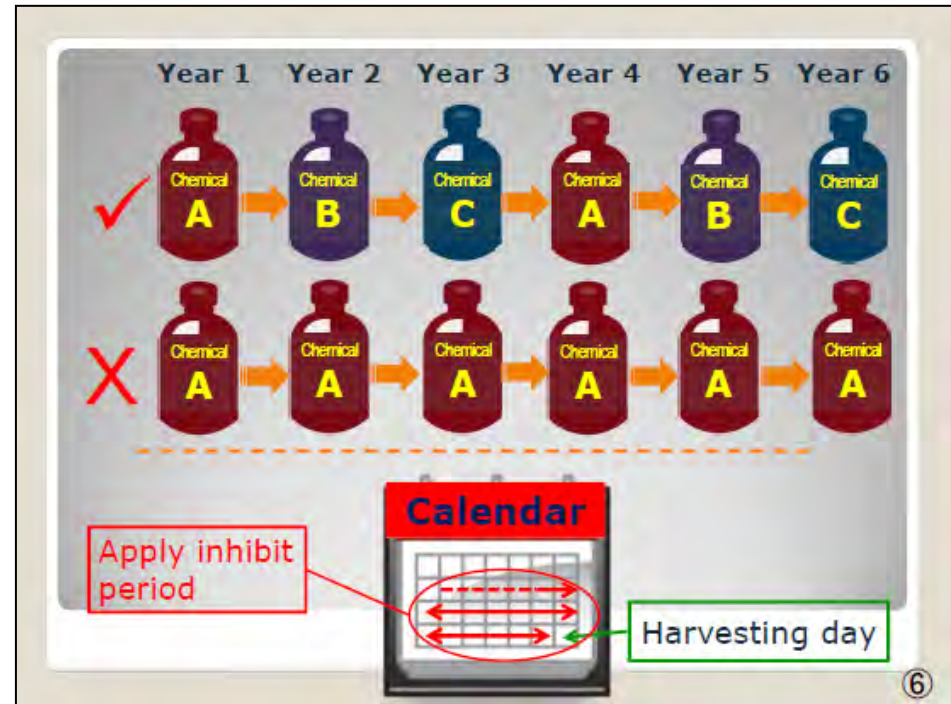
Too much

Selective herbicide



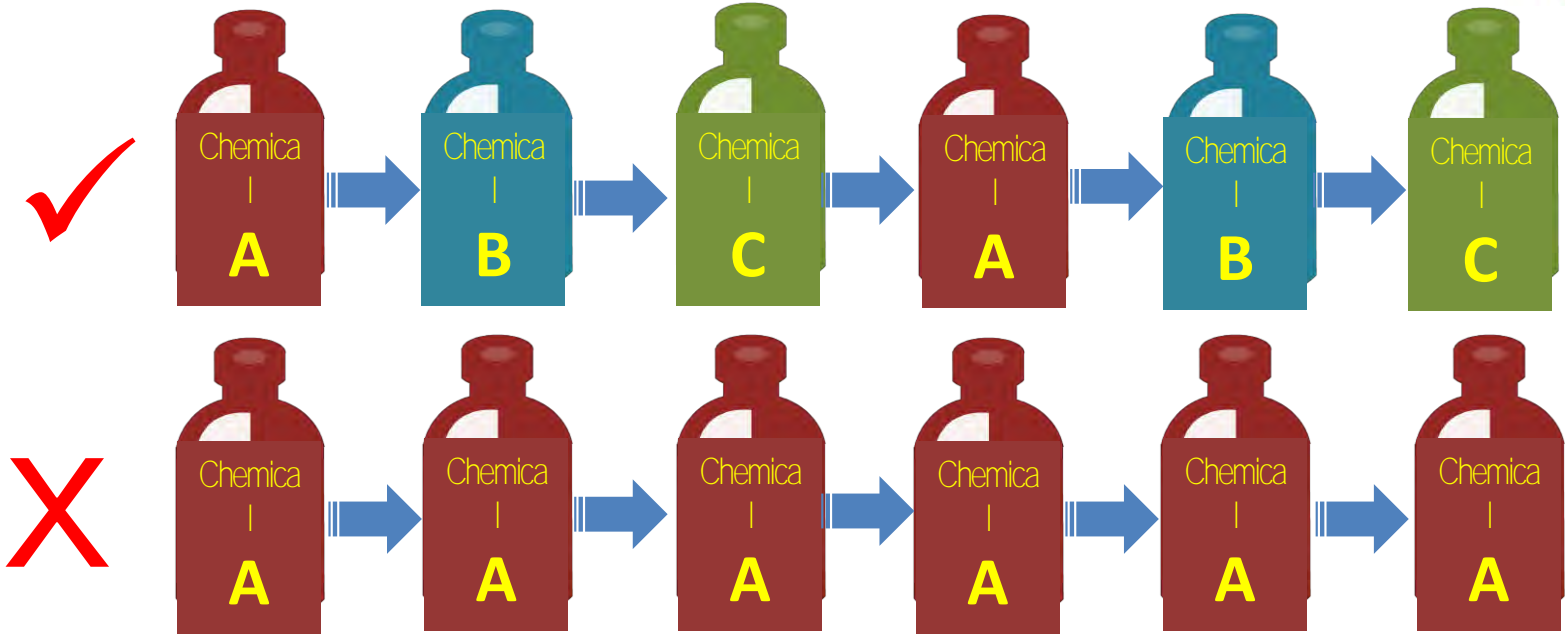


Back side

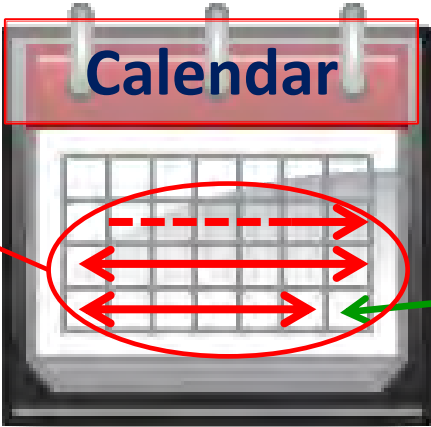


- If Agro-chemicals with same materials continue to be used over long periods, its efficiency will be reduced.
- Agro-chemicals must not be applied just before harvesting. (see label of each chemical for details)

Year 1 Year 2 Year 3 Year 4 Year 5 Year 6



Apply inhibit period



Harvesting day

Back side

- The most serious disease in Jasmine 85 cultivation is Blast.

Face

RC OST 2-4

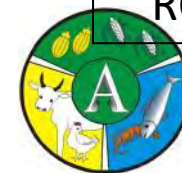
## **Disease & Pest Control**

MOFA-JICA Project  
Sustainable Development of Rain-fed Lowland Rice Production

- Diseases of rice are caused by fungus, bacteria and virus.
- Some of diseases can be prevented or be reduced the onset by non-chemical control such as a seed selection and optimum nursery and field management.



RC OST 2-4

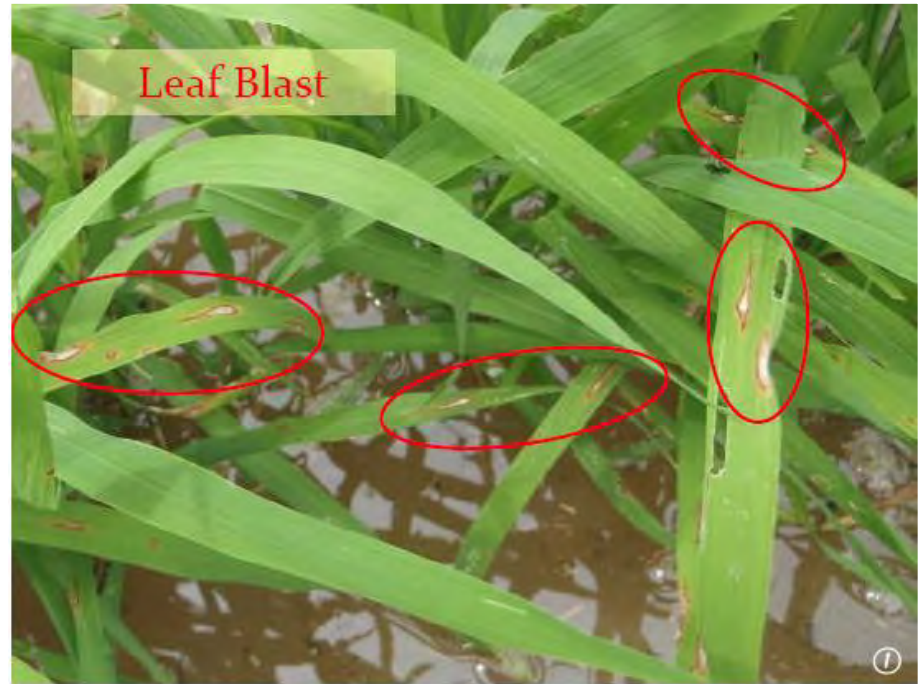


MOFA/JICA TENSUI RICE

Rice  
Cultivation

# Disease & Pest Control

Back side



- Conditions suitable for the development of “Blast”

[Weather and climate]

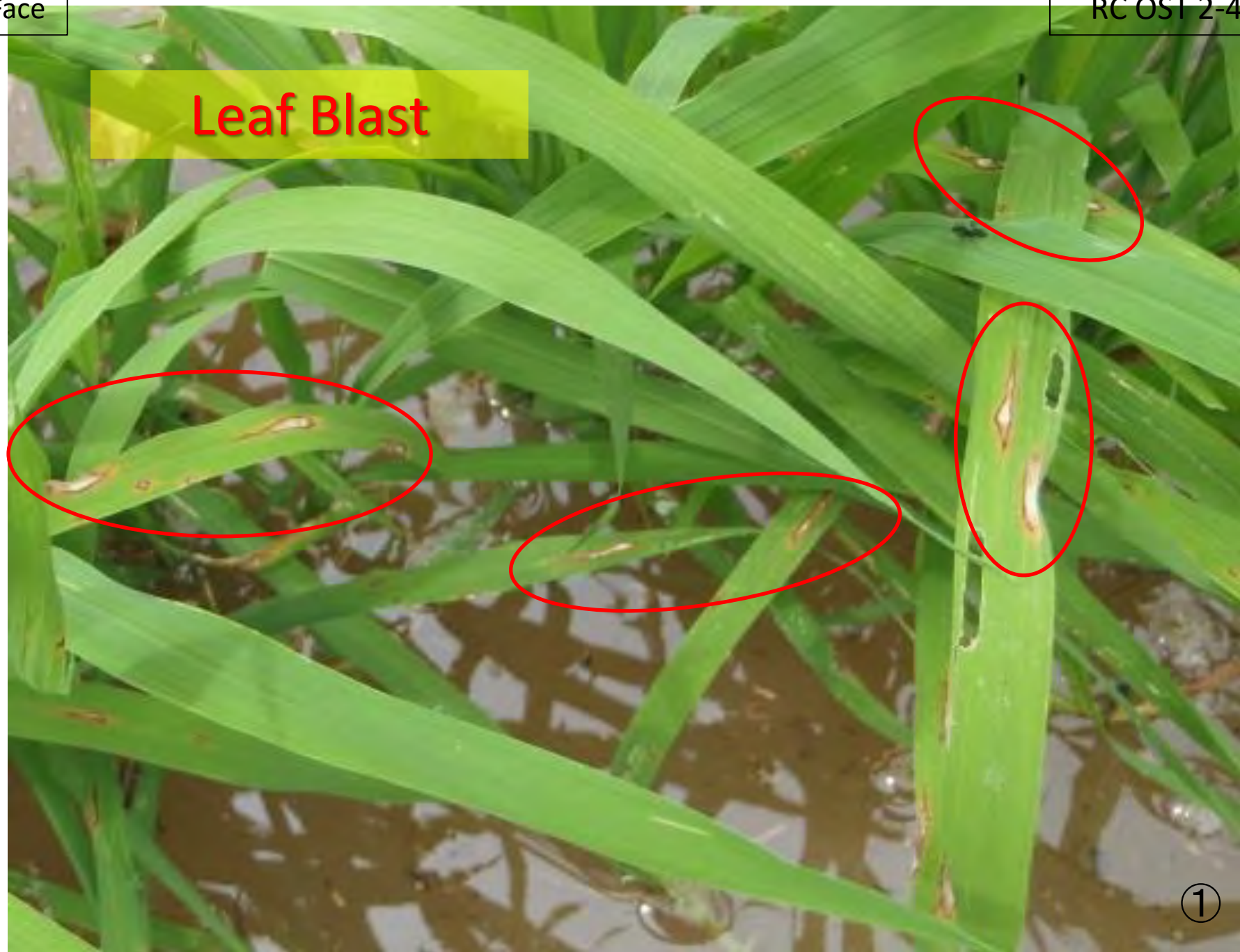
- Low-temperature ( 25 – 28 °C )
- High-humidity
- Less sunlight ( Cloudy, Rainy )

[Management]

- Excess fertiliser application
- Higher plant density



**Leaf Blast**



Back side

- This is the typical symptom of Blast.



- Non-chemical Control
  - Select disease tolerant Variety  
(Jasmine 85 is not disease tolerant)
  - Avoidance of use of diseased seed
  - Seed selection
  - Avoidance of excess fertilizer application

Face

# Leaf Blast

RC OST 2-4





Back side

- After heading time, if neck of panicle, rachis of branch and grains are infected, those colour change to brown and the fullness of grains becomes worse or grains go die.



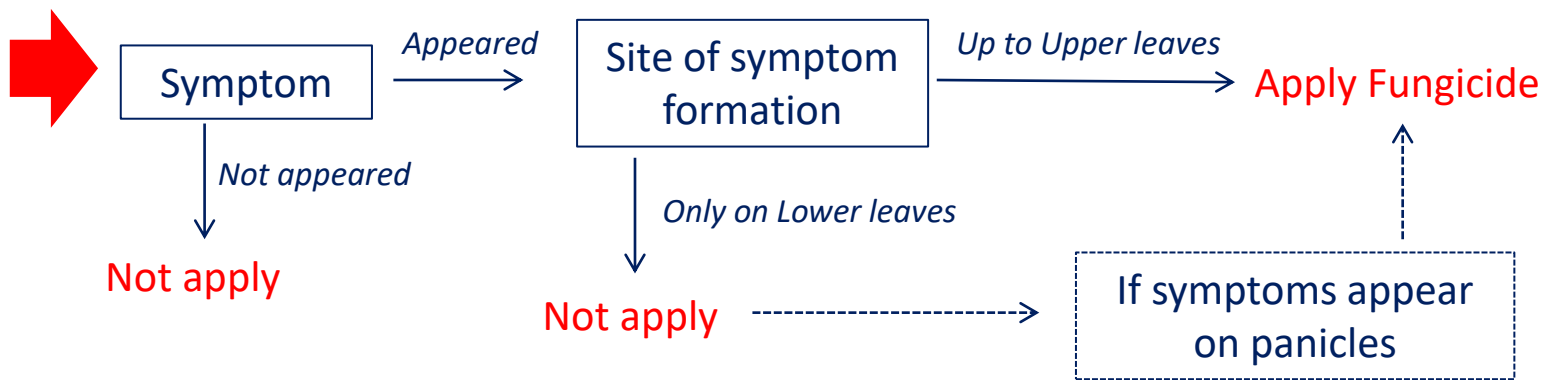
- If these symptoms appear, the fungicide that is effective in Blast should be sprayed immediately to prevent epidemic in whole field.

Panicle Blast





- Do not be delay to apply fungicide, when the symptom of the disease appear,.
- If fungicide is applied after the spread of Blast, damaged plants do not recover well.



# Even if symptoms is appeared only on lower leaves, sometimes panicle blast is developed.



# Dead rice plants by Blast





Back side

- If symptoms of Blast appear on upper leaves, spray the fungicide.
- Spray fungicide at full heading time as necessary.

Method of spraying the fungicide [Example]

- 100 litres of 1000-fold dilute solution of **TOPS-M** (or **THIPOSIN**) is applied for  $\frac{1}{4}$  acre.

Face

RC OST 2-4

## Foliage application for “Blast”

*# If symptoms appear*



TOPS-M 70% WP 1,000-fold, 100L /  $\frac{1}{4}$  acre  
(THIOPSIN 70% WP)

1<sup>st</sup> application :



Just before heading time

2<sup>nd</sup> application:



Full heading time  
(As necessary)

⑧

### Important Note:

- The dilution ratio and spray volume are different from chemical to chemical.

# Foliage application for “Blast”

# If symptoms appear



TOPS-M 70% WP 1,000-fold, 100L / ¼ acre  
(THIOPSIN 70% WP)

1<sup>st</sup> application :



Just before heading time

2<sup>nd</sup> application:



Full heading time  
(As necessary)

## How to make 1,000-fold dilute solution:

- The bottle for water can be used as in place of the scale to measure dust formulation chemicals.
- 15 grams of TOPS-M equivalents to six (6) scoops of it.
- Mix 15 litres of water and 15 grams of TOPS-M (or THIPOSIN) and then put it in a knapsack sprayer for 1 round of spray

## Chemical Control for Blast (Foliage application)

How to make 1,000-fold solution of TOPS-M 70% WP (THIOPSIN 70% WP) for 100L / ¼ acre



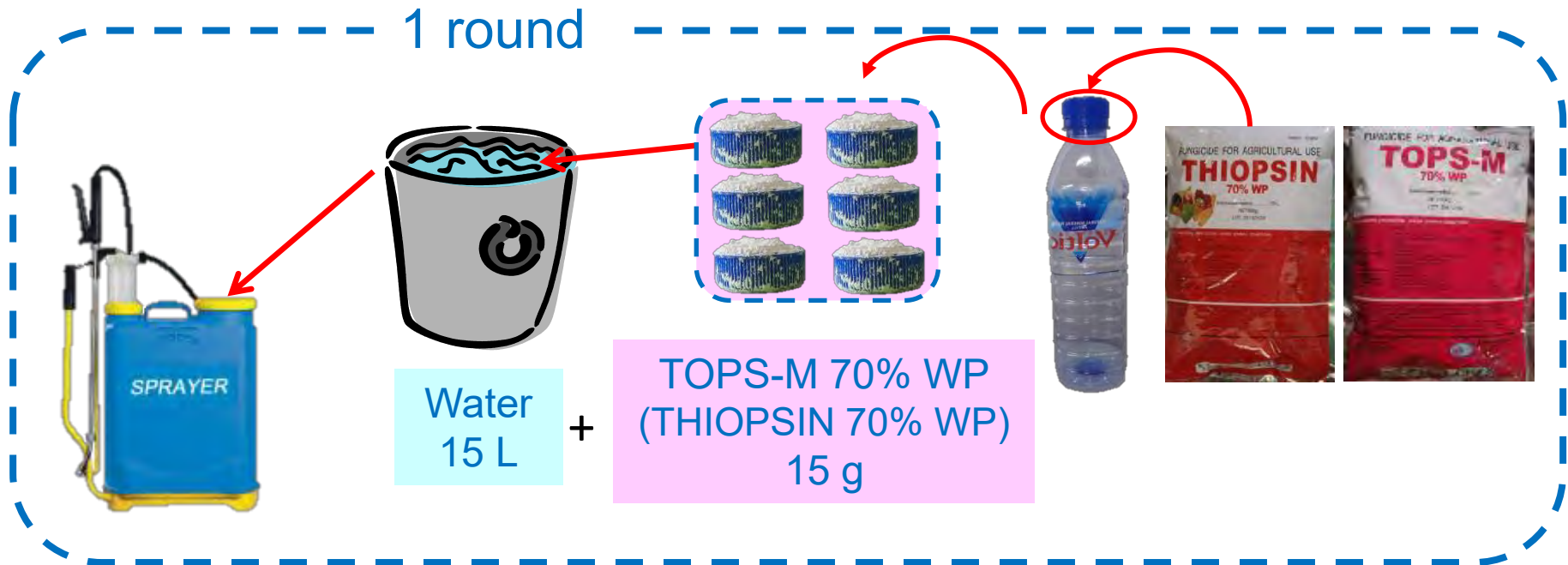
Total 105 grams of ***TOPS-M*** (or ***THIPOSIN***) and 105 litres of water which is equivalent of 7 rounds are required for ¼ acre.



# Chemical Control for Blast (Foliage application)

How to make 1,000-fold solution of TOPS-M 70% WP (THIOPSIN 70% WP) for 100L /  $\frac{1}{4}$  acre

1 round



x 7 rounds  $\doteq$  100 L  
for  $\frac{1}{4}$  acre

Back side

## How to apply:

In case of **TOPS-M** or  
**(THIOPSIN)**

- First, mix 15 litres of water and 15 grams of TOPS-M (or THIPOSIN) and spray it to 1/7 of ¼ acre field.
- Then, mix same dilute solution and spray it to the next 1/7 of the field.
- Repeat it 5 more times.

Face

## Chemical Control for Blast (Foliage application)

RC OST 2-4

How to apply 1,000-fold solution of TOPS-M 70% WP (THIOPSIN 70% WP) for 100L / ¼ acre

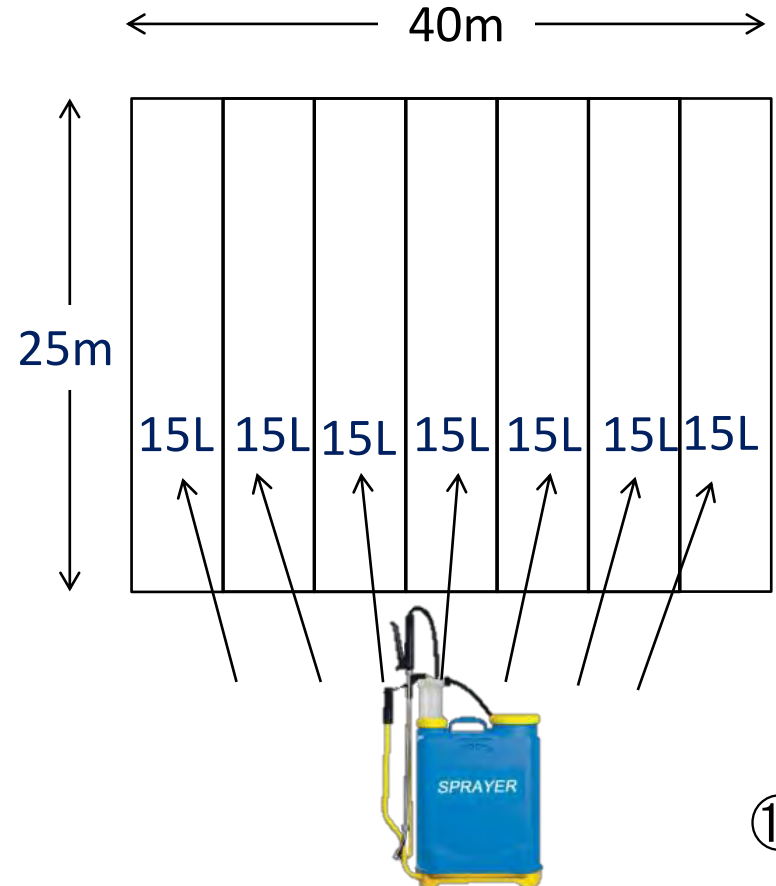


# Chemical Control for Blast (Foliage application)

How to apply 1,000-fold solution of TOPS-M 70% WP (THIOPSIN 70% WP) for 100L / ¼ acre



x 7 rounds  
for ¼ acre



Back side

- The yellowing of leaves starts from the tip of lower leaves.
- Plants become stunted and the number of tillers is reduced.



- If the chemicals are applied, damaged plants do not get well.
- But, further spreading of diseases can be prevented by chemical control.



Face

RC OST 2-4

# Virus Disease

by insect transmitted virus





Back side

- This kind of disease is transmitted by *hoppers or beetles*.
- If symptoms appear, apply insecticide.



- There is no effective treatment for virus diseases of rice.
- Countermeasures against those diseases are removing damaged plants from the field and spraying insecticide to prevent an epidemic of diseases.



**Virus Disease**  
by insect transmitted virus





Back side

## Method of spraying the insecticide [Example]

- Twenty (20) litres of 250-fold dilute solution of the insecticide is applied for 1 / 4 acre.
- 20 litres of water and 80 mL of insecticide are required.

Face

## Virus Disease by insect transmitted virus

- Chemical Control by insecticide



13

- First, mix 10 litres of water and 40 mL of insecticide and spray it to half of ¼ acre field.
- Then, mix another 10 litres water and 40 mL of insecticide and spray it to the other half of the field.

# Virus Disease

by insect transmitted virus

- Chemical Control by insecticide

*Chlorpyrifos 150 ~ 300-fold 12 ~ 24L / ¼ acre*



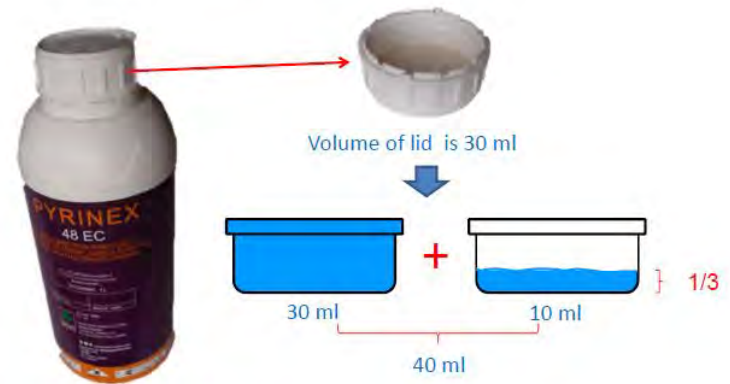
Back side

- The Lid of bottle of liquid formulation chemical can be used as measure cup.

- Volume of lid is differ from product to product.

Face

## Method of measuring chemicals

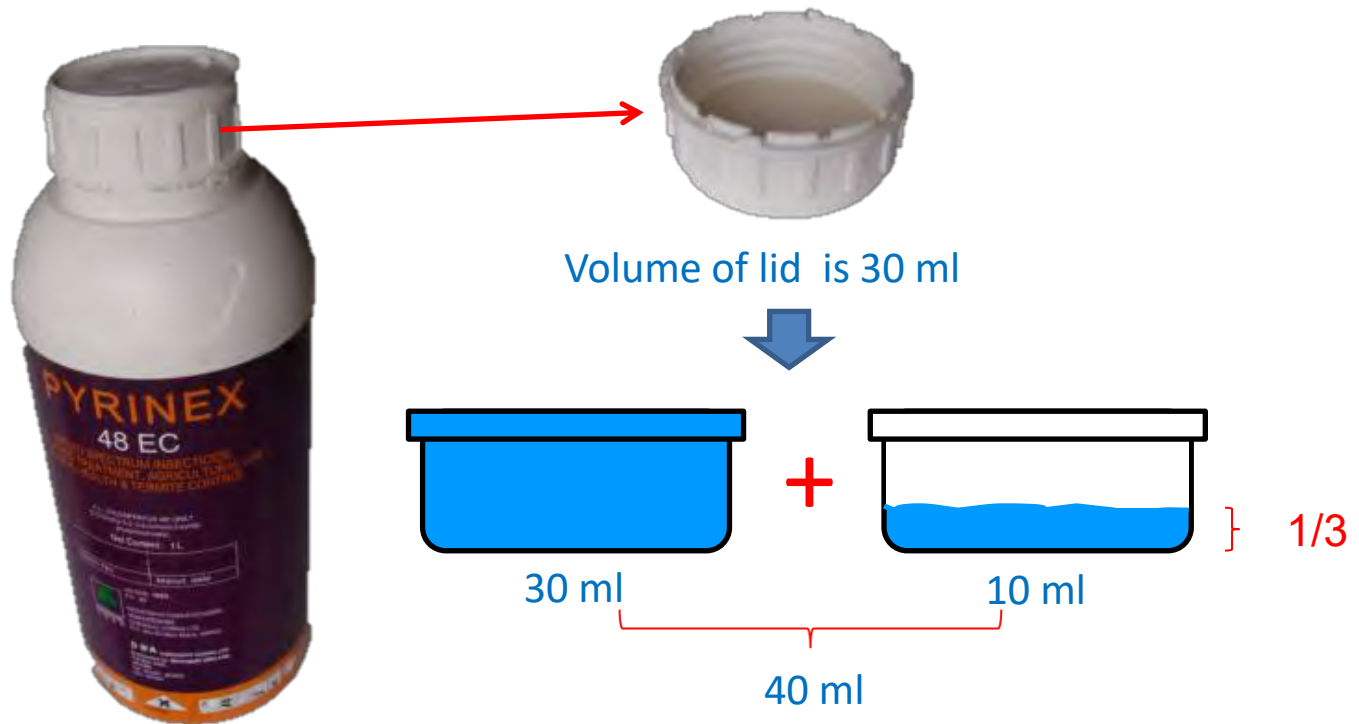


Note:

Volume of lid is differ from product to product



# Method of measuring chemicals



Note:

Volume of lid is differ from product to product

Back side

## False smut

- This disease can be controlled by fungicide application before heading time.
- Excess fertiliser application encourages a development of this disease.
- If fungicide for Blast is applied, this disease is also controlled.

Face



Bakanae disease



15

## Bakanae Disease

- This disease can be reduced by seed selection.

Face



RC OST 2-4





Back side

## Brown spot

- This disease tends to occur in low fertile soil fields.
- There is no need to control by chemicals.
- Improvement of soil fertility is necessary rather than chemical control.

Face

Brown spot



Damaged panicle by Stem borer



16

## Stem borer

- Before insecticides are applied against Stem borer, the cost of chemical control and the loss caused by Stem borer should be compare.

## Brown spot



## Damaged panicle by Stem borer





Back side

Face

RC OST 2-5-2

# Quality Seed Production

For 2nd Training

MOFA-JICA Project  
Sustainable Development of Rain-fed Lowland Rice Production

## Purpose

- The purpose of the trial is to verify the quality seed production methods
- Equip the farmers with technique on how to produce quality rice seed in their fields.



MOFA/JICA TENSUI RICE

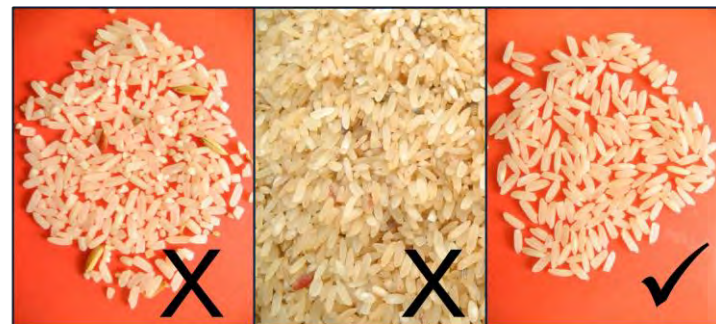
Rice  
Cultivation

# Quality Seed Production

## Purpose of quality seed production

- Seed is one of the most important component to achieve higher yield and higher quality in rice cultivation
- Very few farmers have access to the certified seeds in Ghana, therefore the farmers have to produce necessary seed by themselves
- Seed quality have to be maintained in order to preserve the purity of a variety

## Why quality seed ?



Many broken grains are mixed

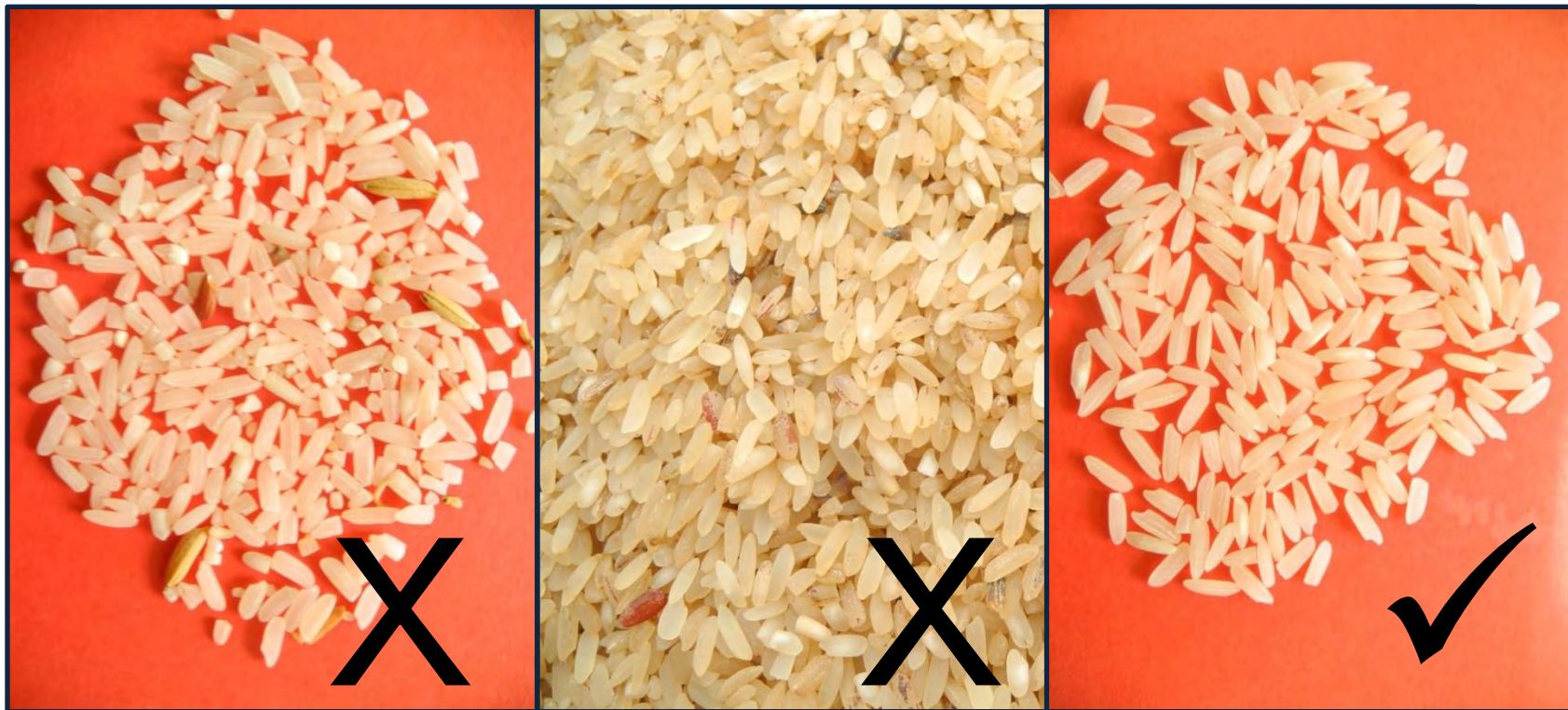
Other varieties or other crops and weeds are mixed

Genetically pure, Not infected pests, Fulfilling grains

## Conditions for Quality Seed

1. Purity
  - Genetically-pure
  - Not mixed with other varieties
  - Not mixed with other crops and/or weeds
2. Healthy
  - Not infected pests and/or diseases
  - High germination ratio
  - Not mixed with damaged grains
3. Good Quality
  - Fulfilling grains
  - Uniformly fine

# Why quality seed ?

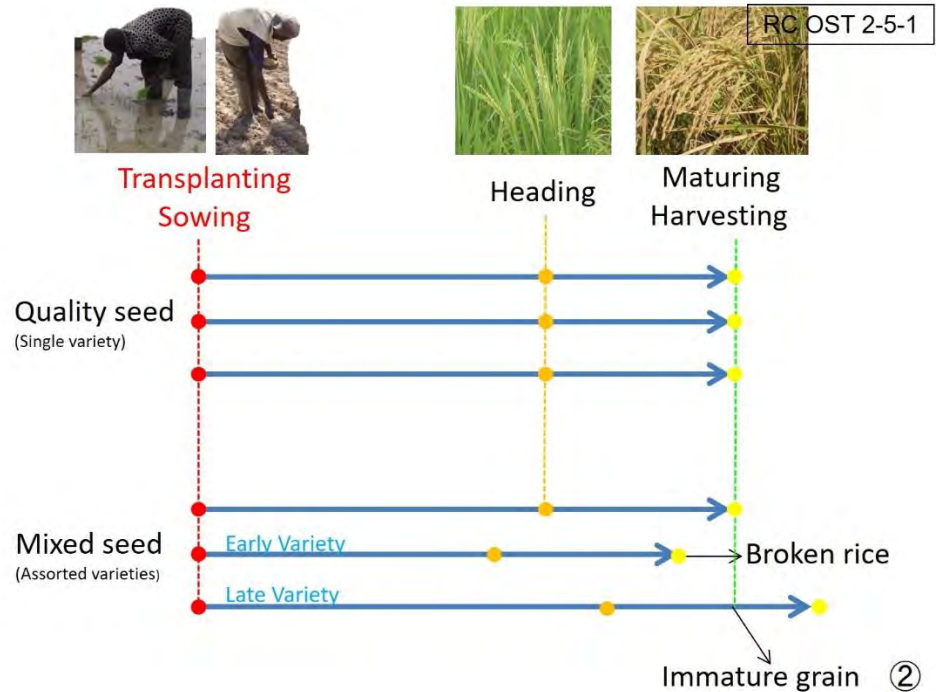


Many broken grains  
are mixed

Other varieties or  
other crops and  
weeds are mixed

Genetically pure,  
Not infected pests,  
Fulfilling grains

- If mixed seed is used, heading and maturing time is unequal.
- Therefore, over-dry grains and immature grains are mixed in harvested grains.
- Over-dry grains cause broken rice and immature grains become thin grains and screenings.



- If quality seed is used, heading and maturing are uniform.
- Then, the rice quality is improved and milling loss is decreased.





RC OST 2-5-1

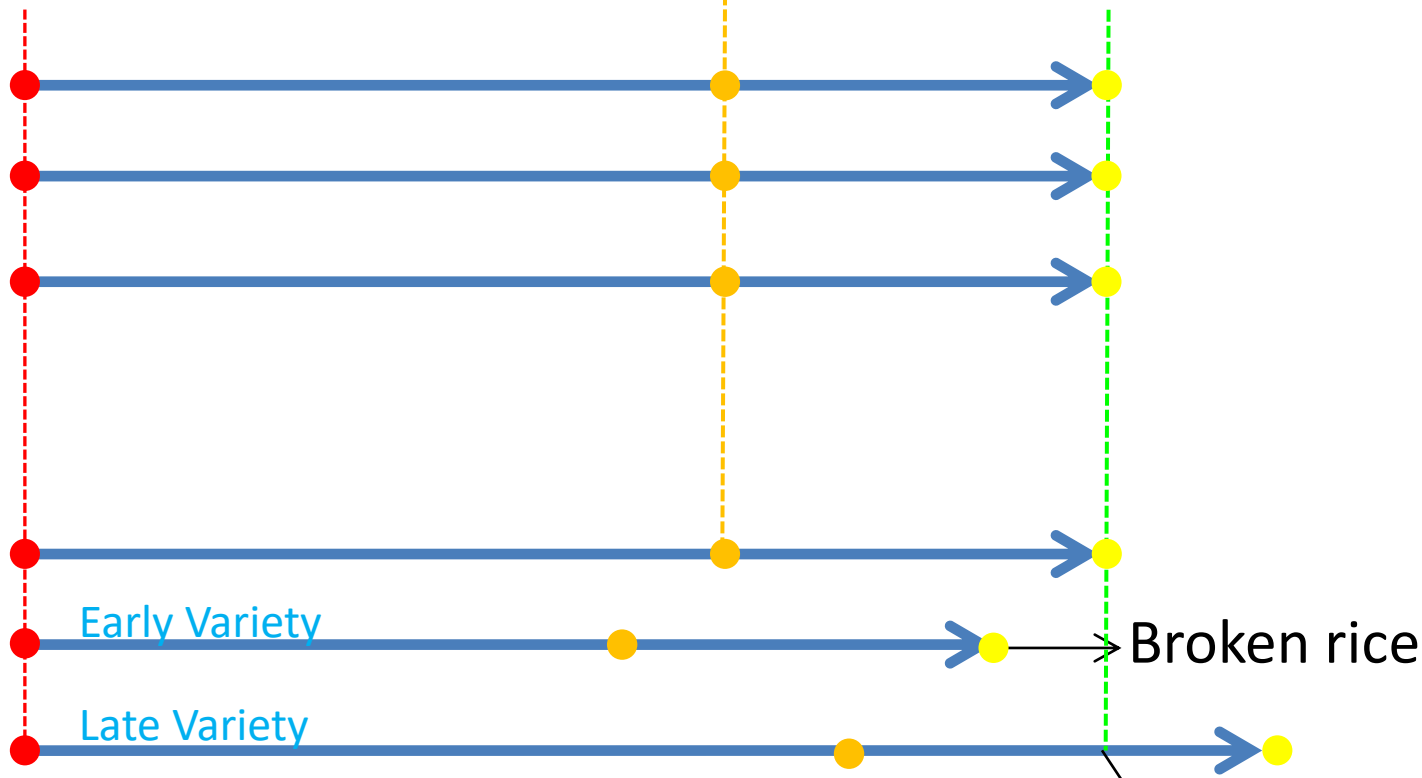
Transplanting  
Sowing

Heading

Maturing  
Harvesting

Quality seed  
(Single variety)

Mixed seed  
(Assorted varieties)



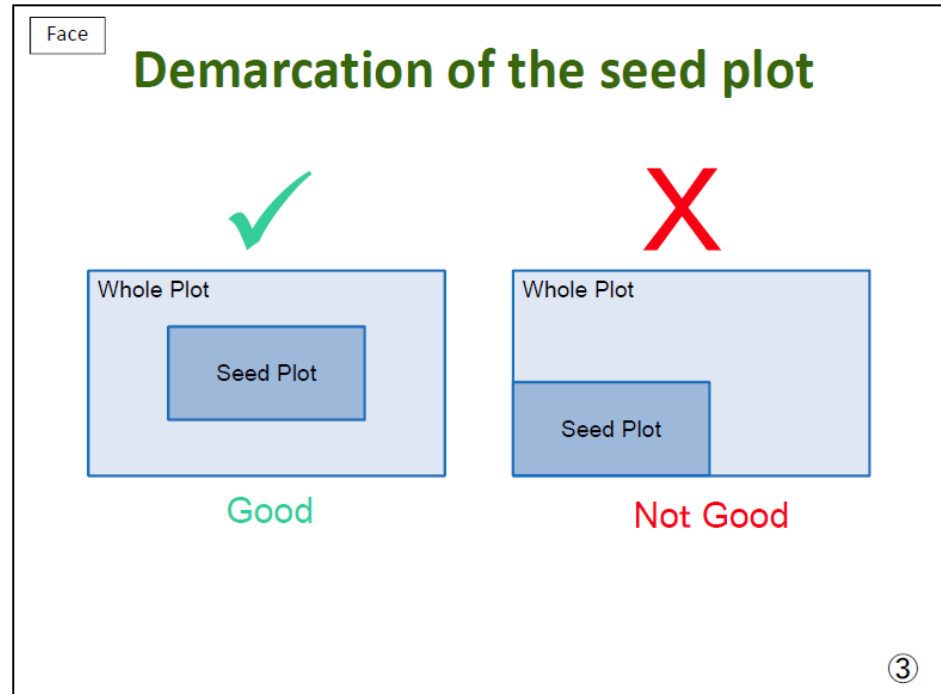
Immature grain ②

Back side

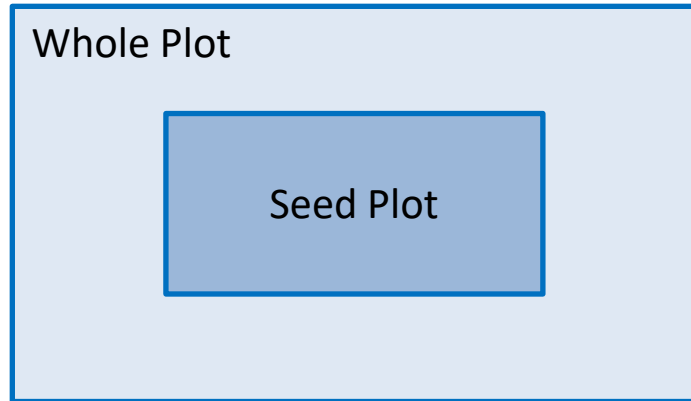
- Seed plot must be demarcated at the center, NOT on the corner or border of the field.

Why?

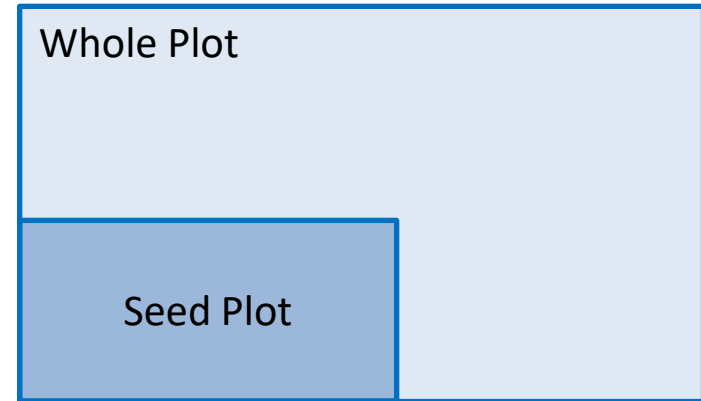
- Edge of field may be contaminated by diseases. Seed must be disease free.
- Prevent mixture of other varieties. Seed must be pure variety.



# Demarcation of the seed plot



Good



Not Good

Back side

- Off-types can be identified by plant height, colour of grain, awned grain or awnless, heading time, etc.





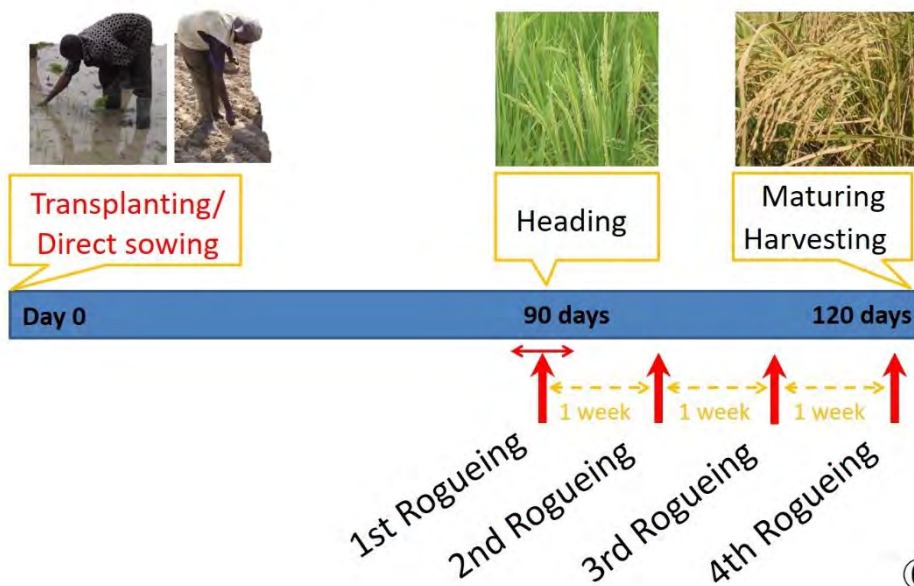
# Off-types





- Off-types and damaged plants are uprooted from the field (Seed plot) once a week from just before/after heading time to harvesting time.
- If abnormal plants or damaged plants appear, those should be removed from the field even though it is before heading time.

## Off-type Removal (Rogueing)



- Although rogueing is sometime done by cutting panicles, off-types must be uprooted.

# Off-type Removal (Rogueing)



Transplanting/  
Direct sowing



Heading



Maturing  
Harvesting



1st Rogueing  
2nd Rogueing  
3rd Rogueing  
4th Rogueing

Paddy field in which pure seed is not used



Paddy field in which pure seed is not used.



Paddy field in which pure seed is not used





Paddy field in which pure seed is used



Paddy field in which pure seed is used.



Paddy field in which pure seed is used





# Value Chain of Local Rice



- Let's explain target farmers the local rice value chain and reasons why they need to apply new techniques for rice production!
- Farmers are in the most important position among value chain actors!





MOFA/JICA TENSUI RICE PROJECT

# Value Chain of Local Rice

Farming  
Management

Good quality of Local Rice makes everybody happy!!

**-Ashanti Region-**

# Why metropolitan consumers do not purchase local rice?

## **1) Presence of stones**

It is tedious for busy metropolitan consumers to remove stones by themselves and they prefer to purchase imported rice without stones.

## **2) Selling without packaging**

Packaged rice in small size is preferred by metropolitan consumers because it is less likely to be affected by rats, insects, moisture, etc. and can be easily kept at home.

## **3) Cleanliness**

It is tedious for busy metropolitan consumers to remove contaminants such as husks and dust.

# *Why metropolitan consumers do not purchase local rice?*



**1) Presence of stones**



**2) Selling without packaging**



**3) Cleanliness**





# *Which types type of rice do metropolitan consumers want to buy?*

**Local rice has a high potential!!**

**1) Good taste!**  The freshly harvested rice is delicious!

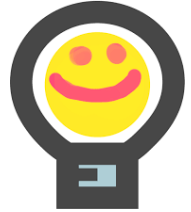
**2) Good smell (Aroma)**  The rice which is just milled has aroma, especially, aromatic varieties!

**3) Stone free**  
**4) Cleanliness**  
**5) Whiteness** }  These can be achieved by not putting rice directly on the rice field after harvesting, using tarpaulin when drying paddy and using rice mills equipped with de-stoners.  
**6) Package appearance**

 The number of domestic companies that sell local rice by making original packages is gradually increasing. They are constantly looking for good quality paddy as the demand for local rice is becoming higher.

# Which types of rice metropolitan consumers want to buy?

Local rice has higher potential!!



**1) Good taste**



**2) Good smell (Aroma)**



**3) Stone free**



**4) Cleanliness**



**5) Whiteness**



**6) Package appearance**

# Quality of your paddy affect an entire value chain

- When farmers sell good quality of paddy to aggregators or miller-sellers, they will like to buy it. It's because their customers such as wholesalers and retailers will definitely purchase good quality paddy and price negotiation will be easier.
- Final consumers will be able to eat delicious and healthy local rice which is comparable to imported rice.
- All the actors of local rice value chain such as farmers, aggregators, millers, wholesalers, retailers and customers will make better profit, if farmers produce good quality of paddy.



# Quality of your paddy affect an entire value chain

Farmers



Miller



**High quality**

A central graphic featuring a sack of rice with a yellow top and a fan of 50 Ghanaian Cedi banknotes. The text "High quality" is written in a stylized font with yellow lightning bolts around it. Below the sack and banknotes are two blue thumbs-up icons.

Wholesaler



Retailer



Customer



# Low quality of paddy can negatively affect the entire local rice value chain

- If farmers produce poor quality paddy, the entire local rice business may become stagnant.
- When farmers sell low quality paddy to aggregators or millers, they will refuse to buy it or purchase only at low price. **It's because their customers such as wholesalers and retailers will not purchase it at good price and price negotiation will be very difficult, too..**
- Wholesalers, retailers and final consumers in urban areas will purchase imported rice instead of low quality local rice.
- All the actors in the local rice value chain will have high risk of keeping paddy which can not be sold anywhere for long.



# Quality of your paddy negatively affect the entire value chain

Farmers



**Low quality paddy**



Miller



Wholesaler



Retailer



Customer



Do you want to sell rice to increase income?

If yes, we recommend you to apply all the technics of TENSUI 2 !!

Because.....,

**Do you want to sell rice to  
make increase income?**

# Apply all the technics!!

Application of all the TENSUI2 techniques can increase yield and sales volume of rice per acre. Quality of rice will become high enough to match the needs and wants of metropolitan consumers, price negotiation will be easier and rice can be sold at a higher price.

Farmers will be able to prepare good quality seeds and inputs for following seasons.

It is then expected that a positive spiral can be caused.



# Apply all the technics!!

## Farmers



## Aggregators



**Buy at higher price!**

## Miller





# If not apply the technics...

It will reduce yield and sales volume of rice per acre.

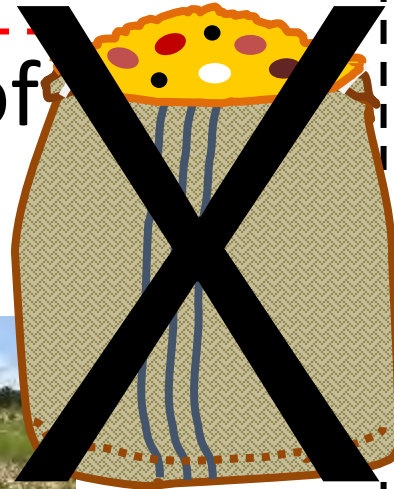
The quality of rice will become lower, price negotiation will be difficult and rice can not be sold at a higher price.

Farmers will not be able to prepare good quality seeds and inputs for next-season.

Then, a negative spiral can be caused.

*If not apply the  
technics...*

Poor condition of  
Paddy field



**Refused to  
Buy...**



Aggregator



Miller



# Good Practices of Farm Management



- We have several good practices of farm management found among TENSUI Project farmers. Today, let's learn about their stories! Then, you will be the ones who can be “good examples”!!

The image shows the cover of a training manual. At the top right, it is labeled 'FM-OST-2'. The cover features the logos of the Sustainable Development of Rain-Fed Lowland Rice Production Project and JICA. A green horizontal bar contains the text 'MOFA/JICA TENSUI RICE PROJECT'. The main title is 'Good Practices of Farm Management -Ashanti Region-' in large pink letters. A yellow vertical bar on the right side says 'Training Manual'. At the bottom, it says 'Page 1 (Front)' and 'Sustainable Development of Rain-Fed Lowland Rice Production MOFA/JICA TENSUI RICE PROJECT'.



MOFA/JICA TENSUI RICE PROJECT

# Good Practices of Farm Management

Rice  
CultivationFarming  
ManagementLand  
Development

Extension

Other

# Case 1:


- Let's learn about a good practice of Frenchman of Tepa, Ahafo Ano North District!

(shared in August 2014)

**Case 1:**

**Profit Increase after Quality Improvement**

**-Frenchman of Tepa-**



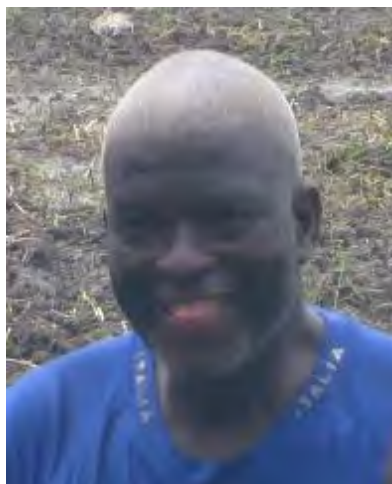
Page 2 (Front)





# Case 1:

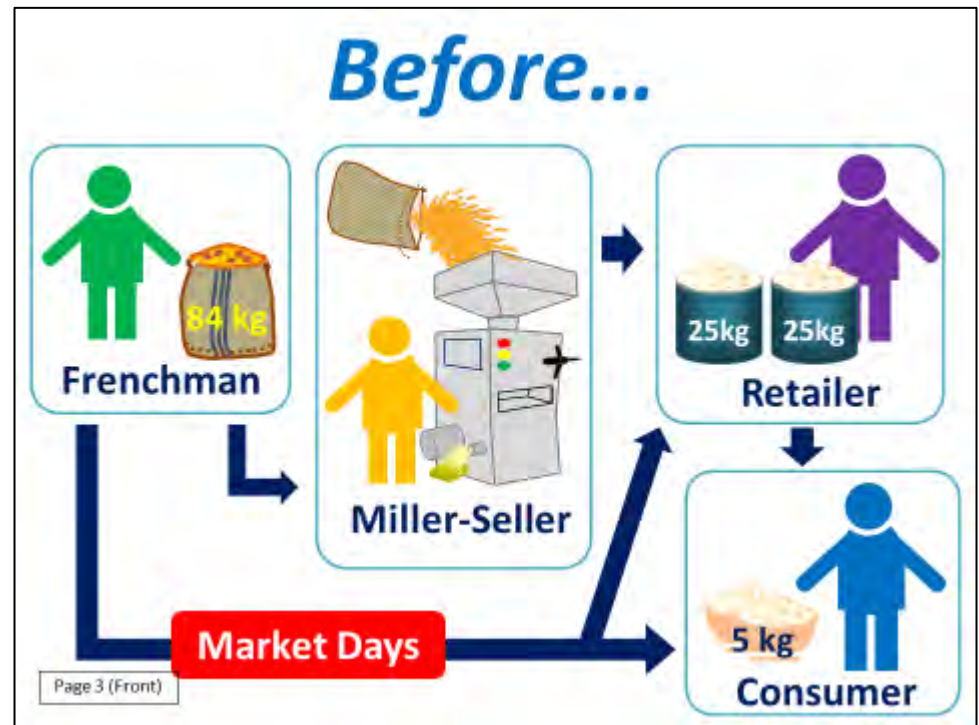
## Profit Increase after Quality Improvement *-Frenchman of Tepa-*



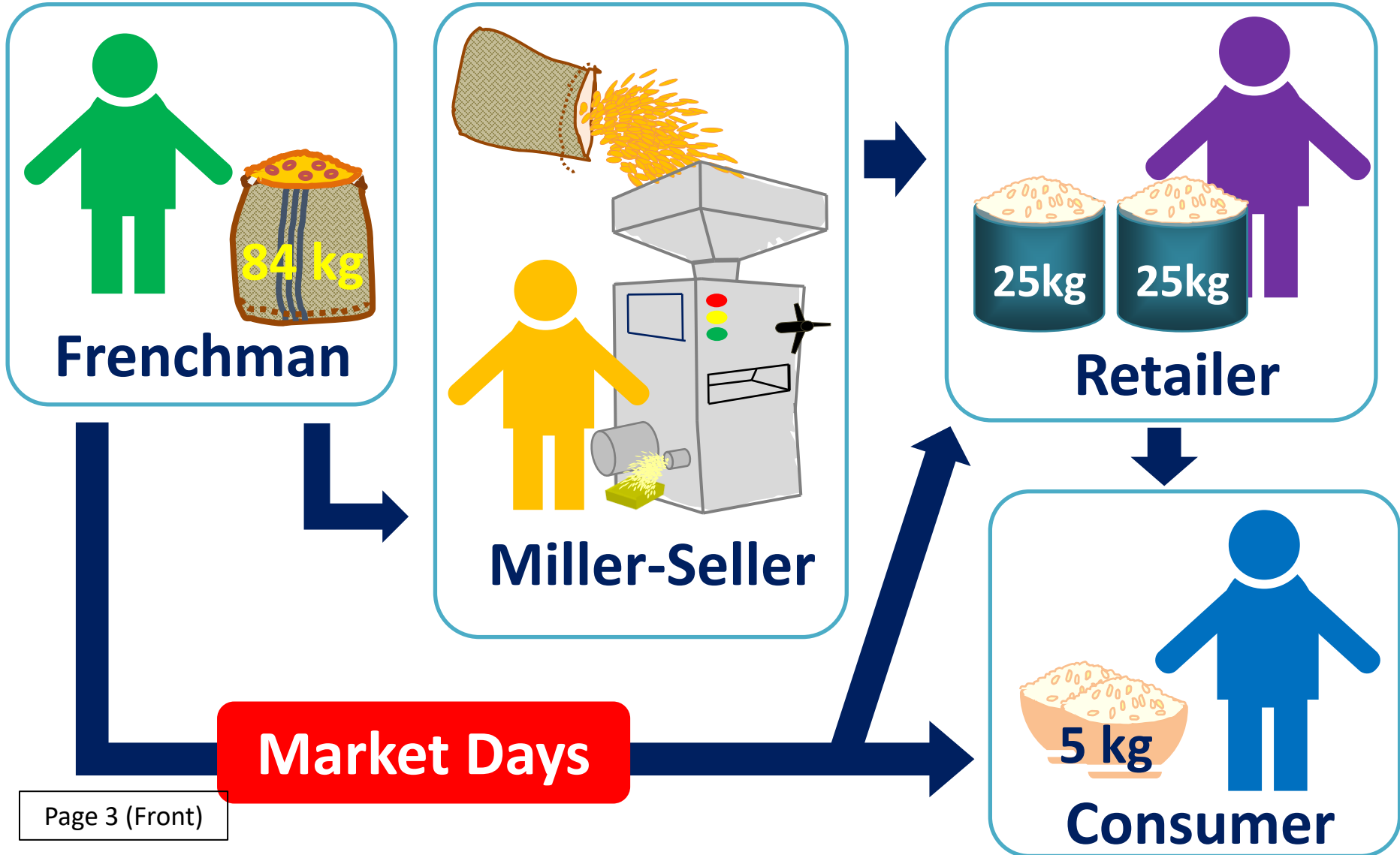
# Before...



- Frenchman of Tepa used to produce average quality rice before joining the TENSUI project. He brought his paddy to a miller-seller in the Tepa town and the miller seller sold the milled rice to retailers, who sold the rice to consumers.
- Sometimes, Frenchman was able to sell the paddy directly to retailers or consumers on market days.

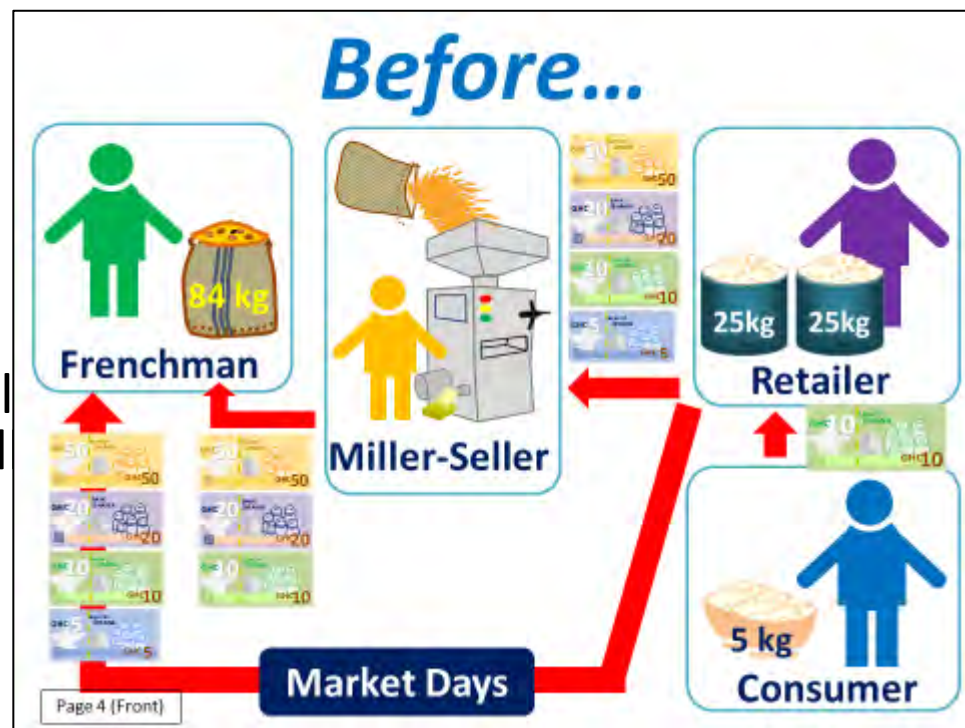


# Before...



# Before...

- Retailers paid miller- sellers GHc 85 for 50kg bag milled rice. Then he paid GHc 80 to Frenchman after deducting the milling charge GHc 5.
- Retailers sold 5kg of milled rice to consumers at GHc 10 (Ghc 100/50kg milled rice).
- When Frenchman was able to sell milled rice to retailers on market days, they paid GHc 85 directly to Frenchman.
- Because there is no intervention by a miller-seller between Frenchman and retail income than he did through a mil



# Before...



**Frenchman**

**Miller-Seller**

GHC 50  
BANK OF GHANA  
GHC 50  
GHC 20  
BANK GHANA  
GHC 20  
GHC 10  
BANK OF GHANA  
GHC 10  
GHC 5  
BANK OF GHANA  
GHC 5

**Retailer**

GHC 50  
BANK OF GHANA  
GHC 50  
GHC 20  
BANK GHANA  
GHC 20  
GHC 10  
BANK OF GHANA  
GHC 10  
GHC 5  
BANK OF GHANA  
GHC 5

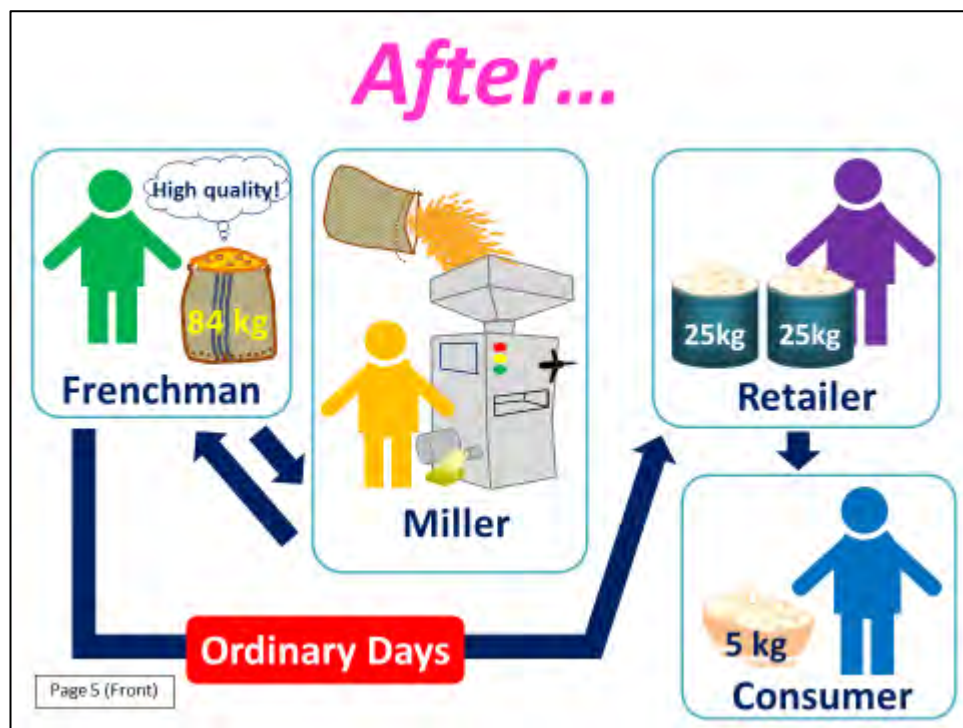
**Consumer**

**Market Days**

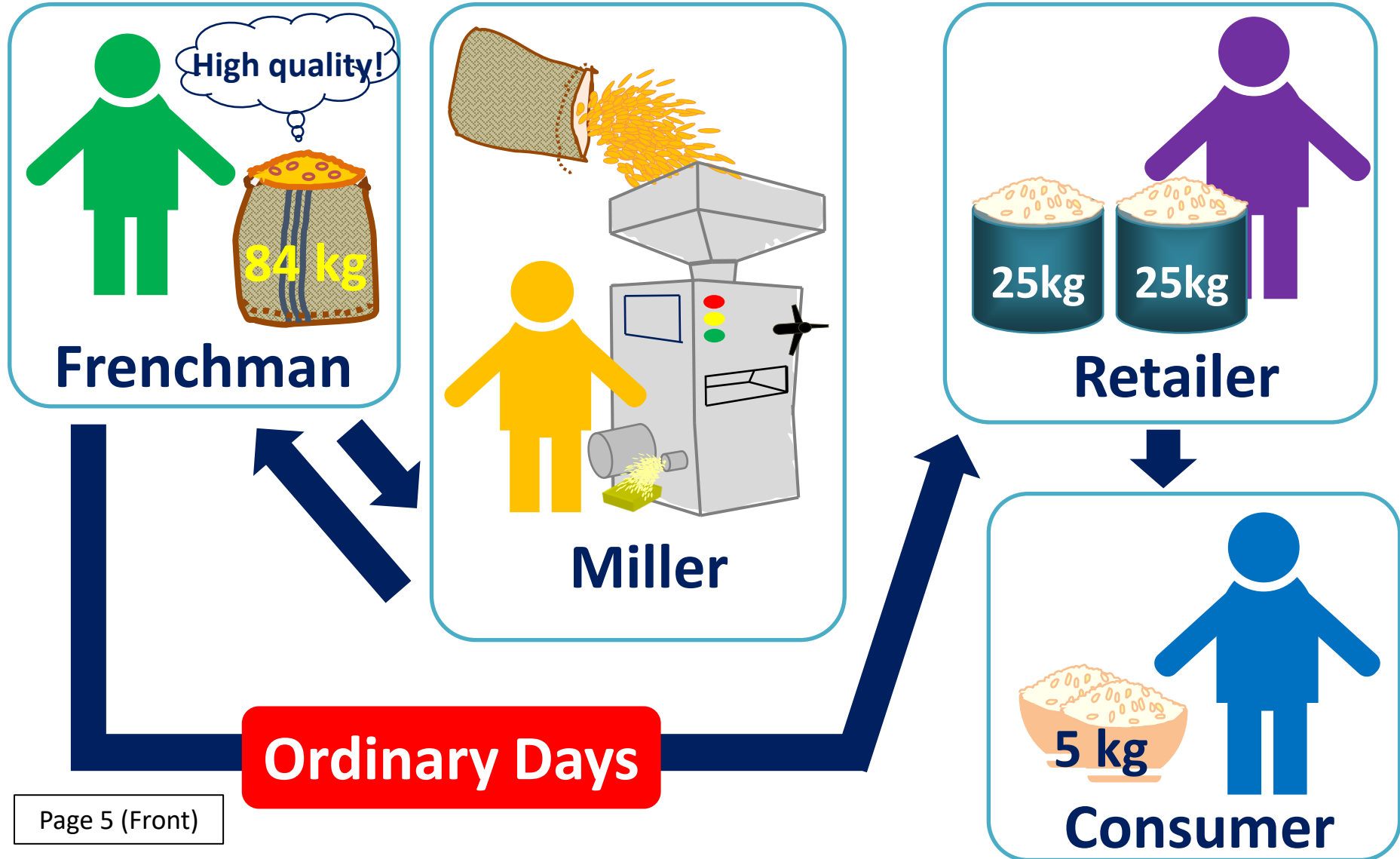


# After...

- After Frenchman joined the TENSUI Project and improved his rice quality, he started to send the high quality paddy to the miller. Then, Frenchman collected the milled rice and sold directly to retailers on any day without waiting for market days.

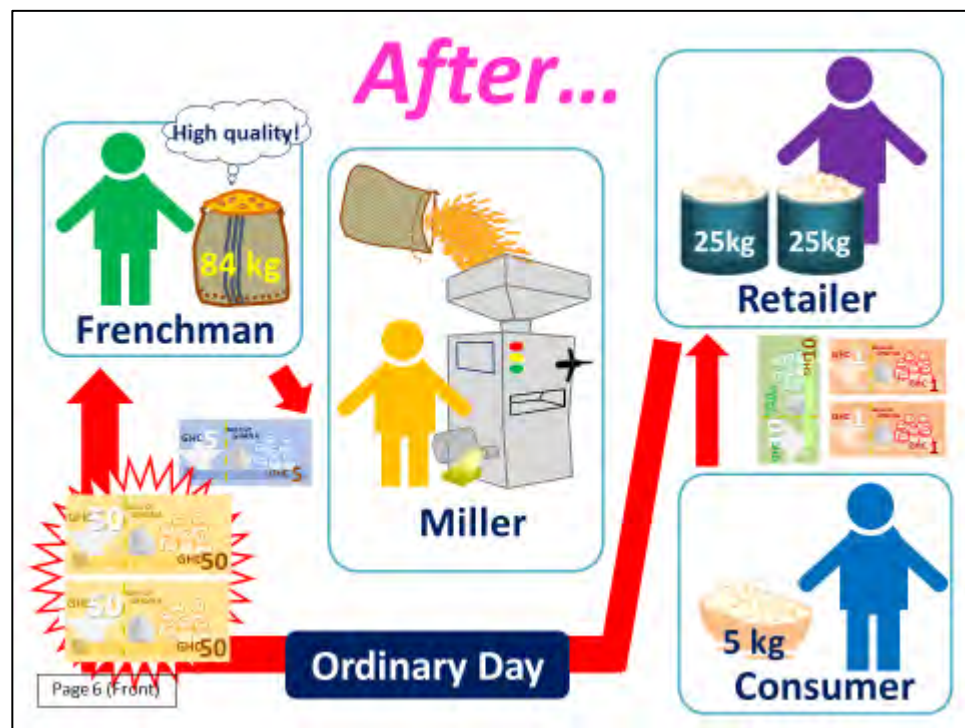


# After...



# After...

- After Frenchman began to produce good quality rice, he was able to receive GHc 100 for 50kg milled rice from retailers.
- Frenchman then gave Ghc 5 to the miller as milling charge. The difference GHc 15 was then made in his income by selling directly to retailers.
- Retailers were also selling to consumers at GHc 12 per 5kg milled rice (GHc 120 / 50kg of milled rice).



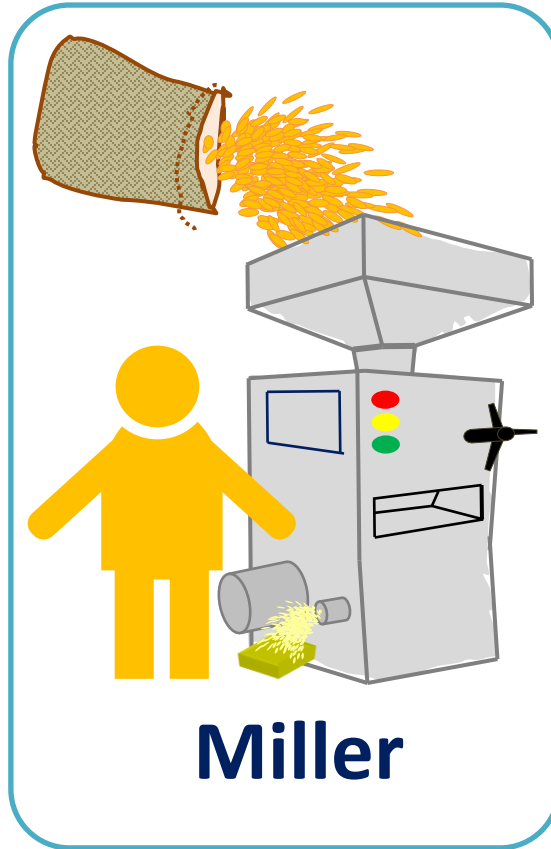
# After...



High quality!

84 kg

**Frenchman**



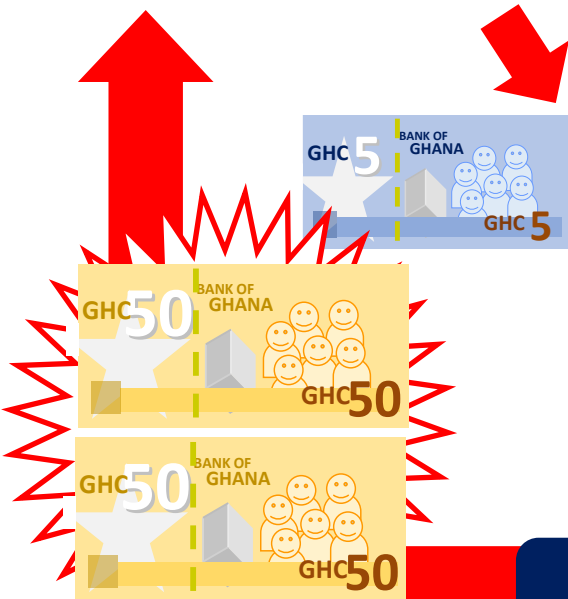
**Miller**



25kg 25kg

**Retailer**

The Development of your Retail Business  
JICA



GHC 50

BANK OF GHANA

GHC 50

GHC 50

GHC 50

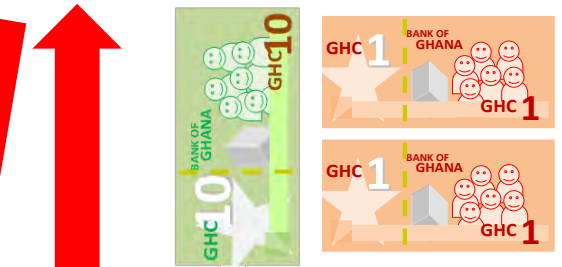
GHC 50

GHC 5

BANK OF GHANA

GHC 5

**Ordinary Day**



GHC 10

BANK OF GHANA

GHC 1

BANK OF GHANA

GHC 1



5 kg

**Consumer**

# Case 2:

- Let's learn about a good practice of Mr. Sapio of Konongo Community in Asante Akyem Central District!  
(shared in August 2014)

## Case 2:

### Direct Marketing of High Quality Rice *-Sapio of Konongo-*





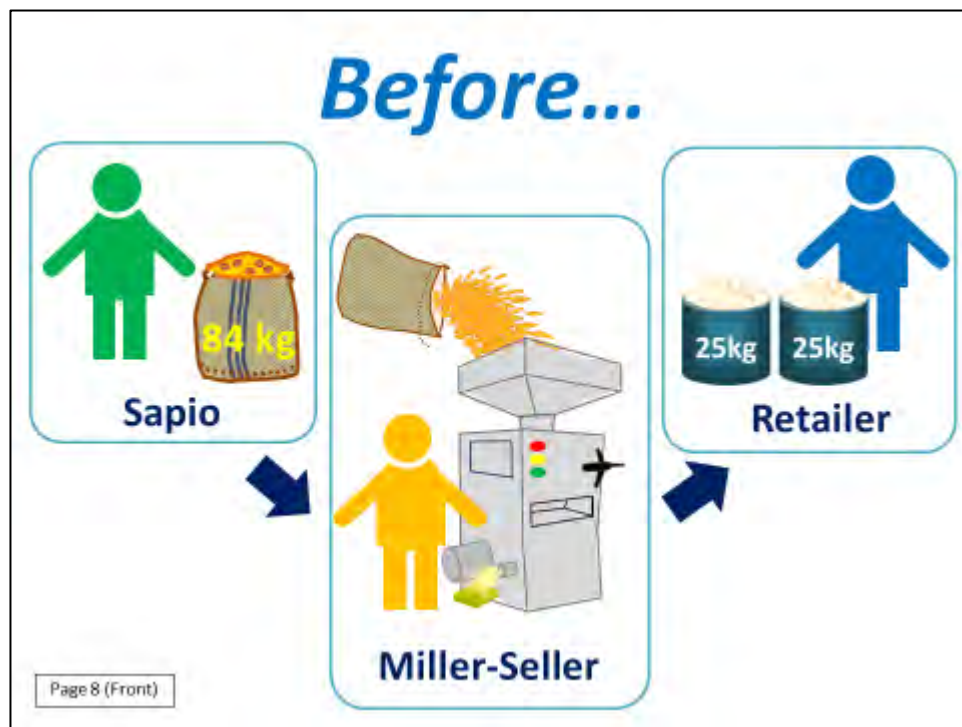
# Case 2:

## Direct Marketing of High Quality Rice *-Sapio of Konongo-*

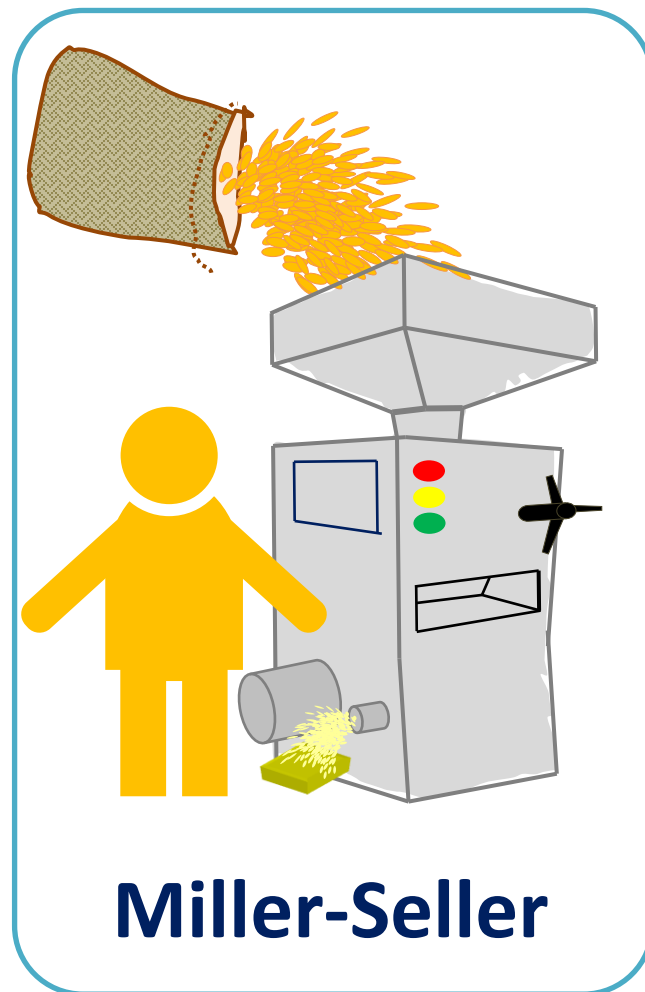


# Before...

- Mr. Sapio was producing high quality rice using the TENSUI methods. He used to ask a miller to sell his rice to retailers and consumers after milling on behalf of him. Then, the miller sold the rice to consumers who came to his milling station. The miller functioned as a “miller-seller”.

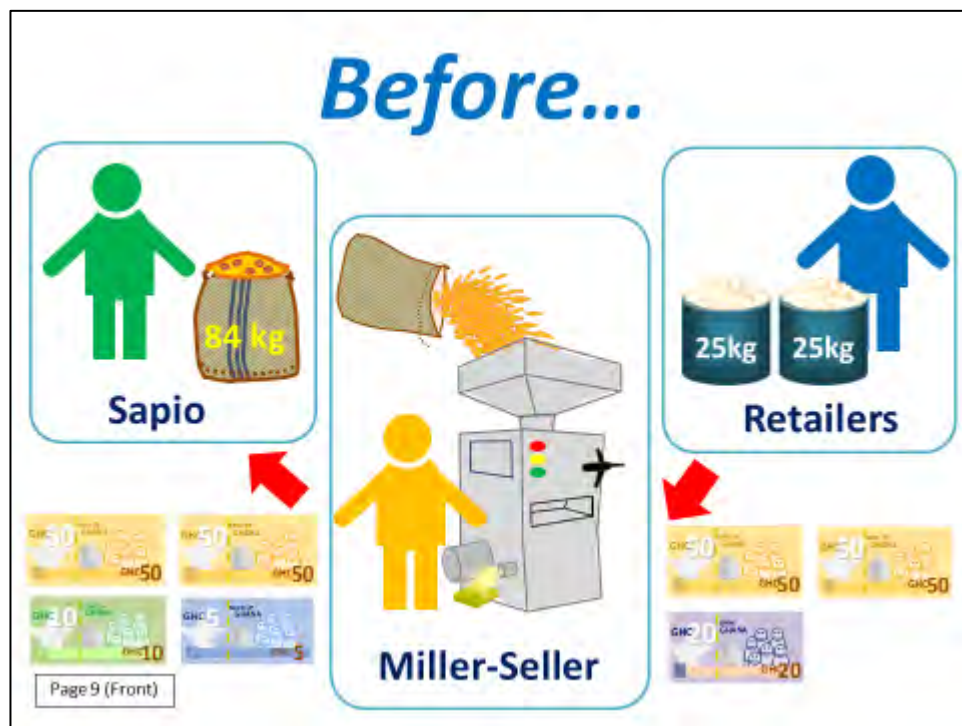


# Before...



# Before...

- At that time, the prevailing price of milled rice was GHC 120/50kg. However, there was no price difference between high quality and low quality. Retailers paid GHC 120/50kg to the miller and the miller gave GHC 115/50kg to Mr. Sapio after deducting GHC 5/50kg as a milling fee.
- This means his total profit was GHC115/50kg.

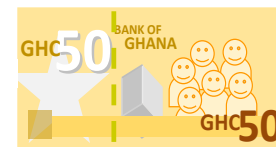
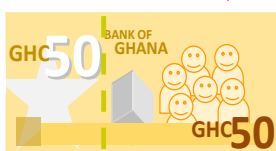


# Before...

**Sapio**

**Miller-Seller**

**Retailers**





# Then...

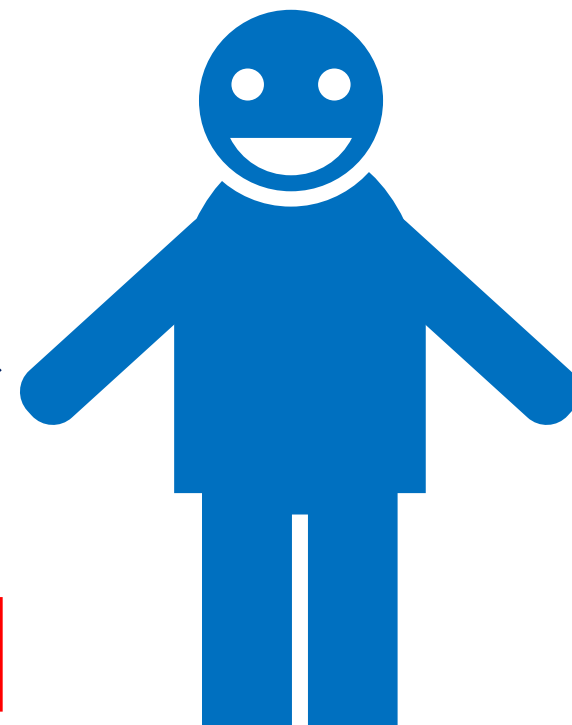
- Then, Mr. Sapio started sale promotion to retailers and consumers by giving samples of quality milled rice. Retailers were very happy about the quality and they started to realize the value of his rice.



# Then...



**Sapio**

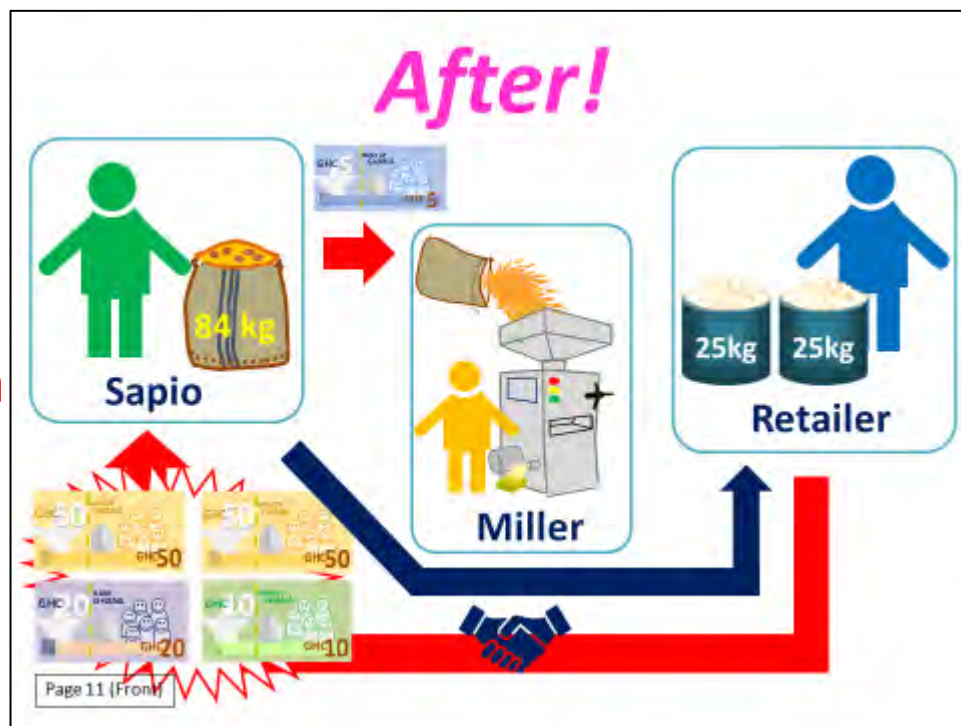


**Retailer**



# After!

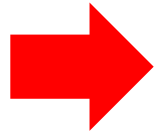
- Eventually, Mr. Sapio started to sell the milled rice directly to the retailers at GHC 130/50kg without intervention of the miller.
- Because he still had to pay GHC 5/50kg to the miller, the total profit was GHC 125/50kg.
- This is how he got profit increase (GHC10/50kg milled rice)!
- **Ask participants: Do you know any retailers or consumers around you who can be interested in high quality rice? How are you going to negotiate with them for higher price?**



# After!

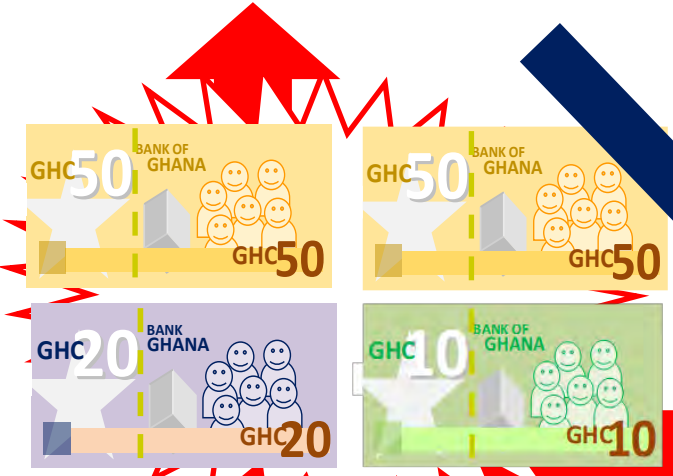


**Sapio**



**Miller**

**Retailer**




# Case 3:

- Let's learn about a good practice of Cyprian of Konongo Community in Asante Akyem Central District!
  - (shared in August 2014)

**Case 3:**

**Saving Input Cost for Profit**  
**-Cyprian of Konongo-**



Page 12 (Front)



# Case 3:

## Saving Input Cost for Profit *-Cyprian of Konongo-*



# In 2012...

- In 2012, unit price for 50kg bag of NPK was GHc 31 and Urea cost GHc 32 per 50kg bag.
- A litre of herbicide was sold at GHc 11.5

**In 2012...**



**NPK**  
GHc 31/50kg bag

**UREA**  
GHc 32/50kg bag

**HERBICIDE**  
GHc 11.5/1 L bottle

Page 13 (Front)

# In 2012...



**GHC 31/50kg bag**



**GHC 32/50kg bag**



**GHC 11.5/1 L bottle**

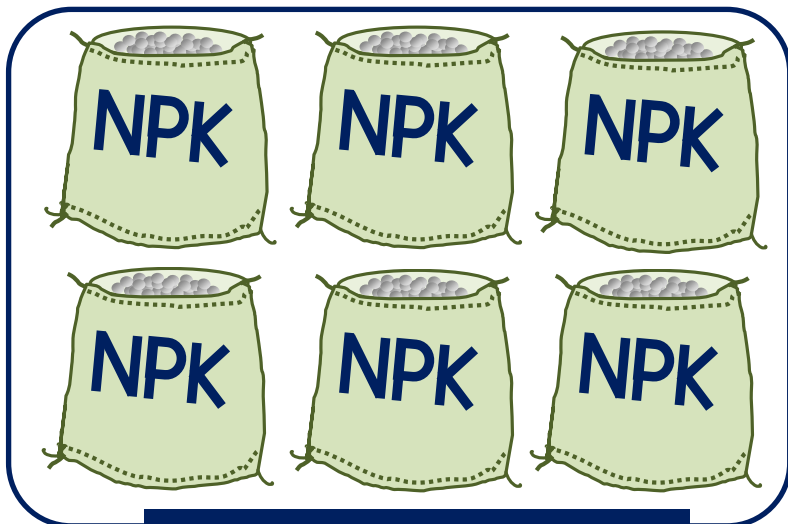
# At the End of the Cultivation Season in 2012...



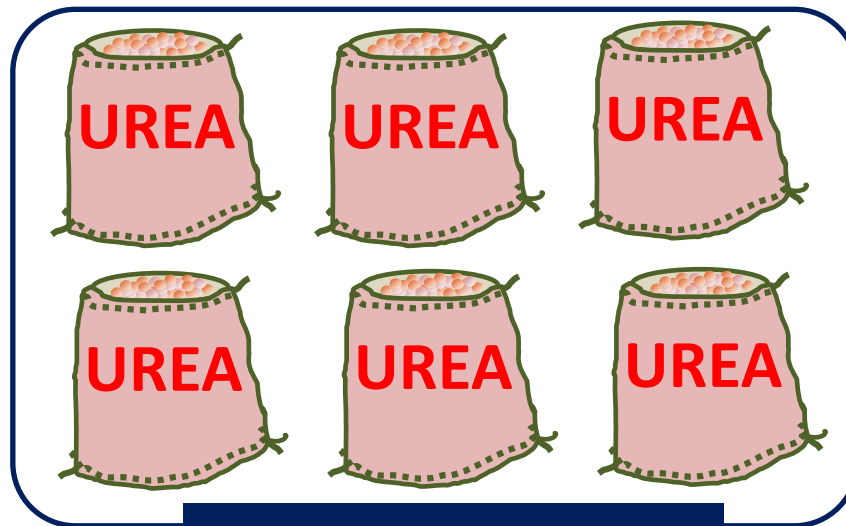
- At the end of cultivation season in 2012, Mr. Cyprian decided to buy 6 bags of NPK at the cost GHc 186. He also spent GHc 192 on 6 bags Urea. Again he purchased 6 litres of herbicide at cost of GHc 69.
- In total, he spent GHc 447 on the three inputs.



# At the End of the Cultivation Season in 2012...



**GHC 186/6 bags**



**GHC 192/6 bags**



**GHC 69/6 bottles**

**Total:  
GHC 447**



# In 2013...

- In 2013, NPK price increased to GHc 51/ 50kg bag whilst Urea was selling at GHc 55/ 50kg bag. A litre bottle of Herbicide was also increased to GHc 14.



# In 2013...



**GHC 51/50kg bag**



**GHC 55/50kg bag**



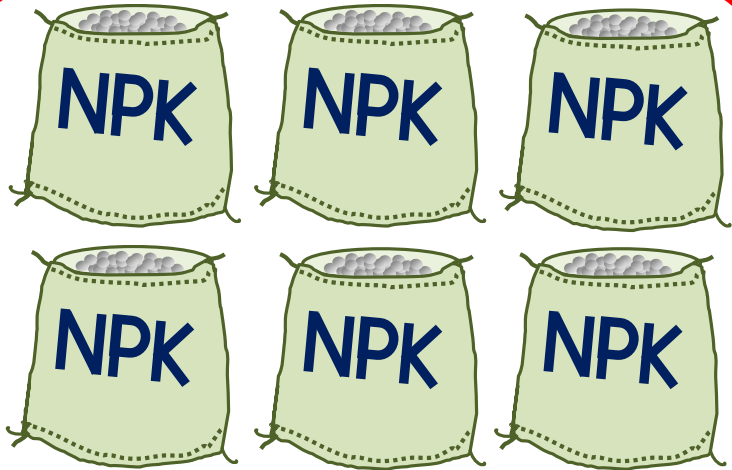
**GHC 14/1 L bottle**

# *If He Purchased the Inputs in 2013, He Would Have Spent...*

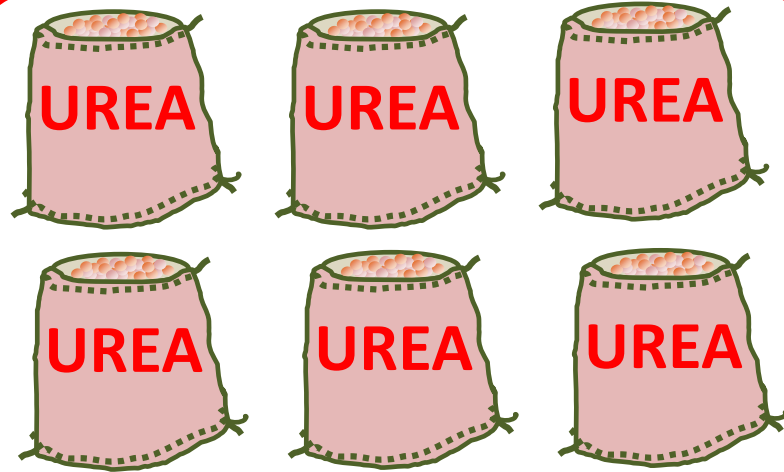
- If Mr. Cyprian was to purchase same quantity of inputs in 2013, he would have spent GHc 720 in total.



# *If He Purchased the Inputs in 2013, He Would Have Spent...*



**GHC 306/6 bags**



**GHC 330/6 bags**



**GHC 84/6 bottles**

**Total:  
GHC 720**

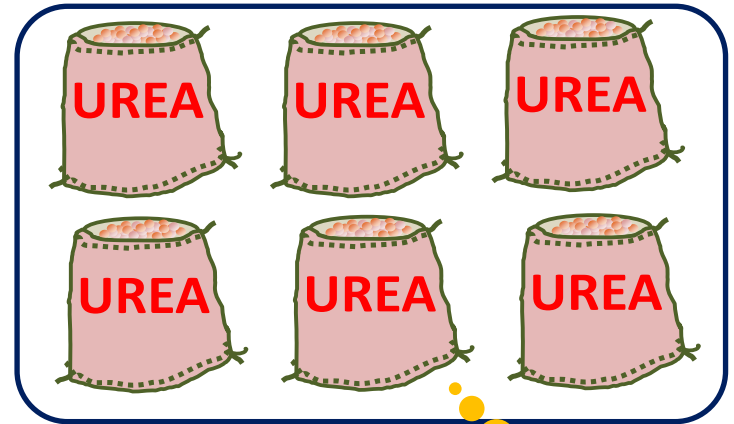
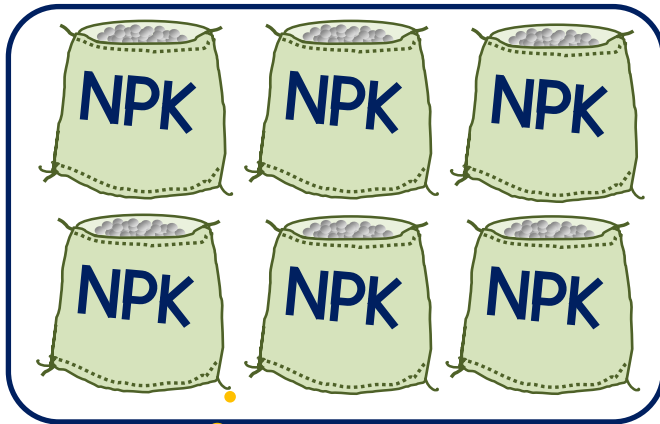
# However...

- However, he used the inputs acquired in the previous year (2012) for his 3 acres rice field in 2013.





# However...



Bought  
in 2012



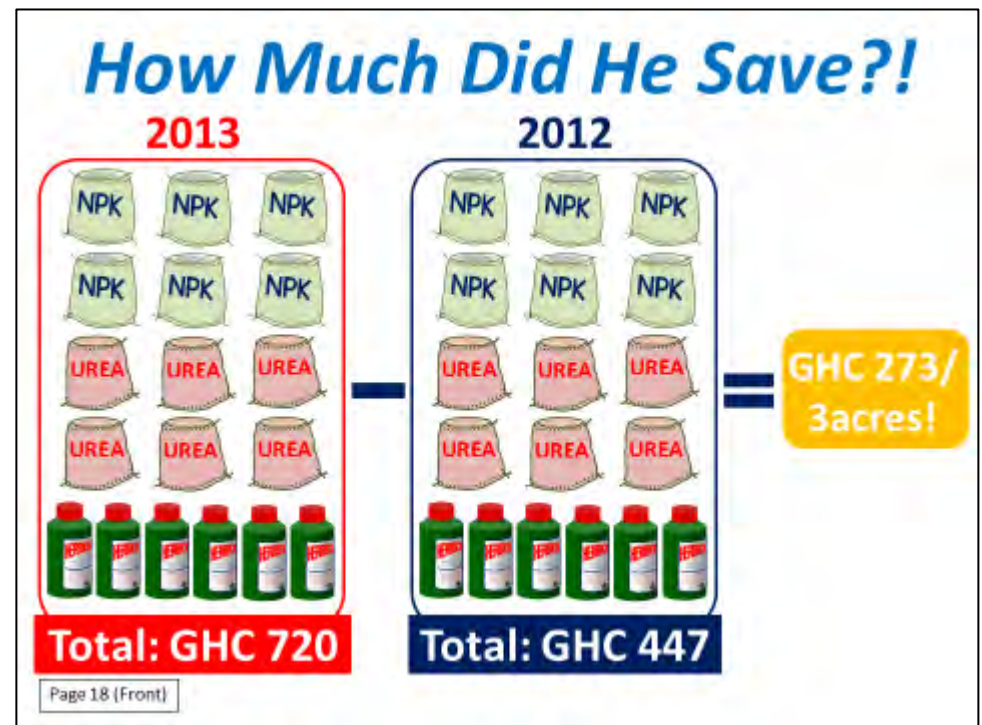
Bought  
in 2012



Bought  
in 2012

# How Much Did He Save?!

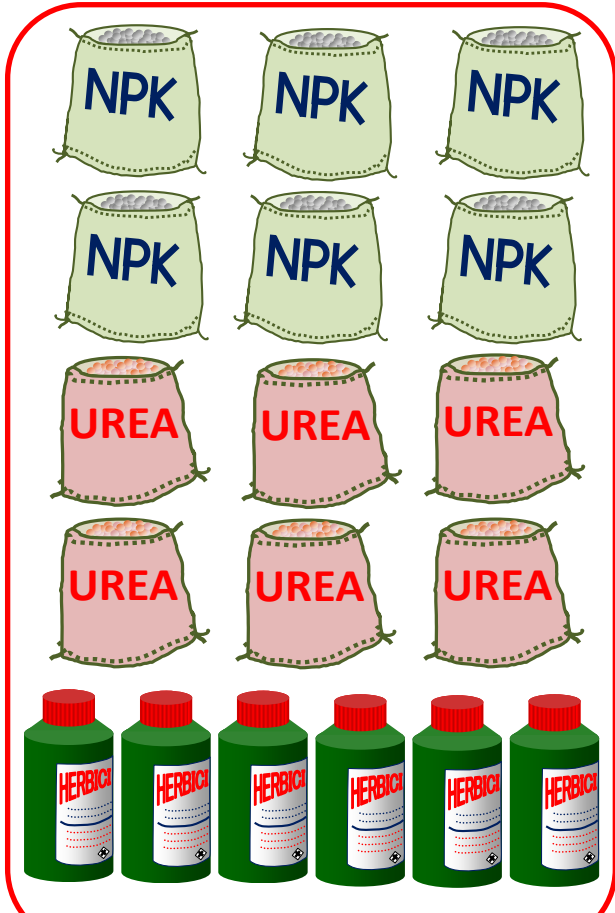
- How much did he save when he purchased Inputs in advance?
- In 2013 the inputs cost GHc 720. Meanwhile, he spent GHc 447 on same quantity of inputs in 2012.
- Since he bought in advance, he made saved GHc 273 on 3 acres!!!



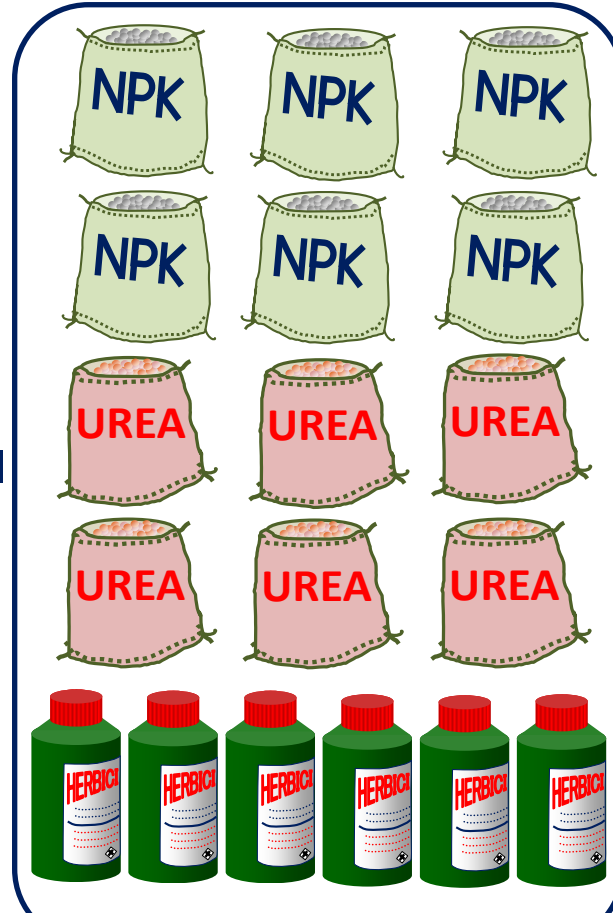
# How Much Did He Save?!

2013

2012



Total: GHC 720



Total: GHC 447

GHC 273/  
3acres!



# Let's Produce Seeds for Profit!

- Do you know activities required for seed production?
- Do you know cost for seed production?
- Do you know how much you can earn through seed production?

→ Let's learn about a good practice of seed production in Northern Region today!

**Case 4:**  
**Let's Produce Seeds for Profit!**

Page 12 (Front)

# Case 4:

## Let's Produce Seeds for Profit!



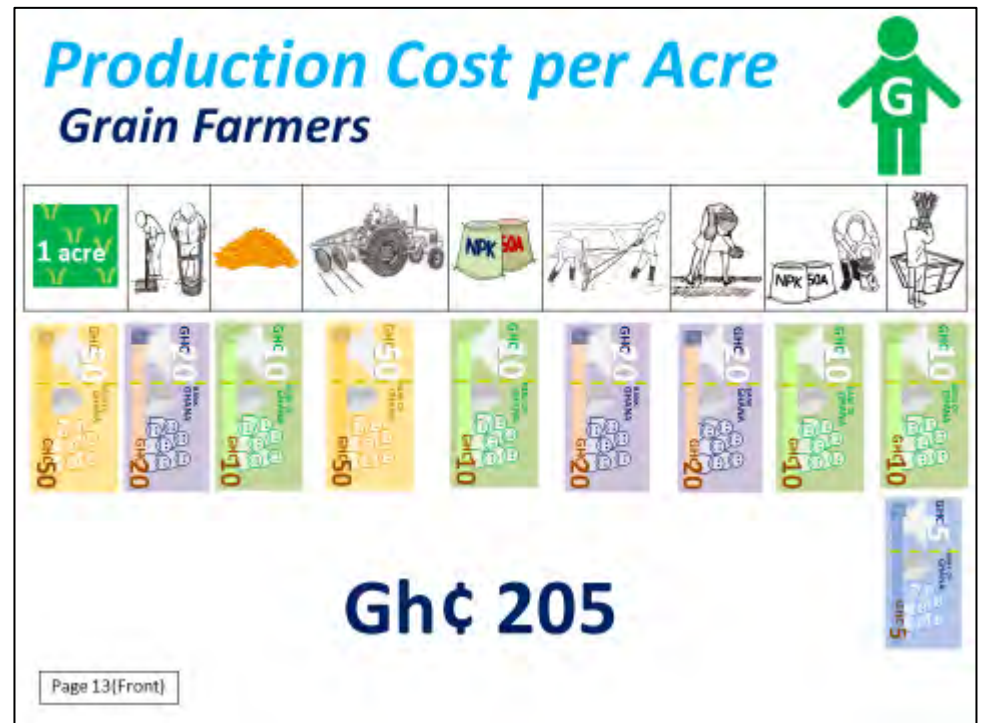


# Production Cost per Acre

## Grain Farmers

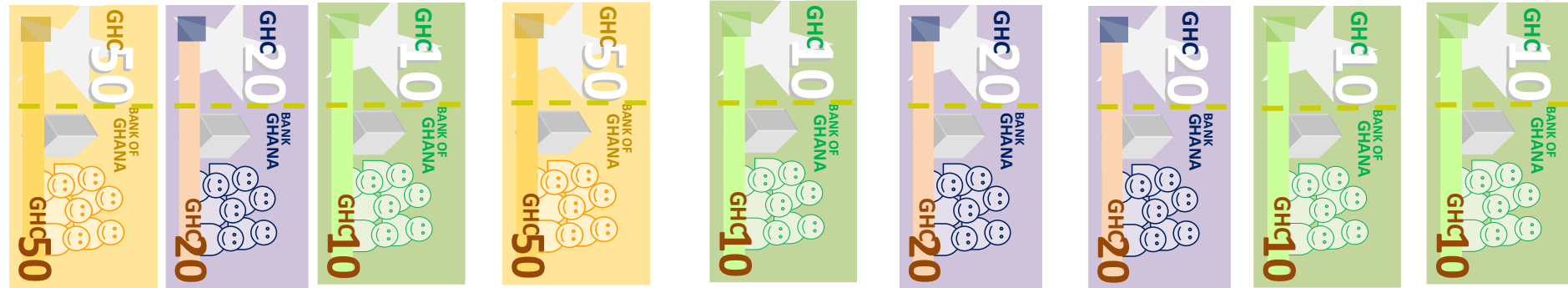
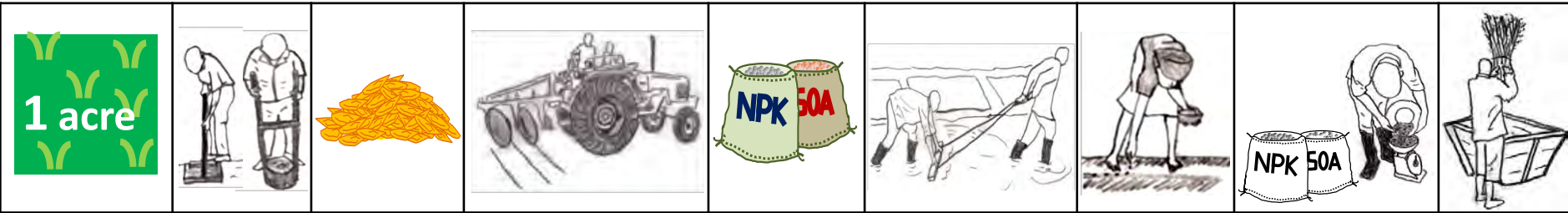


- Grain farmers need around GHC205 for grain production. For example, they spend money for land rent, land development, seed, tractor, fertilizer, etc.



# Production Cost per Acre

## Grain Farmers

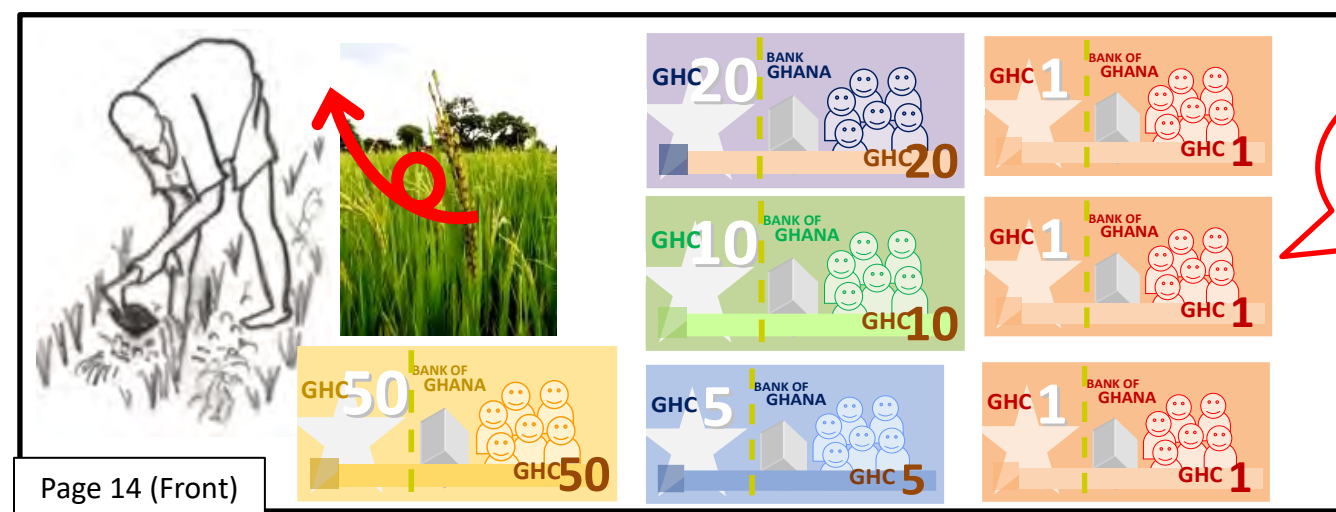
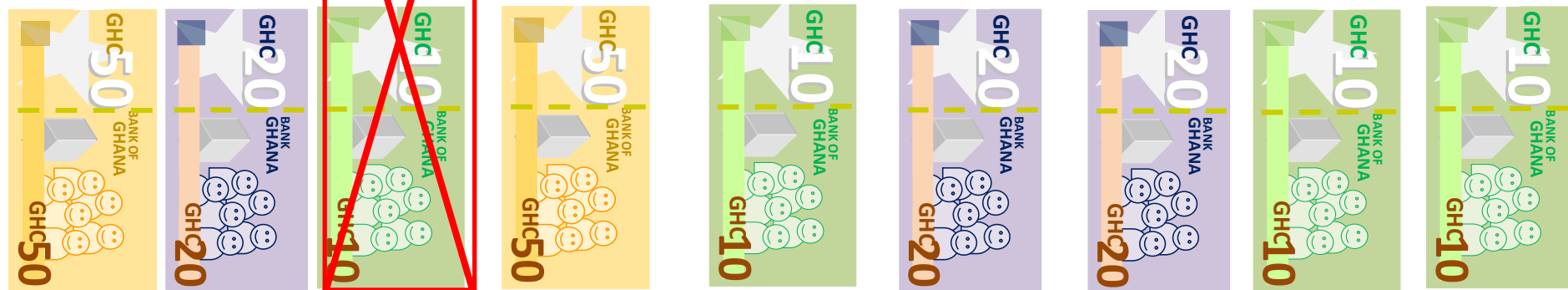
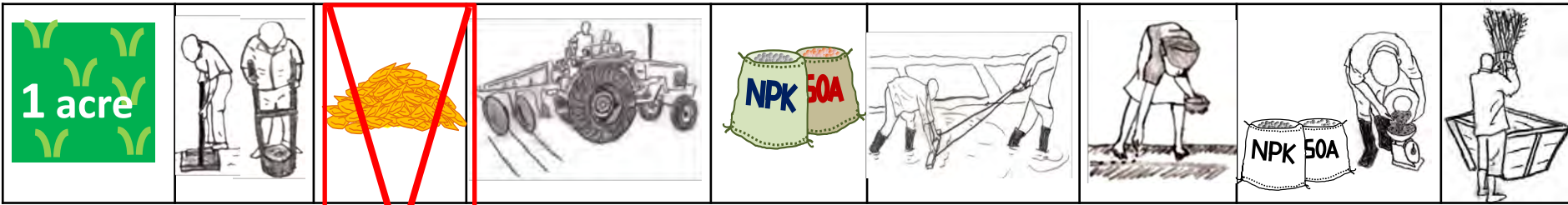


**Gh¢ 205**



# Production Cost per Acre

## Seed Farmers



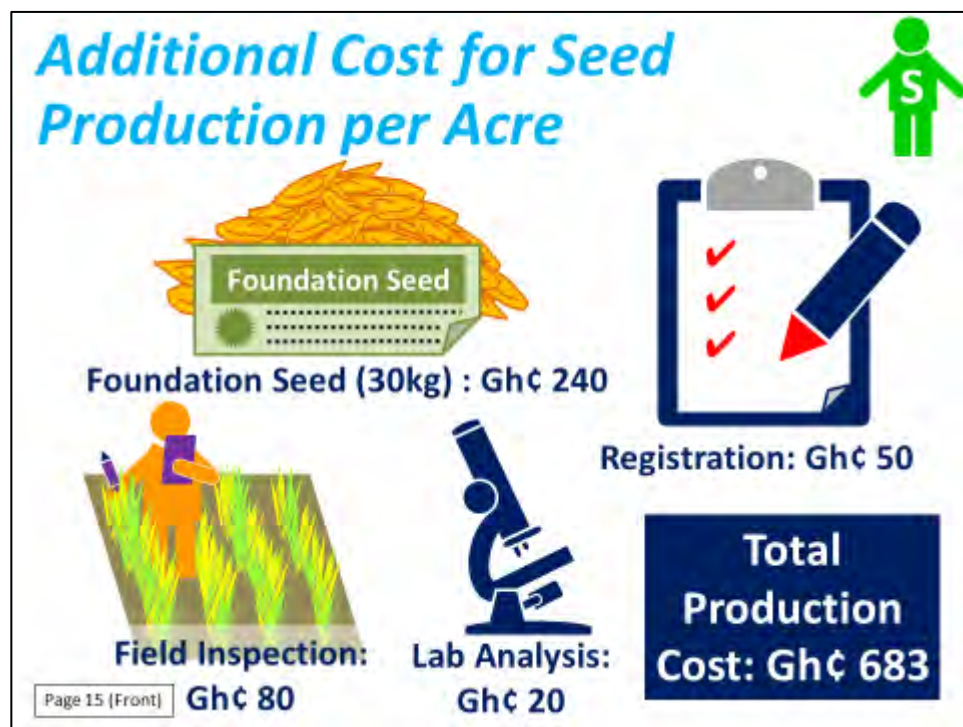
**GH¢ 88**

**Gh¢ 293**



# Additional Cost for Seed Production per Acre

- In addition, seed farmers need to pay to purchase foundation seed, registration, field inspection (GHC20 x 4 times = GHC80) and lab inspection.
- In total, their production cost will be GHC683 per acre, around 3.3 times than grain producers' cost.





# Additional Cost for Seed Production per Acre



**Foundation Seed (30kg) : Gh¢ 240**



**Registration: Gh¢ 50**



**Field Inspection:  
Gh¢ 80**



**Lab Analysis:  
Gh¢ 20**

**Total  
Production  
Cost: Gh¢ 683**

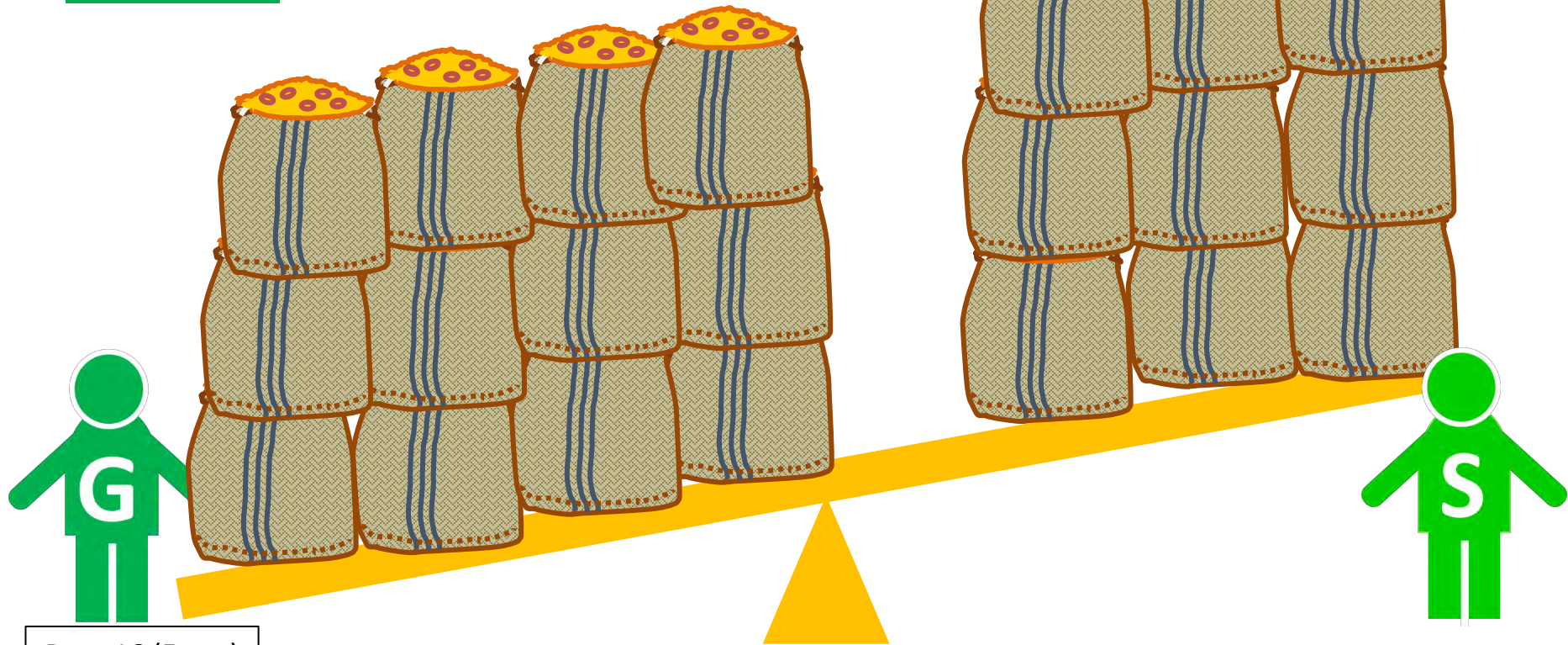
# Production



- Let's look at production of grain farmers and seed farmers!  
Grain farmers gained 12 bags (84kg bag) per acre whereas seed farmers gained 9 bags per acre.
- This is because the seed farmers apply 30cm x 15cm spacing for sowing to gain higher quality while grain farmers apply 30cm x 10cm as recommended by the TENSUI2 Project for higher yield.

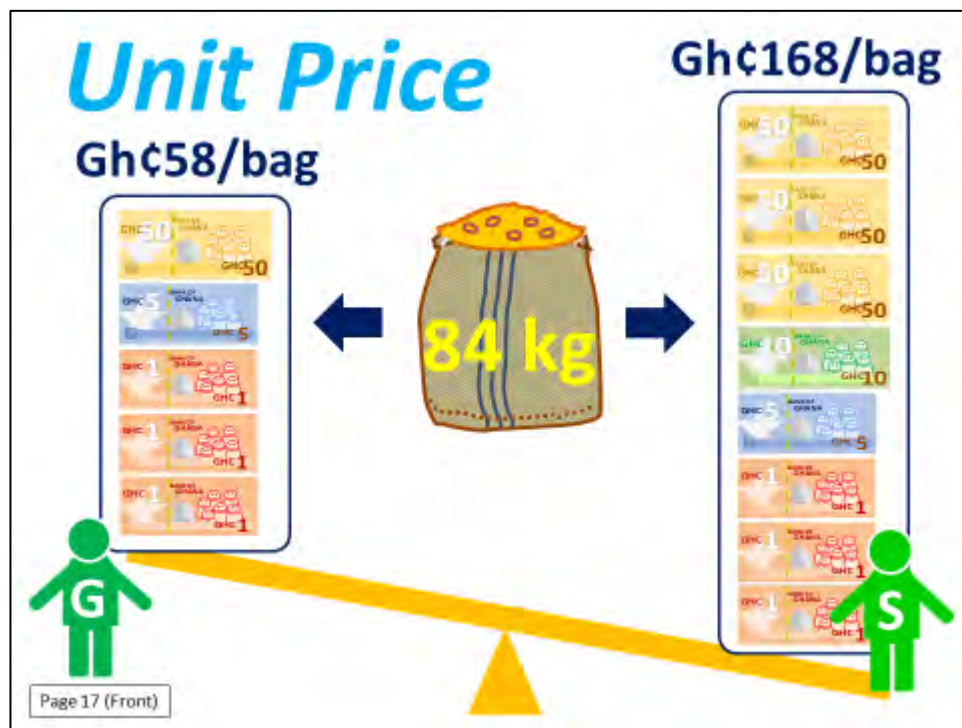


# Production



# Unit Price

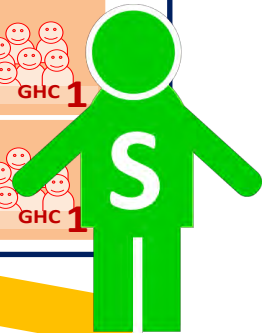
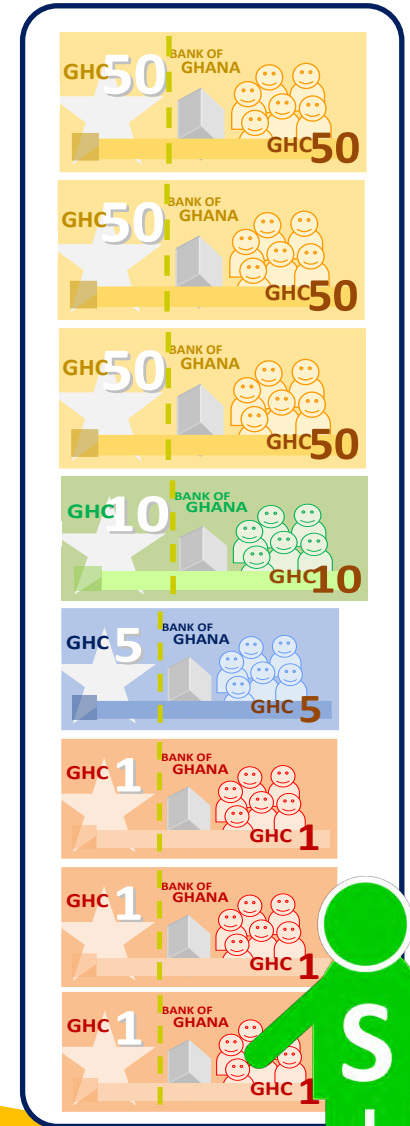
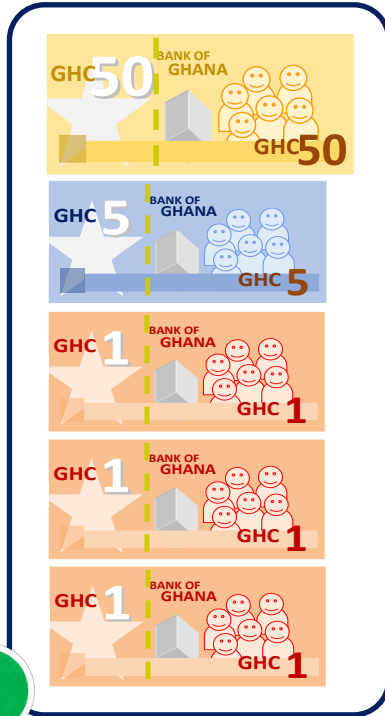
- Selling price of grain paddy was GHC58 per 84kg bag whereas selling price of seed paddy was..... GHC168 per 84kg bag!!



# Unit Price

Gh¢58/bag

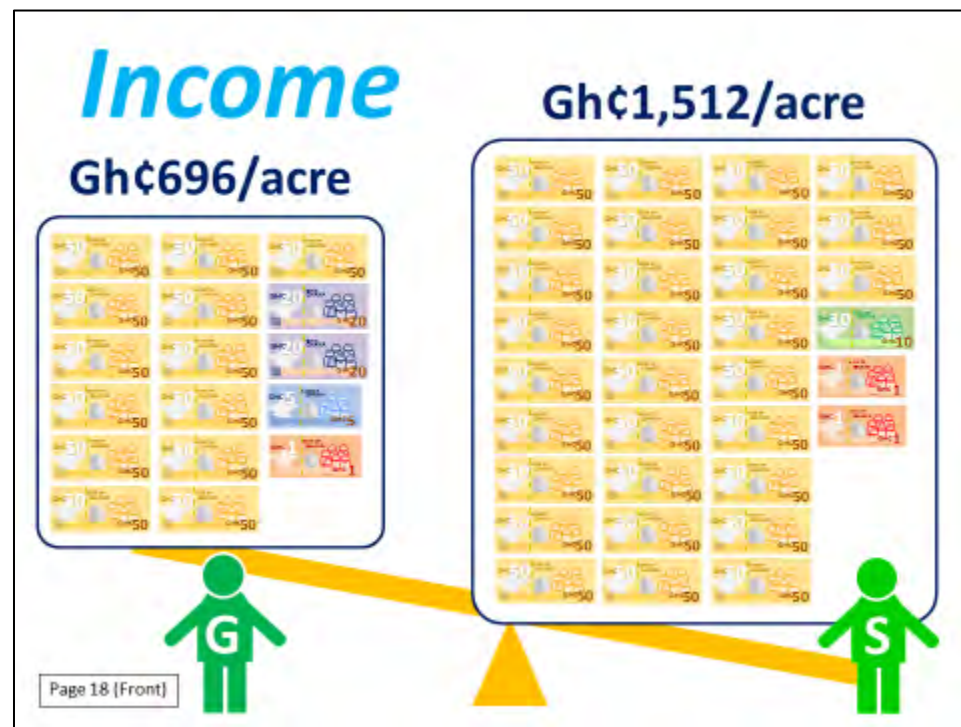
Gh¢168/bag





# Income

- Income through grain paddy was GHC696/acre whereas income through seed paddy was.....  
GHC1,512/acre!!



# Income

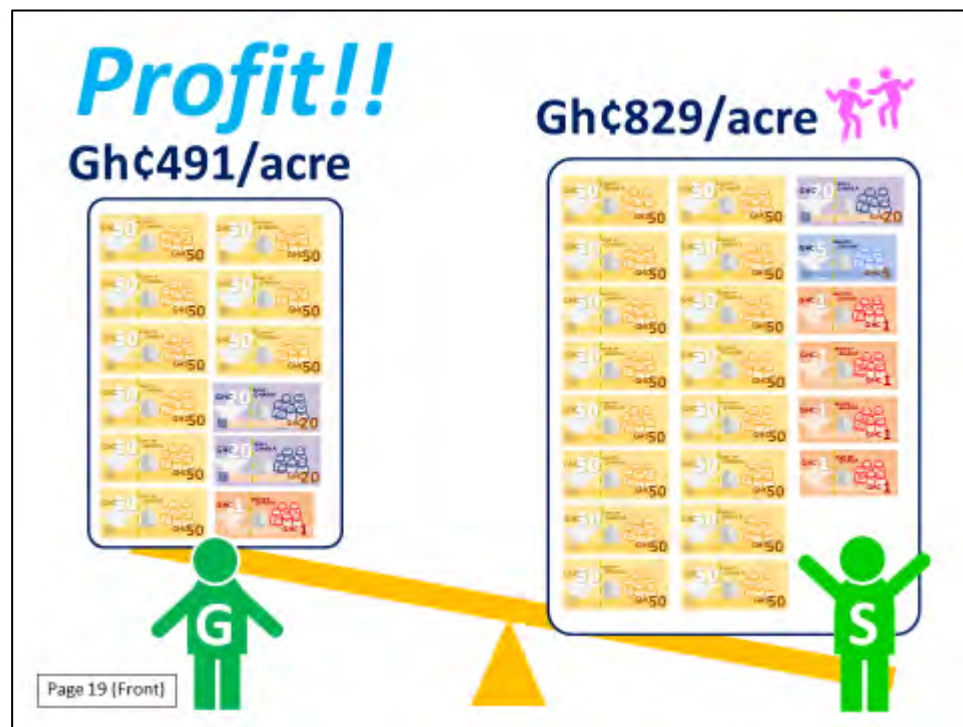
Gh¢696/acre

# Gh¢1,512/acre



# Profit!!

- Then... profit through grain paddy was GHC491/acre whereas profit through seed paddy was..... GHC829/acre!!



# Profit!!

## Gh¢491/acre

## Gh¢829/acre



- 2<sup>nd</sup> onsite training to be carried out during main crop season.
- 2<sup>nd</sup> onsite training includes 7 training topics;
  1. Fertilizer management,
  2. Weed control,
  3. Chemical control,
  4. Disease and pest control, and
  5. Quality seed production
  6. Rice Value Chain
  7. Good practices of farm management



## 2<sup>nd</sup> Onsite Training

Sustainable Development of Rain-fed Lowland Rice Production  
MOFA/JICA TENSUI RICE PROJECT







MOFA/JICA TENSUI RICE

Rice  
Cultivation

# 3<sup>rd</sup> Onsite Training

Back side

- Fishing net is effective for bird scaring.
- Harvesting at optimum moisture content is important for maintaining the rice quality.

## **Bird scaring and Timing of harvesting**

MOFA-JICA Project  
TENSUI RICE  
Sustainable Development of Rain-fed Lowland  
Rice Production



MOFA/JICA TENSUI RICE

# Bird Scaring and Timing of Harvesting

Rice  
Cultivation

Back side

Visual Scarers  
might be  
effective to scare  
birds at least for  
the time being.



Scarecrow

## Bird Scarer



Catapult (Slingshot)

Visual Scarers  
might be  
effective to scare  
birds at least for  
the time being.



Windmill



Balloon

# Bird Scarer



Scarecrow



Catapult (Slingshot)

Visual Scarers might be effective to scare birds at least for the time being.



Windmill



Balloon



# Bird Netting

(1) bird side netting

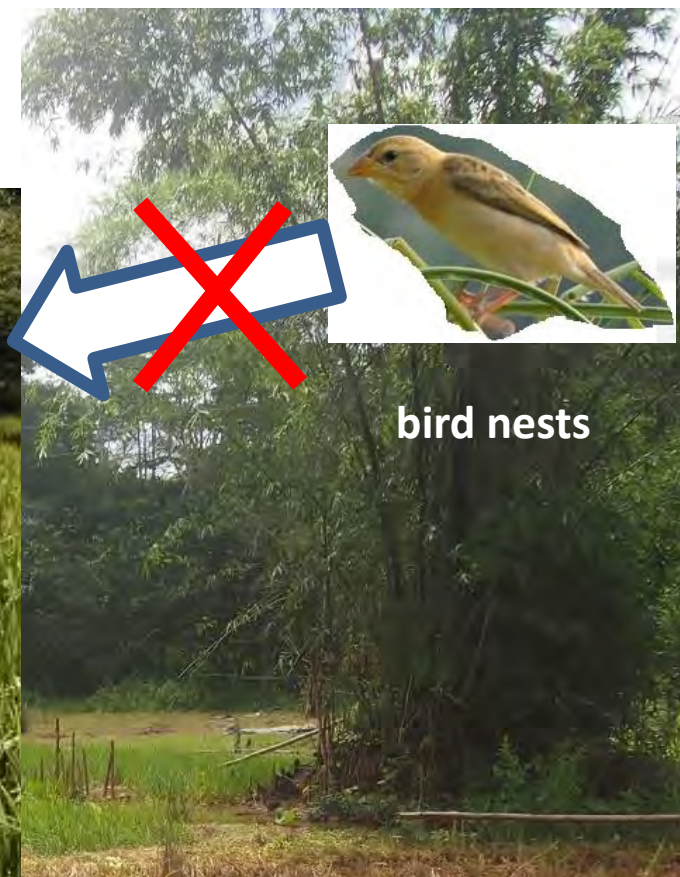
Back side

Bird side netting could be useful to reduce bird damage to rice, especially when the paddy field adjoins to bird nests.



# Bird Netting

## (1) bird side netting





Back side

- Cover top of sticks with plastic bottles/ bags to make covering of bird netting easier. It also helps keep bird nets longer.

## Bird Netting

### (2) bird netting over rice field



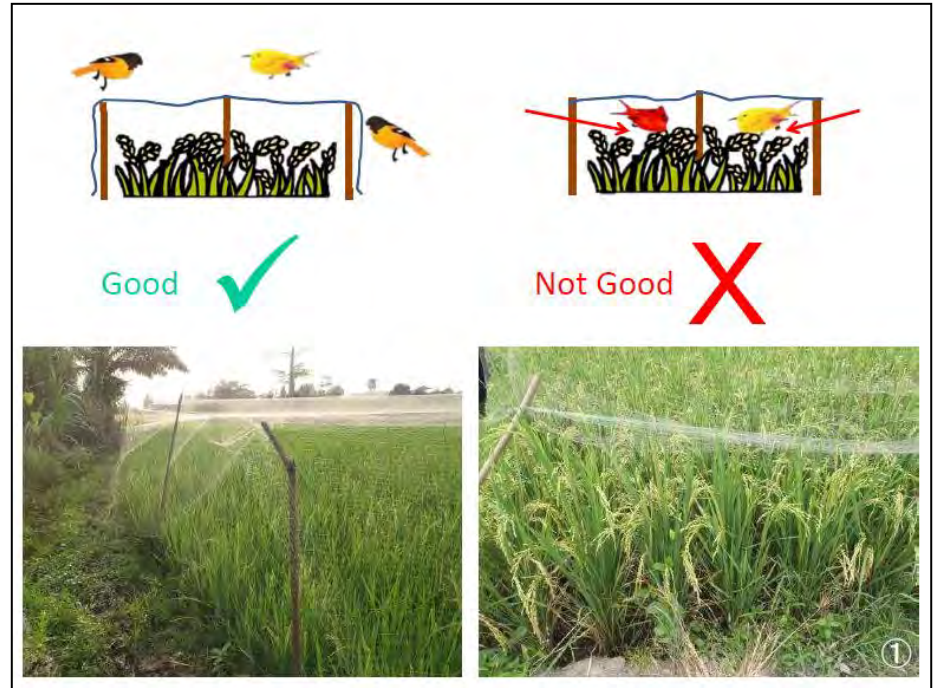
# Bird Netting

## (2) bird netting over rice field



Back side

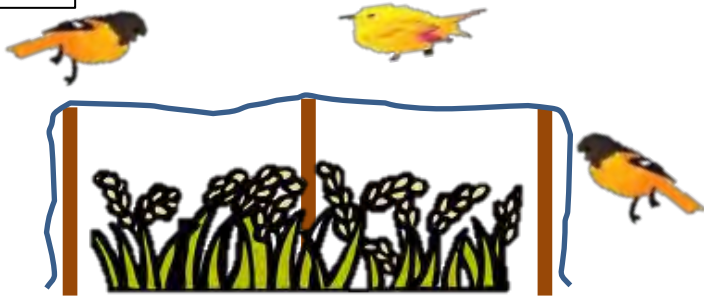
- Not only top face, but also side of the field should be covered fully by the net to prevent the entry of birds.





Face

RC OST 3-2-1



Good



Not Good



Back side

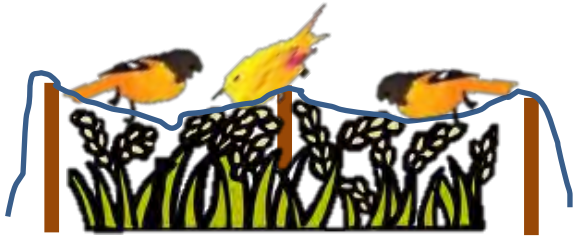
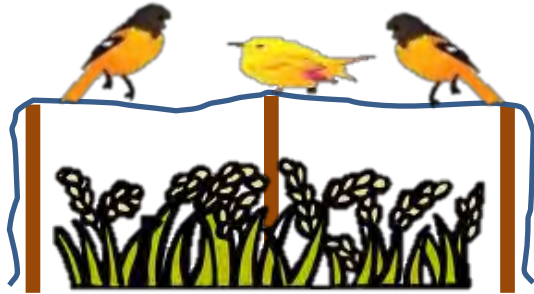
- Net should not be too close to rice grain.
- If the space is minimum, the net falls and birds can eat grains when huge number of birds perch on it.





Face

RC OST 3-2-1



Good



Not Good

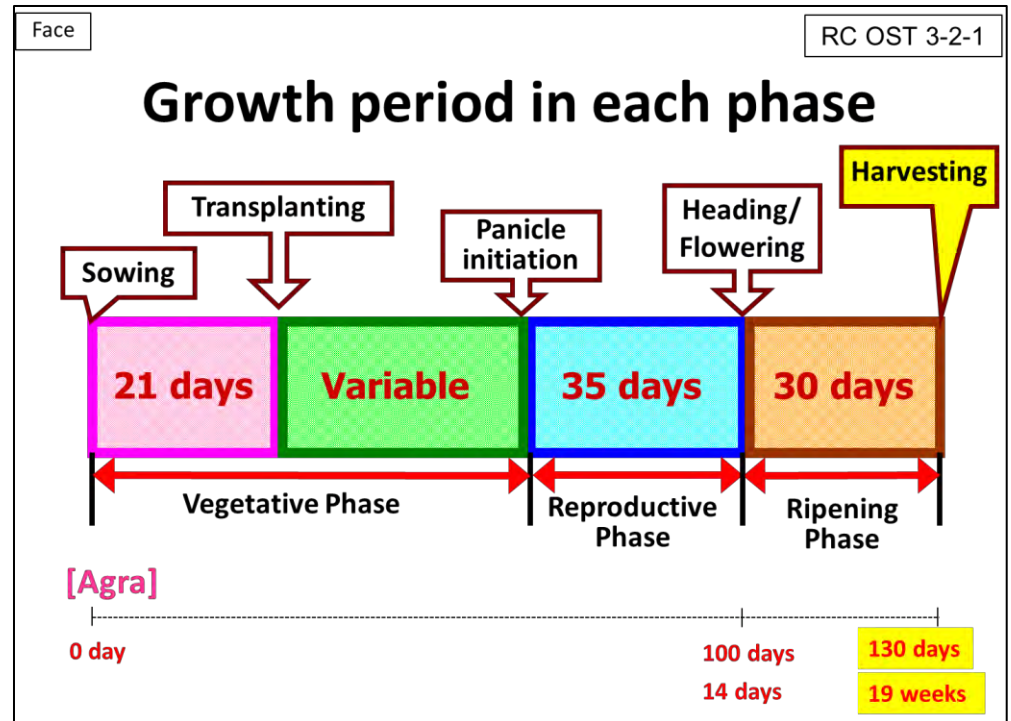


Back side

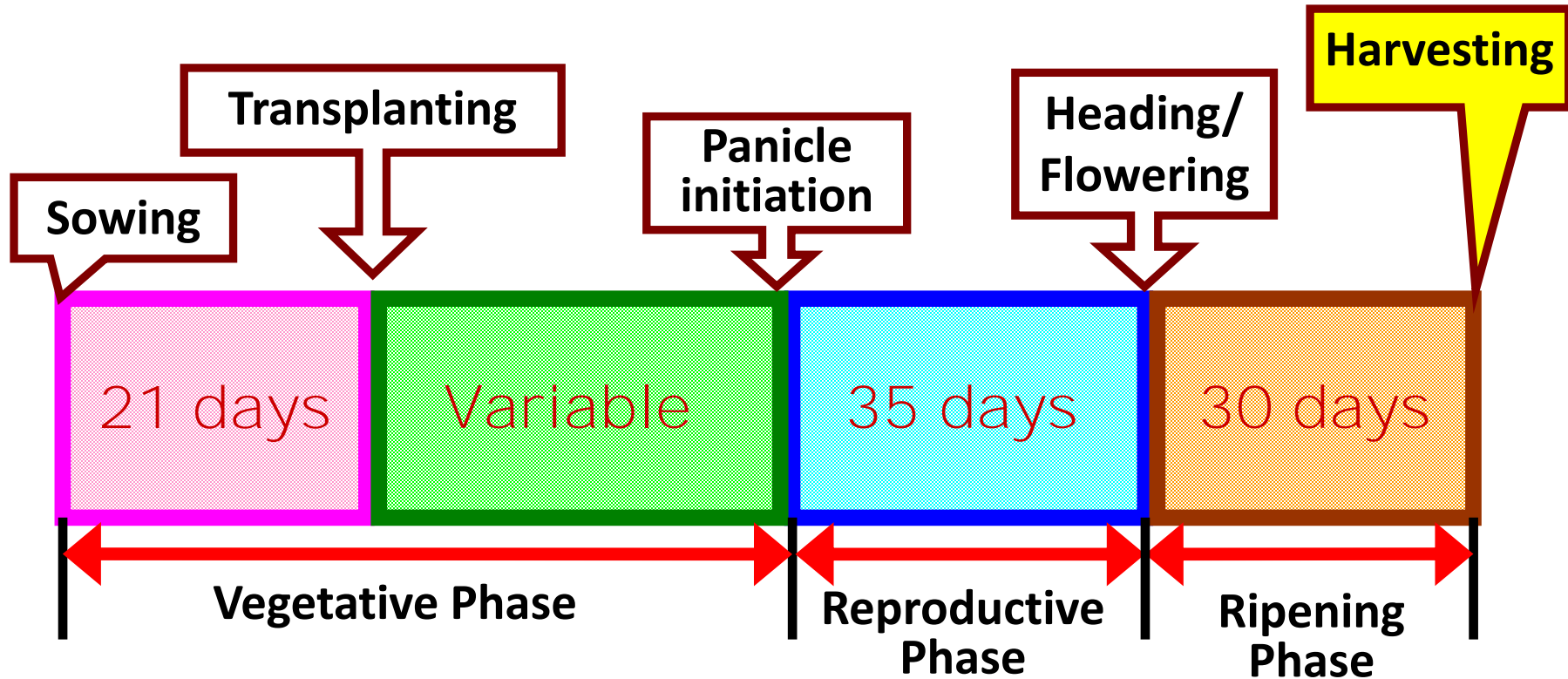
From the 15-16th week (110 days) after sowing, observe the degree of maturing.

At maturity,

- Days after sowing could be 130 days for Agra.
- Days after heading could be 28 – 35 days.



# Growth period in each phase



[Agra]

0 day

100 days

130 days

14 days

19 weeks



Back side

## Watch colour of straw

- 80 – 85 % of spikelets turn out yellow

(Optional)

## Check moisture contents every 2 - 3 days

- Optimum moisture contents : 25 - 20 %

Face

RC OST 3-2-1

## How to Judge Harvesting Time by Panicle Observation



Much too early

Too early

Correct time

Too late



Source : IRRI

# How to Judge Harvesting Time by Panicle Observation



Much too early



Too early



Correct time



Too late



Source : IRRI

Back side

## At the proper harvesting time

- Rachis and flag leaf are still green.
- Grains can be crushed by the fingernails.
- Drain water from rice fields 1 – 2 weeks before harvesting.





Face

RC OST 3-2-1



Back side

- The goal of good harvesting is to maximize grain yield, and to minimize grain losses and quality deterioration.

Face

RC OST3-3

# Harvesting and Post Harvesting

TENSUI RICE  
MOFA-JICA Project  
Sustainable Development of Rain-fed Lowland Rice Production Project

Harvesting of paddy includes cutting, stacking, handling, threshing, cleaning and hauling of paddy.





MOFA/JICA TENSUI RICE

Rice  
Cultivation

# Harvesting and Post Harvesting

Back side

# 1. What is good quality local rice?

Is milled rice with the characteristics which is accepted by the majority of end users?

- No stone, husk, chaff, soil, chalky other impurities
- Higher percent of whole grain
- Same variety
- Preferred aroma
- Acceptable taste
- Good texture and required moisture content
- Uniform Colour



## 2. Parameters considered

Quality factors which cover aspects such as;

- Safety and suitability for human consumption
- Flavors and odors
- Moisture content
- Wholesomeness of kernels
- Foreign (unwanted) matter free
- Contaminants (heavy metals and agro-chemicals residues) free





### 3. Wrong methods of rice cultivation

- Improper planning and management of enterprise(scale, field management constraints)
- Mixture of varieties delayed in harvesting(affect moisture content at harvesting)
- Poor weed management
- Inappropriate tool and poor harvesting methods



In order to prevent grains from contamination by soil and stones, stems must be cut at some distance from the ground.







### 3. Wrong methods of rice cultivation (cont.)

- Improper management of on- field water at harvesting (contamination of paddy threshing)
- Moisture reabsorption during harvesting



Reaped rice should not be put on the bare soil.



Face





Back side

Keep fields free from weeds to avoid weeds getting mixed in with grains.





Face





Back side

Workers take their boots or shoes off, when they work on the tarpaulin.







## 4. Wrong methods of rice processing

- Re-absorption of moisture due to harvested paddy getting in contact with the bare soil
- Threshing using a rusty drum
- Threshing and drying on a bare floor
- Using field boot to stir paddy on drying floor
- Uneven exposure of paddy to sunshine at drying
- Old milling machine and unskilled operators

Face

## Avoid contamination

By Using tarpaulin and “Bambam box”





# Avoid contamination

By Using tarpaulin and “Bambam box”



# Winnowing

- Lighter materials such as unfilled grains, chaff, weed seeds, and straw can be removed from the grain by using a blower, air fan or by wind.

- Winnowing recovers only the heavier grains but other heavy particles like heavier weed seeds, off types, stones and dirt might still be included in the rice.

## Cleaning Methods

### Winnowing





# Cleaning Methods

## Winnowing



## Cleaning

- Removes unwanted materials from the grain.
- Clean grain has a higher value than the ones which is contaminated with straws, chaff, weed seeds, soil, rubbish and other non-grain materials.

## Cleaning

Clean



Dirty



- Grain cleaning will improve the drying and the storability, reduce breakage at time of milling and improve milling output and quality.

# Cleaning



Back side

## Drying

- **Sunny Day:**  
Half day with mixing paddy every 30 min under sunlight
- **Cloudy Day:**  
Whole day with mixing paddy sometimes under cloud

Face

## Drying



Half day with mixing paddy  
every 30 min under sunlight

Whole day with mixing paddy  
sometimes under cloud

9

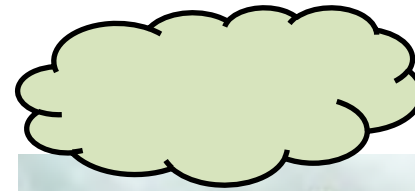
Moisture content of paddy should be 14 % before milling or storing.



# Drying



Half day with mixing paddy every 30 min under sunlight



Whole day with mixing paddy sometimes under cloud

Back side

## Forms of Storage

Rice is store best in this form in descending order :

- Paddy
- Brown rice
- Milled rice

Face

## Some storage structures



10

## Types of Storage

This depends upon ;

- Forms of the produce, e.g. paddy, milled, brown
- Quantity of the rice
- Purpose
- Location of the facility
  - (i) Farmer's store/hut
  - (ii) Milling site

Face

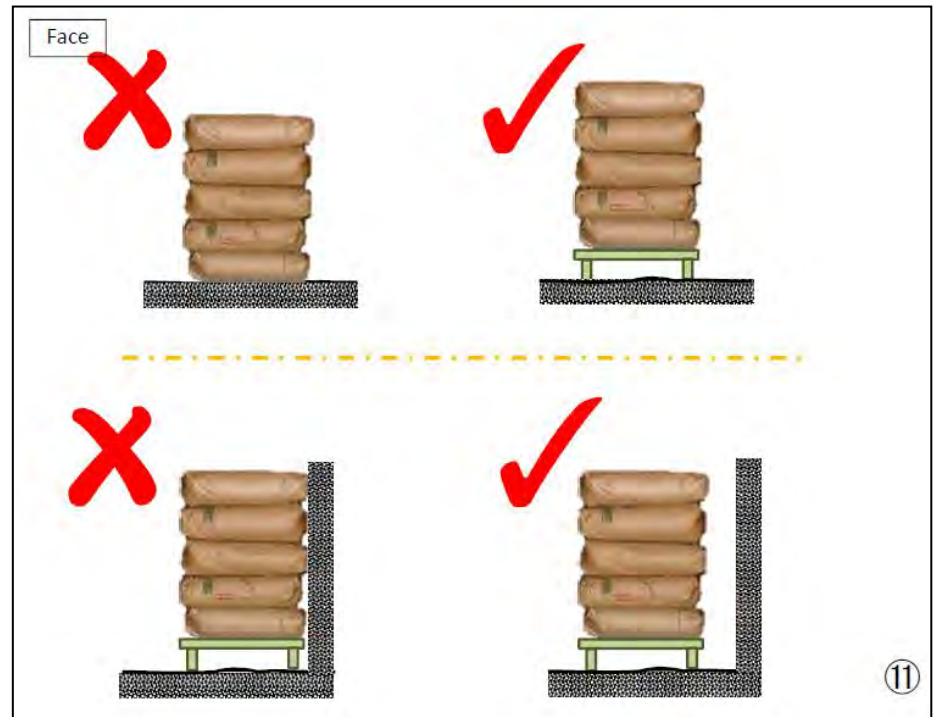
# Some storage structures



Back side

## Appropriate Storage

- Rice is hygroscopic
- To improve and maintain quality
- For a better price
- Prevent quality deterioration
- Prevent rodent attack



- Do NOT put sacks on the floor directly. Those must be put on the platform.
- Keep the interspace between sacks and the wall of the warehouse to ensure air circulation and to prevent the damage by moisture.



Face





# A Tale of Two Farmers...

- This is a story about two rice farmers in Ashanti Region.
- Figures used here are based on the actual data collected by the Impact Survey done in 2013 to compare Project farmers and Non-Project farmers and a market survey in 2014 in Ashanti Region.

MOFA/JICA TENSUI RICE PROJECT

## A Tale of Two Farmers

Project Farmer Non-Project Farmer

### -Ashanti Region-

Sustainable Development of Rain-fed Lowland Rice Production  
MoFA/JICA TENSUI RICE PROJECT

Page 1 (Front)



# A Tale of Two Farmers



Project Farmer



Non-Project Farmer

## -Ashanti Region-

Rice Cultivation

Farm Management

Land Development

Extension

Other

# Once upon a time, there were two farmers...



- Read the farmers' words in the balloons.

*Once upon a time, there were two farmers...*

**TENSUI RICE?**  
Sounds interesting! I like to apply new techniques. Let me invest money, time and energy to it!

**TENSUI RICE?**  
Hmmm.... sounds painful... I don't want to put so much energy on rice cultivation, I don't want to make any investment. Let me continue the traditional methods.

Page 2 (Front)



# *Once upon a time, there were two farmers...*

**TENSUI RICE?**

**Sounds interesting! I like to apply new techniques. Let me invest money, time and energy to it!**



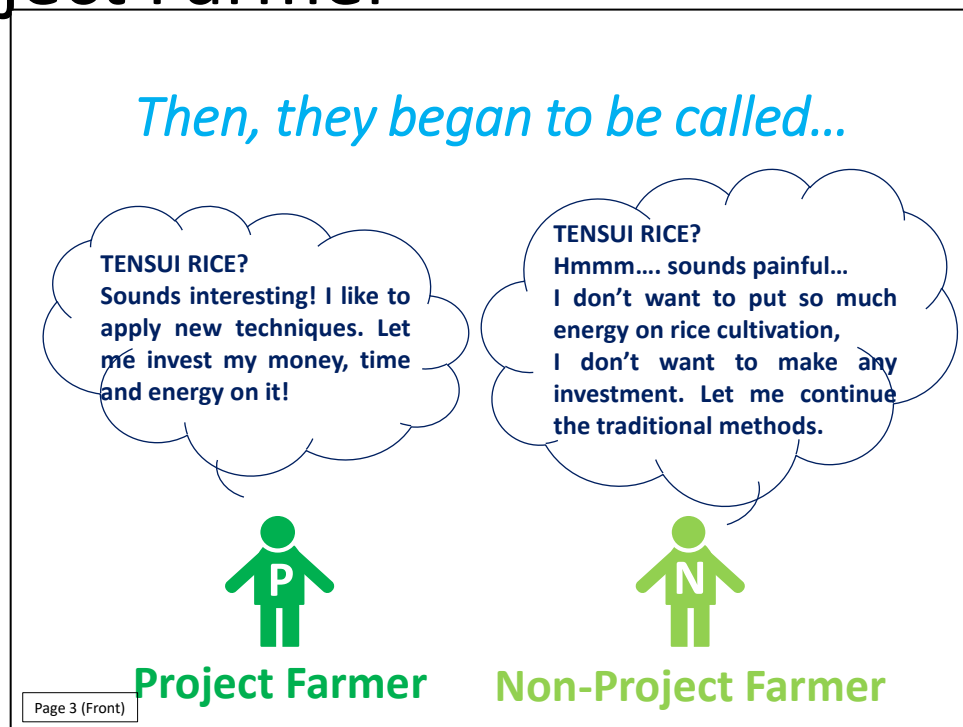
**TENSUI RICE?**

**Hmmm.... sounds painful... I don't want to put so much energy on rice cultivation, I don't want to make any investment. Let me continue the traditional methods.**



# Then, they began to be called...

- “Project Farmer” and “Non-Project Farmer”.
- The one who is willing to try the TENSUI methods is the “Project Farmer” and the one who is sticking to the traditional methods is the “Non-Project Farmer”.



# *Then, they began to be called...*

**TENSUI RICE?**

**Sounds interesting! I like to apply new techniques. Let me invest my money, time and energy on it!**



**Project Farmer**

**TENSUI RICE?**

**Hmmm... sounds painful... I don't want to put so much energy on rice cultivation, I don't want to make any investment. Let me continue the traditional methods.**




**Non-Project Farmer**











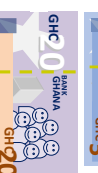

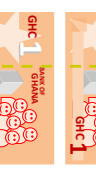

# First, let's see how the Non-Project Farmer worked



- He spent some money for renting a land and buying seeds.
- He applied the traditional production methods including ploughing, broadcasting, bird scaring, harvesting and drying in a quarter acre of land
- He didn't apply fertilizers as he didn't buy them.
- In total, his production cost was GHC 89.
- **Ask farmers: How much have you spent? More than him or less than him?**

*Non-Project Farmer* 

**Total Production Cost per 1/4 Acre**

|  |   |   |   |   |   |   |   |
|--|---|---|---|---|---|---|---|
|   |   |   |   |   |   |   |   |
|  |  |  |  |  |  |  |  |
| <b>GHC 89</b>  |   |   |   |   |   |   |   |

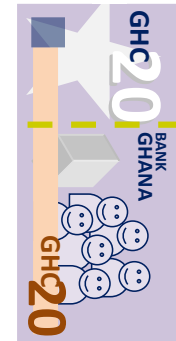
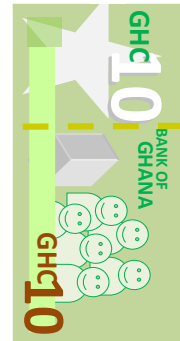
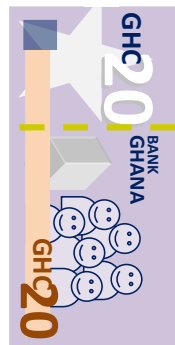
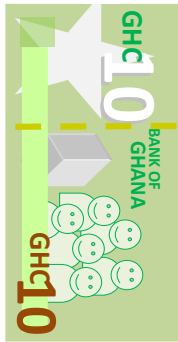
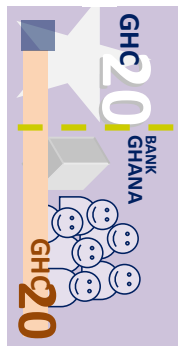
Page 4 (Front)



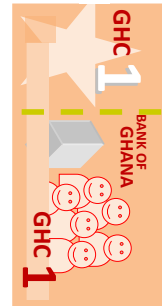
# Non-Project Farmer



## Total Production Cost per 1/4 Acre



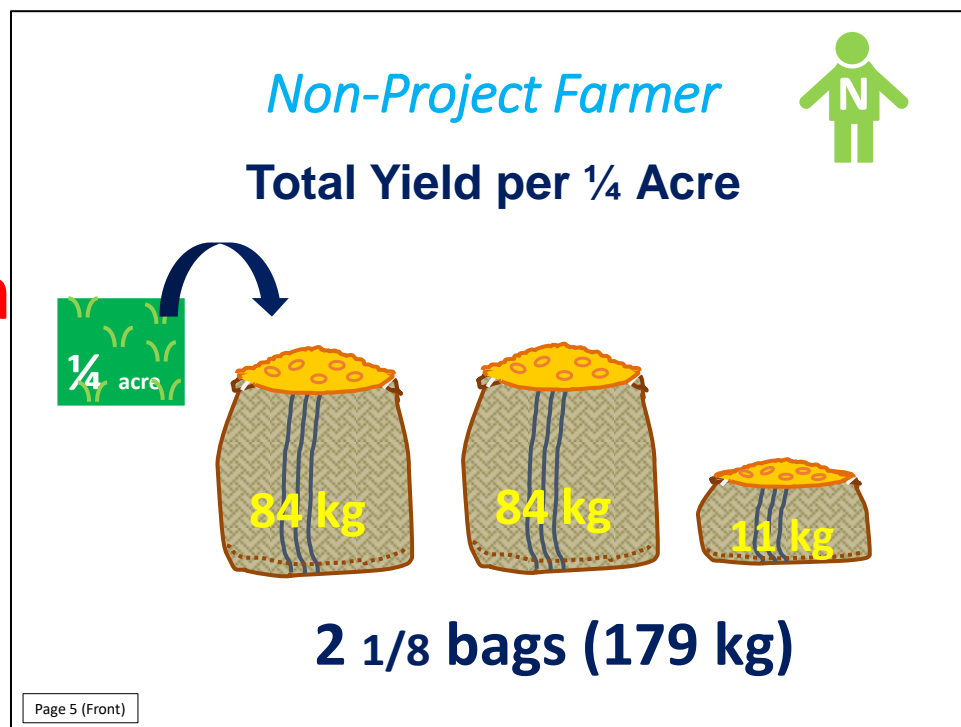
**GH¢ 89**



# Total Yield per $\frac{1}{4}$ Acre

- In the harvest season, the Non-Project Farmer harvested 2 and  $\frac{1}{8}$  bags of paddy (around 179kg) from  $\frac{1}{4}$  acre.

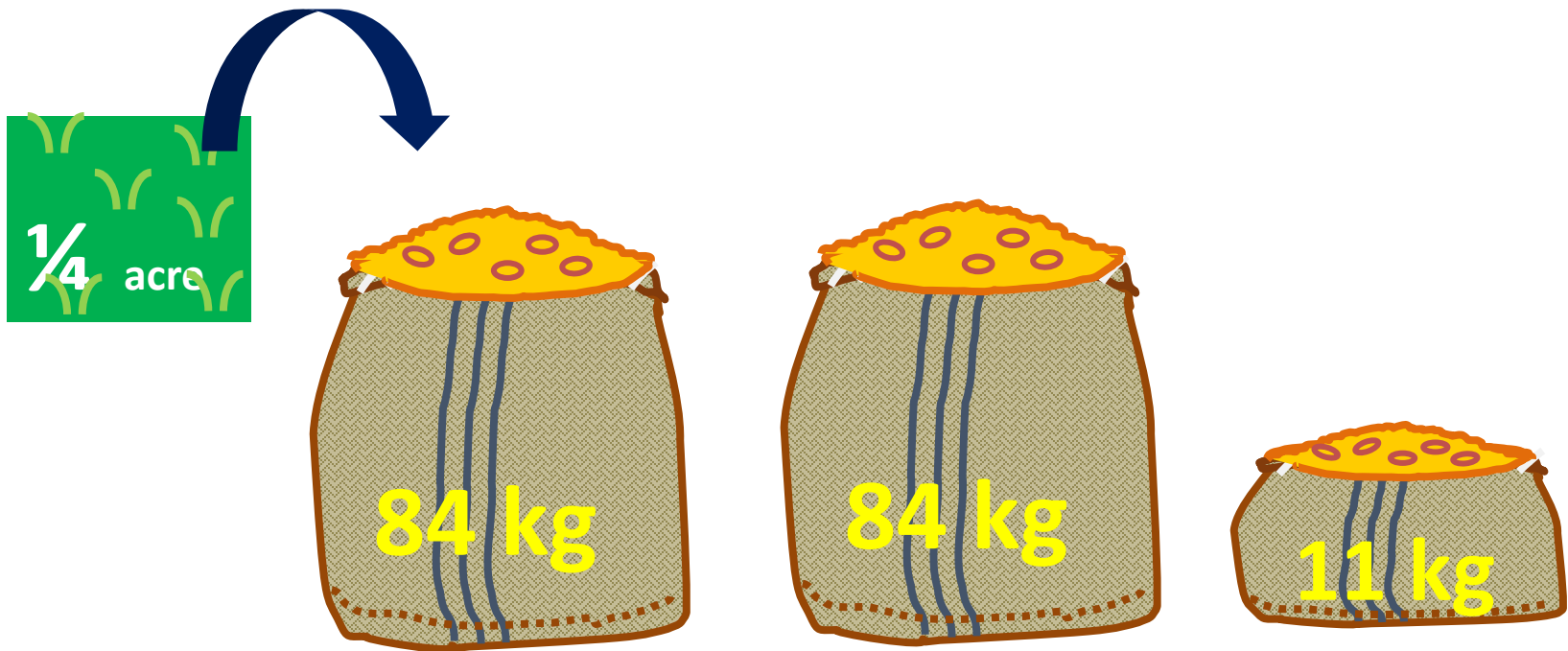
- Ask farmers:  
How much have you harvested? More than him or less than him?



# *Non-Project Farmer*



## Total Yield per $\frac{1}{4}$ Acre

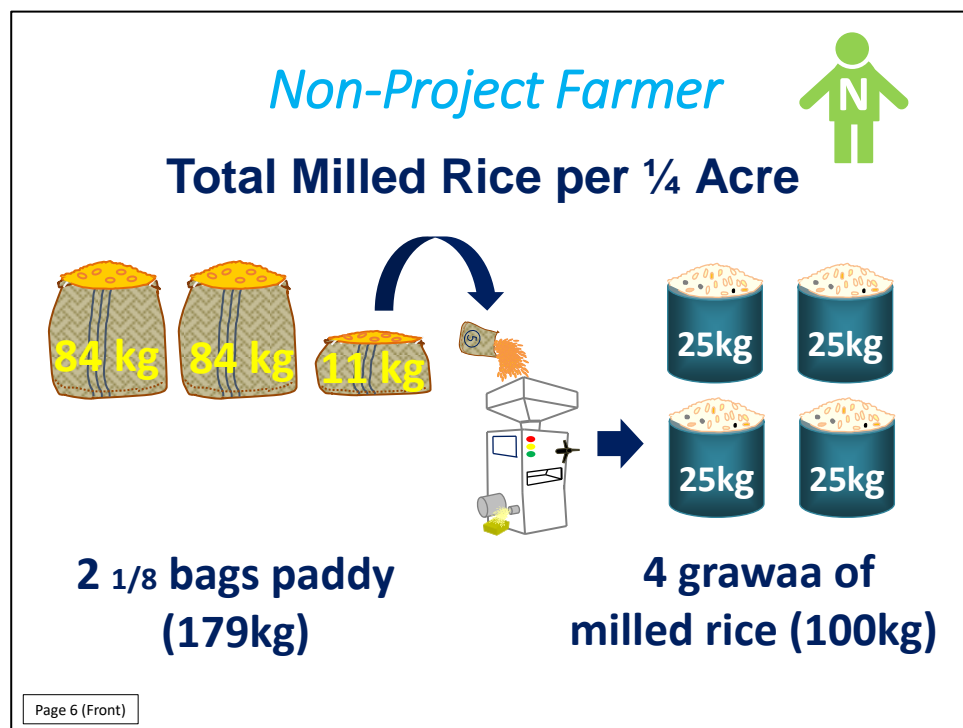


**2  $\frac{1}{8}$  bags (179 kg)**

# Total Milled Rice per ¼ Acre

- From 2  $\frac{1}{8}$  bags of paddy, the Non-Project Farmer gained 4 grawaa of milled rice

Note for AEA: If 179kg of paddy is milled at the recovery rate of 60%, the Non-Project Farmer would get 107kg of milled rice. However, for better understanding of the material by farmers, “100kg” is used to make the story simpler.

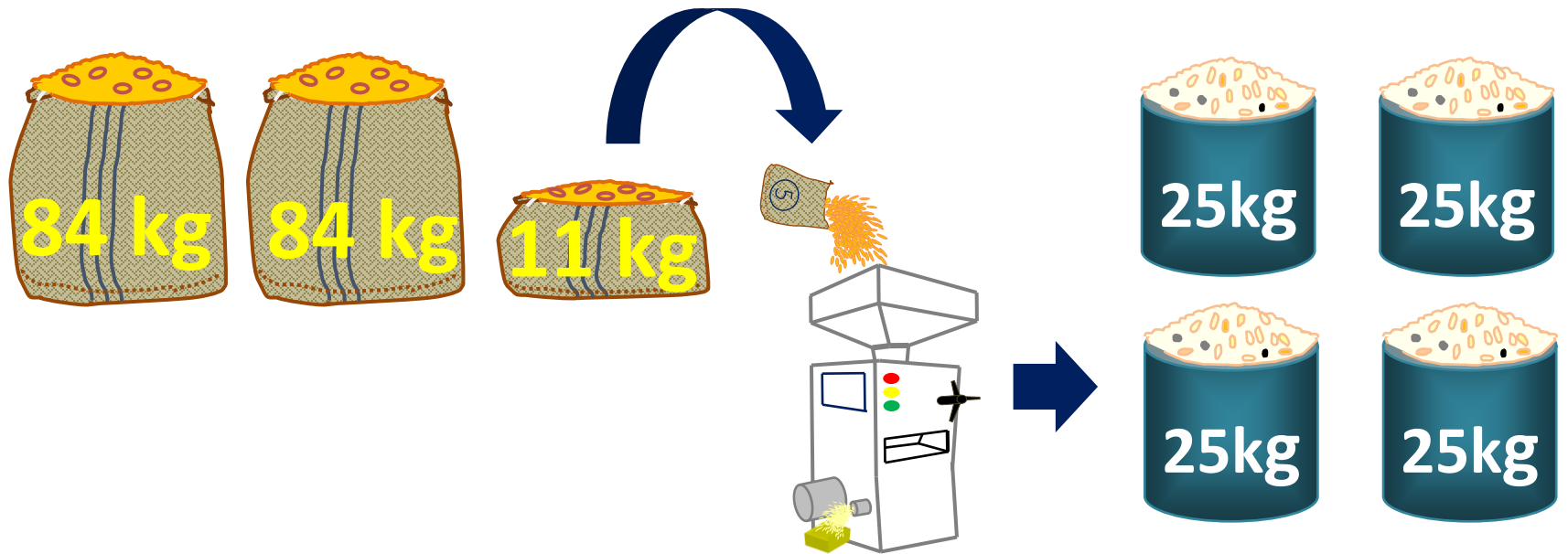




# Non-Project Farmer



## Total Milled Rice per 1/4 Acre

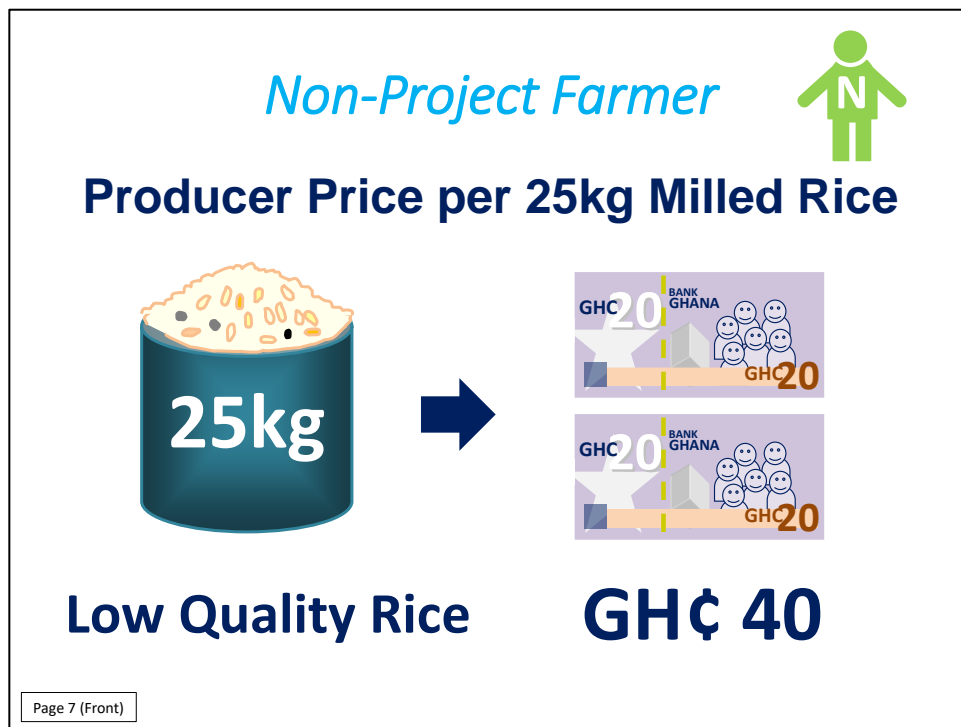


**2 1/8 bags paddy  
(179kg)**

**4 grawaa of  
milled rice (100kg)**

# Producer Price per Grawaa (25kg milled rice)

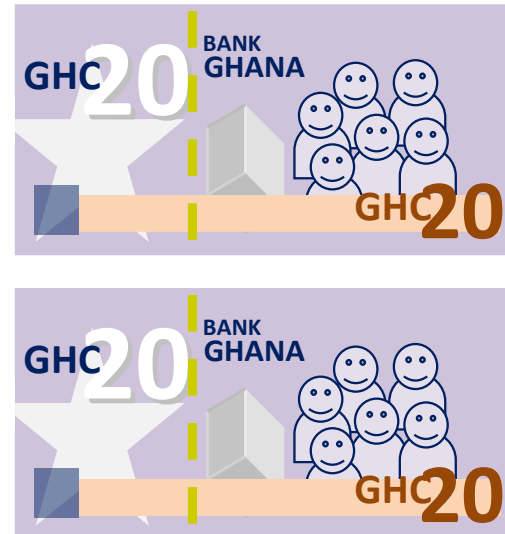
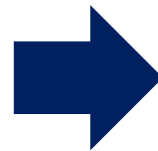
- Quality of the Non-Project Farmer's rice was not so high. The milled rice included lots of foreign matter such as stones, husks and different varieties.
- An aggregator agreed to buy the rice at GHC 40 per grawaa.
- **Ask farmers: How is the quality of your rice? What is price of your rice?**



# Non-Project Farmer



## Producer Price per 25kg Milled Rice

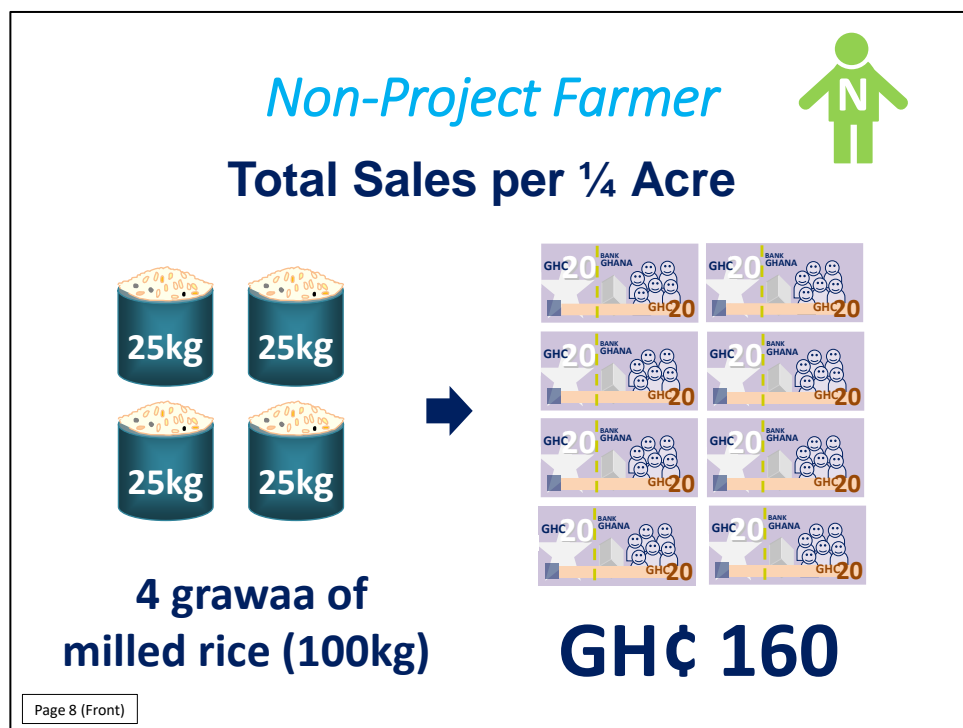


Low Quality Rice

**GH¢ 40**

# Total Sales per ¼ Acre

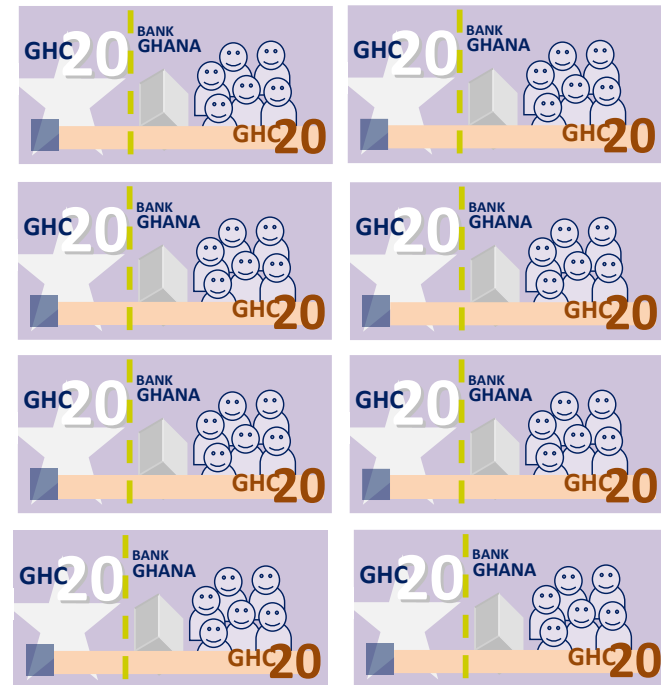
- In total, the Non-Project Farmer gained GHC 160 from 4 grawaas of milled rice.
- Ask farmers:  
Is his income big or small??



# Non-Project Farmer



## Total Sales per 1/4 Acre



4 grawaa of  
milled rice (100kg)

**GH¢ 160**

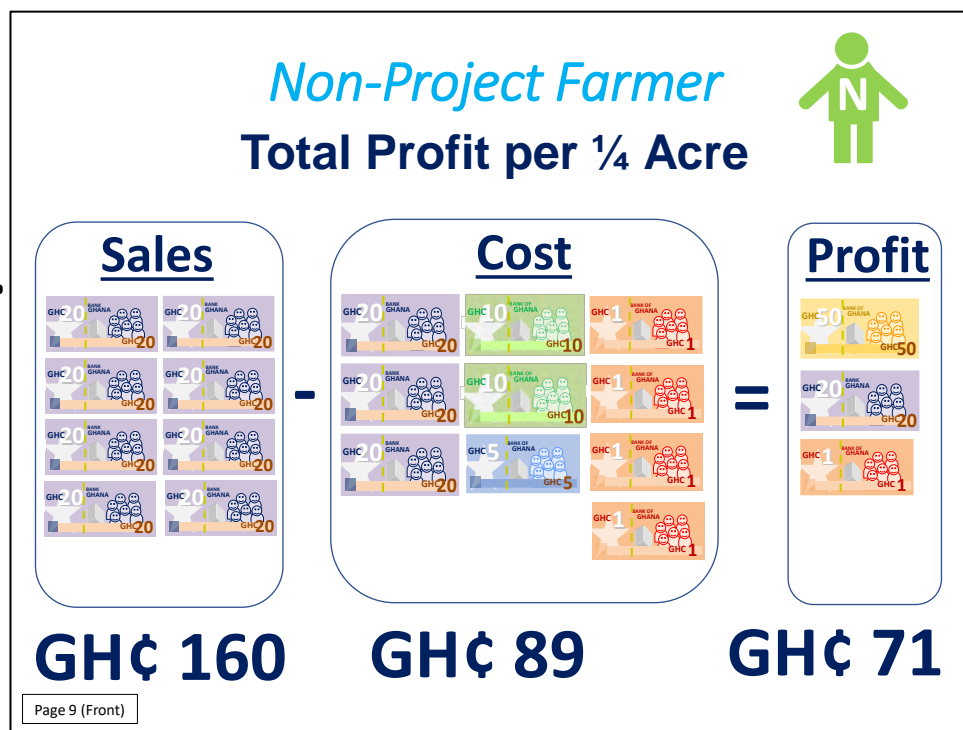


# Total Profit per ¼ Acre

- Eventually, the Non-Project Farmer got GHC 71 as a profit from rice production in ¼ acre. The profit is a difference calculated

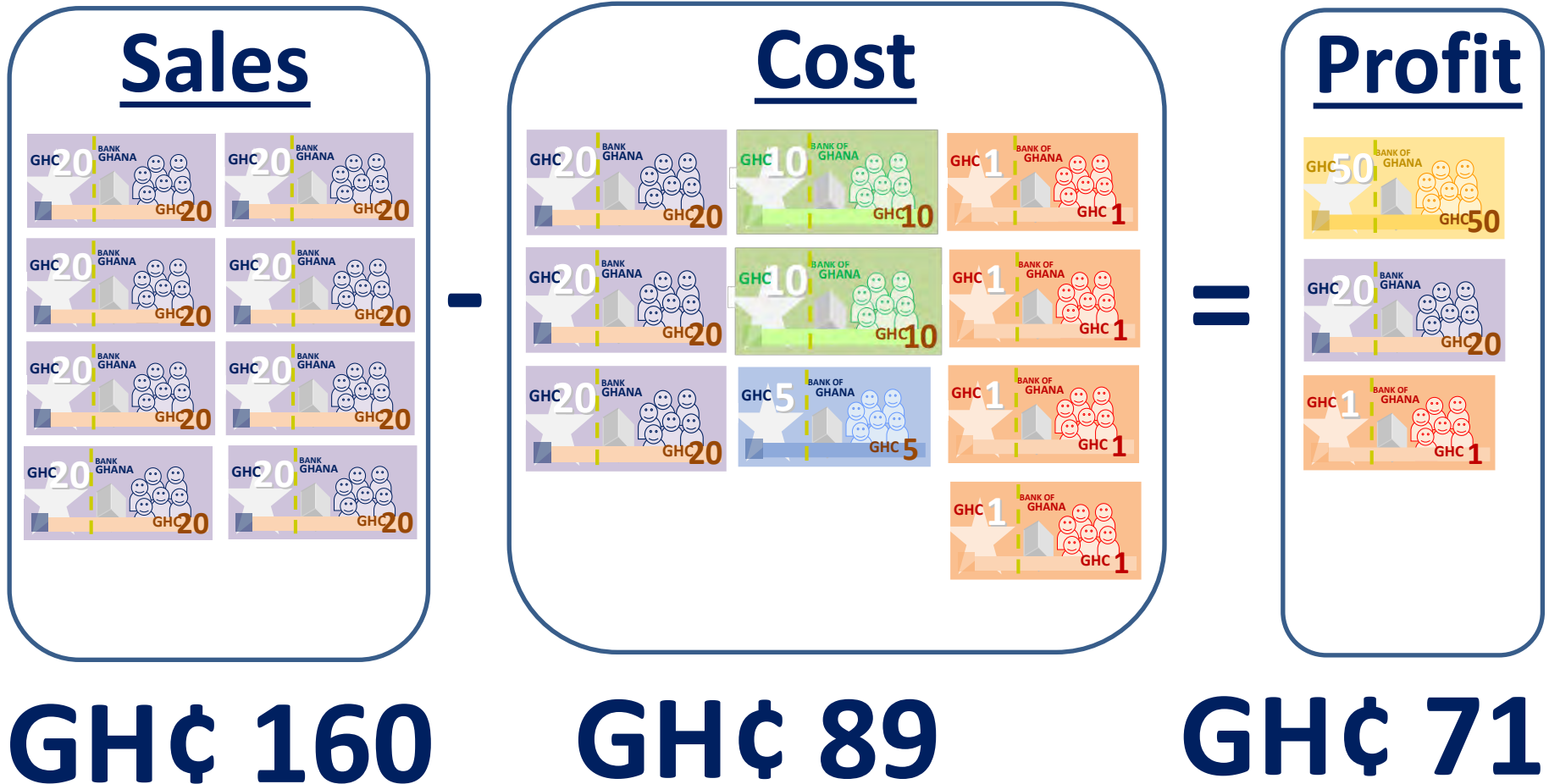
by subtracting the cost (GHC 89) from the sales (GHC 160).

- **Ask farmers:**  
Is his profit big or small??



# Non-Project Farmer

## Total Profit per ¼ Acre

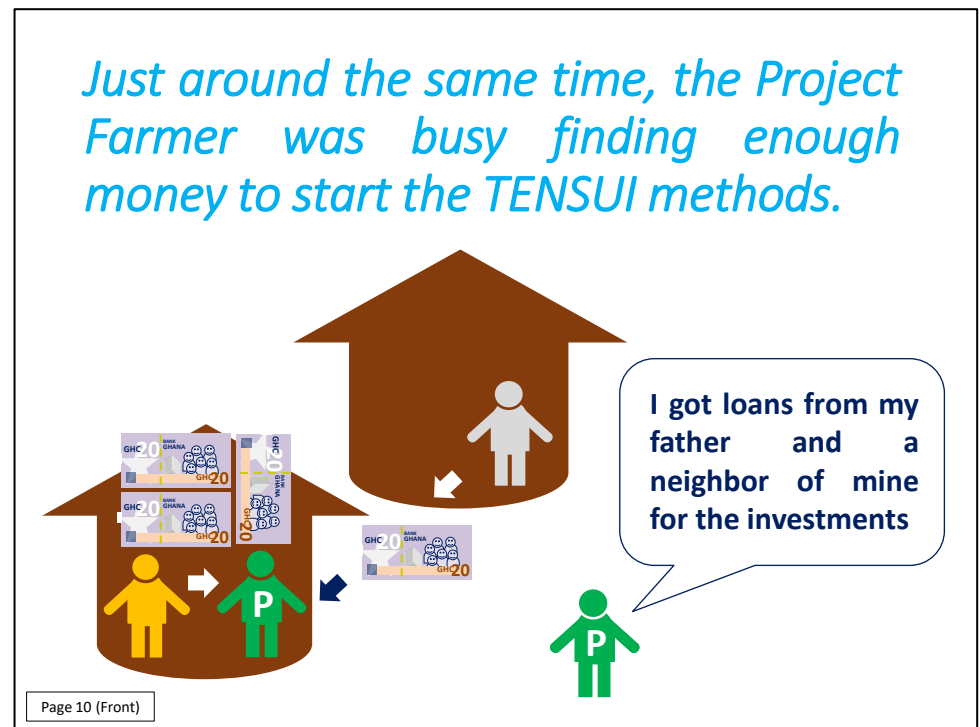


Just around the same time, the Project Farmer was busy finding enough money to start the TENSUI methods.

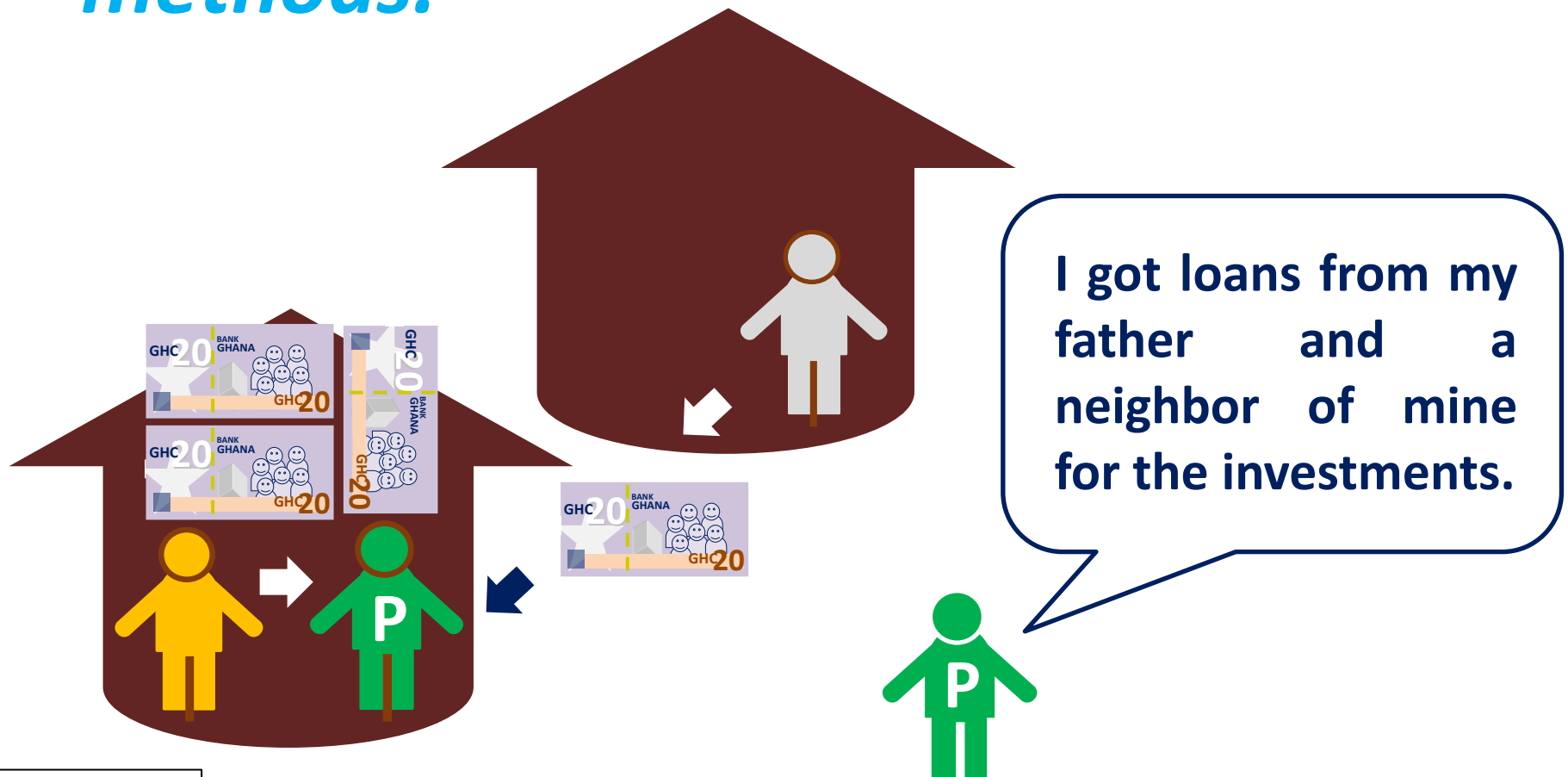


- After estimating how much he should spend for rice cultivation per  $\frac{1}{4}$  acre, he borrowed GHC 60 from his father and GHC 20 from his neighbor.

- Ask farmers:  
Have you estimated a production cost before starting to cultivate??  
How did you come up with the necessary money?



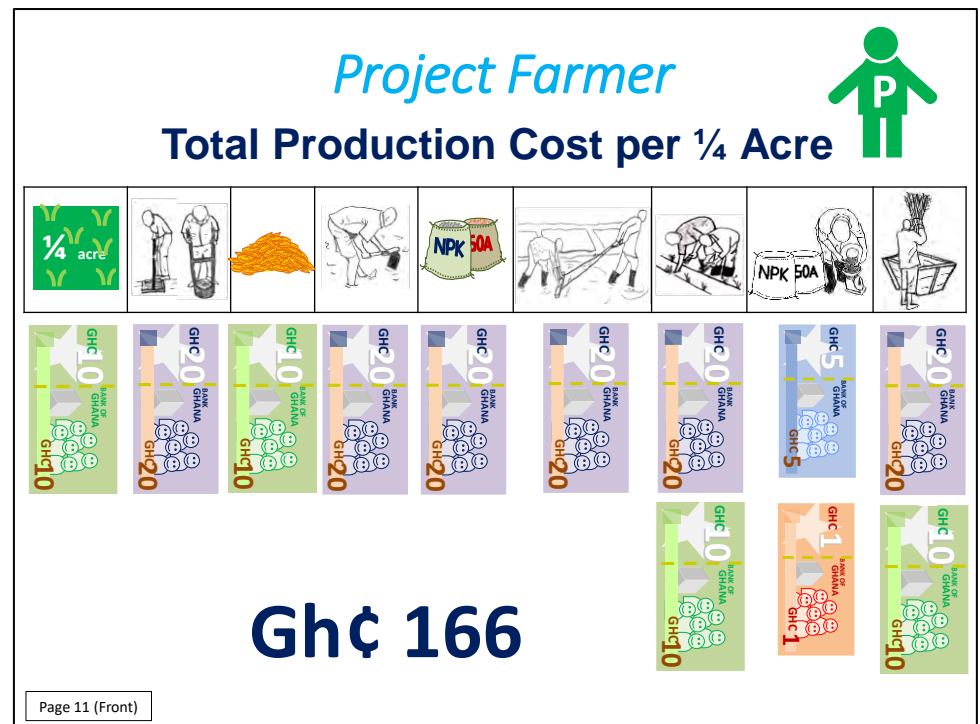
*Just around the same time, the Project Farmer was busy finding enough money to start the TENSUI methods.*



# Then, let's see how the Project Farmer worked



- He spent some money for renting a land and buying seeds and fertilizers.
- He applied the TENSUI methods including ploughing, leveling, transplanting, fertilizer application and threshing using a bambam box.
- His total production cost was GHC 166.
- **Ask farmers:**  
Is his production cost too much or reasonable?

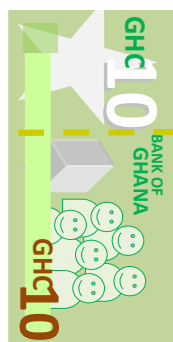
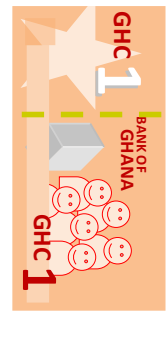
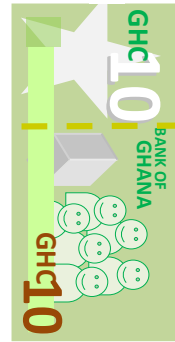
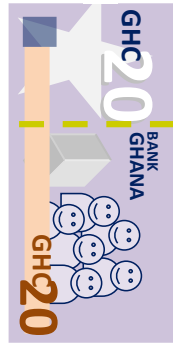
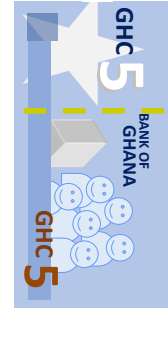
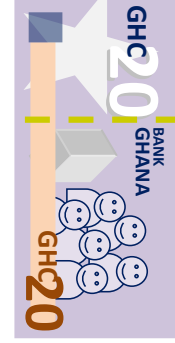
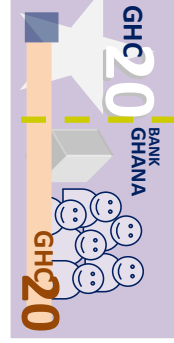
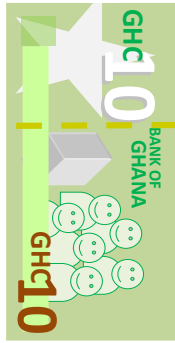
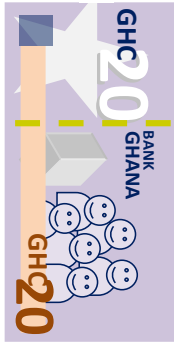
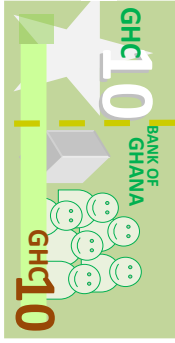
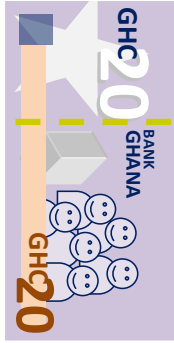
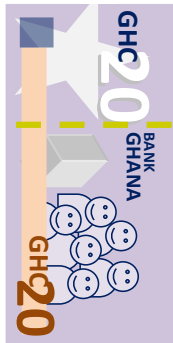
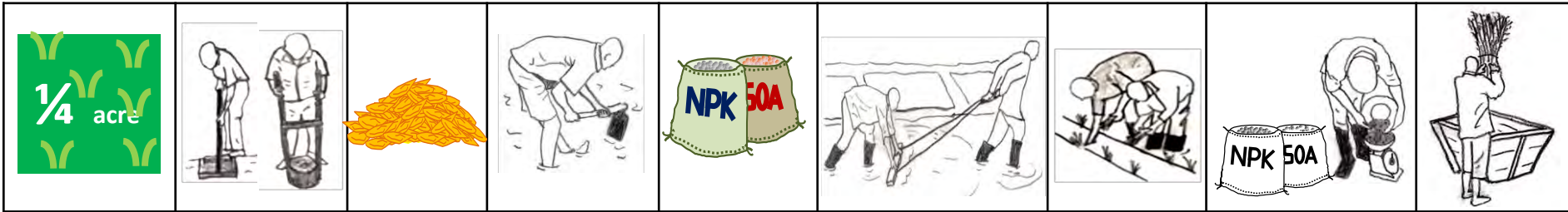




# Project Farmer



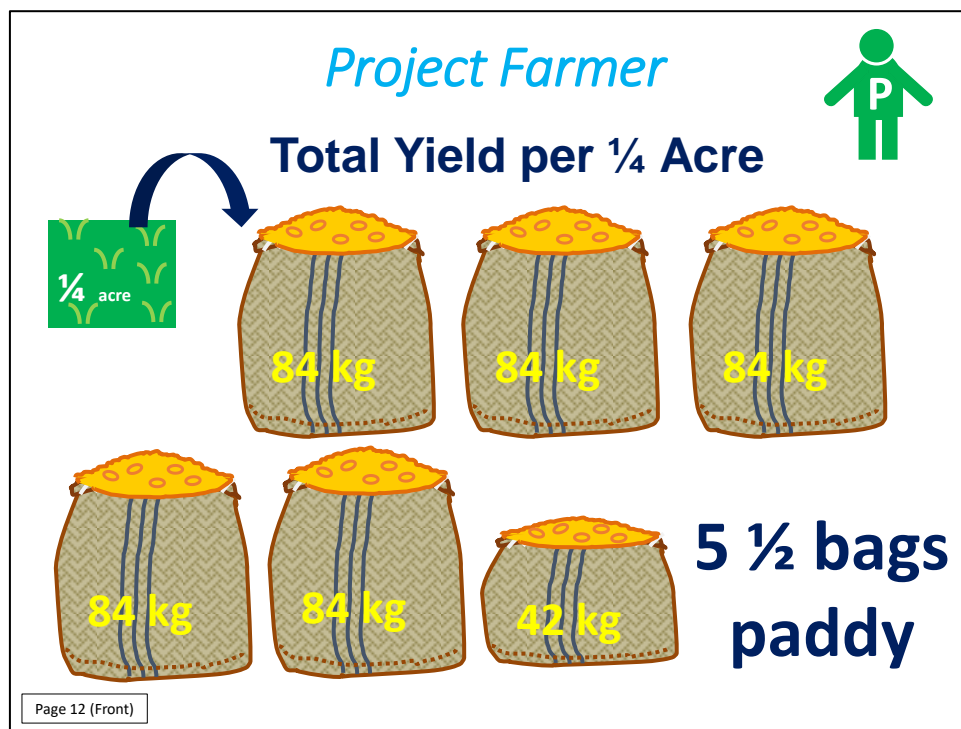
## Total Production Cost per 1/4 Acre



**Gh¢ 166**

# Total Yield per $\frac{1}{4}$ Acre

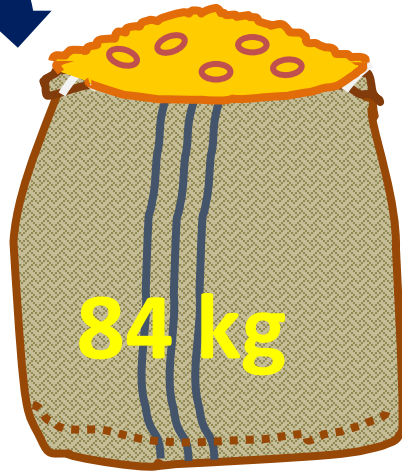
- The Project Farmer harvested  $5 \frac{1}{2}$  bags of paddy (462 kg) from  $\frac{1}{4}$  acre.
- Ask farmers:  
Is his harvest big or small?



# Project Farmer



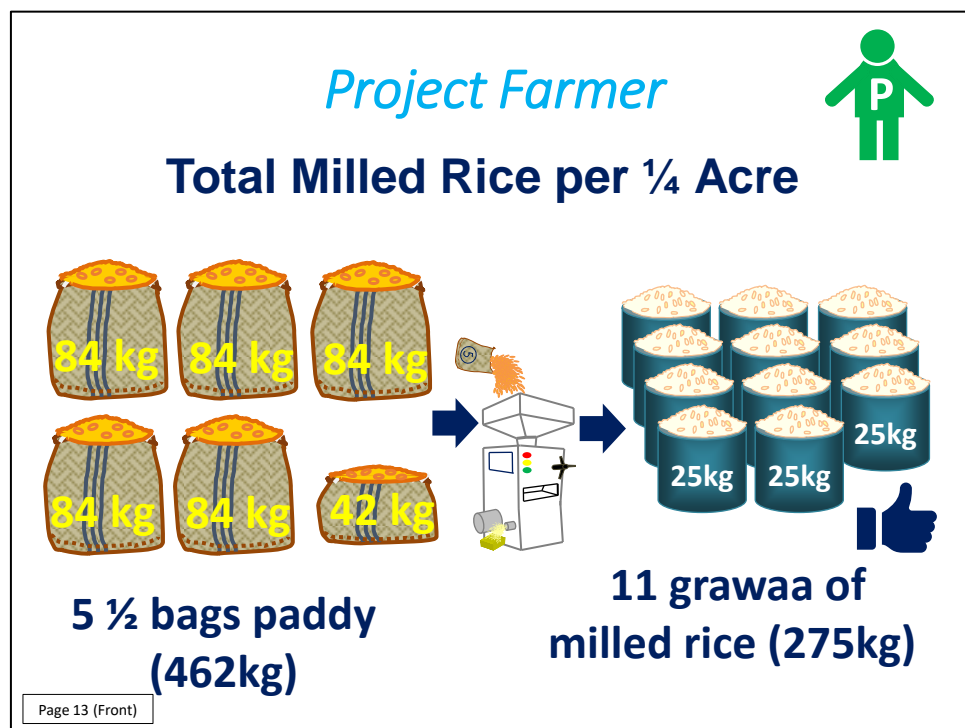
## Total Yield per $\frac{1}{4}$ Acre



**5  $\frac{1}{2}$  bags  
paddy**

# Total Milled Rice per ¼ Acre

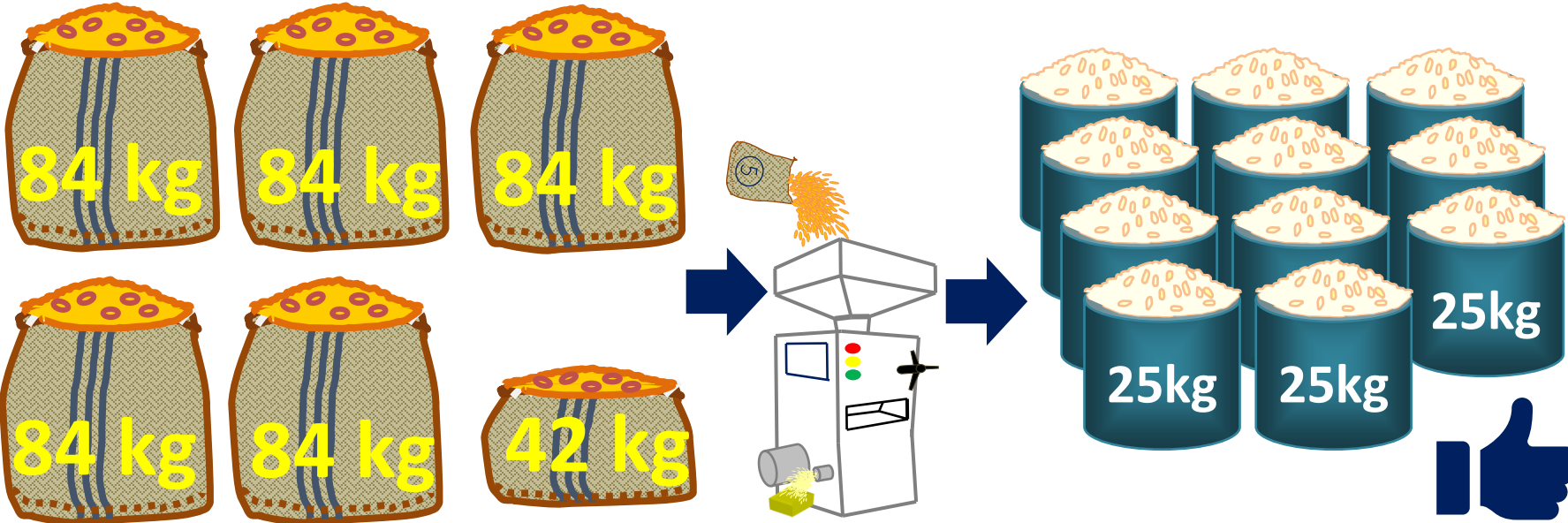
- After milling, the Project Farmer gained 11 grawaa of milled rice



# Project Farmer



## Total Milled Rice per ¼ Acre



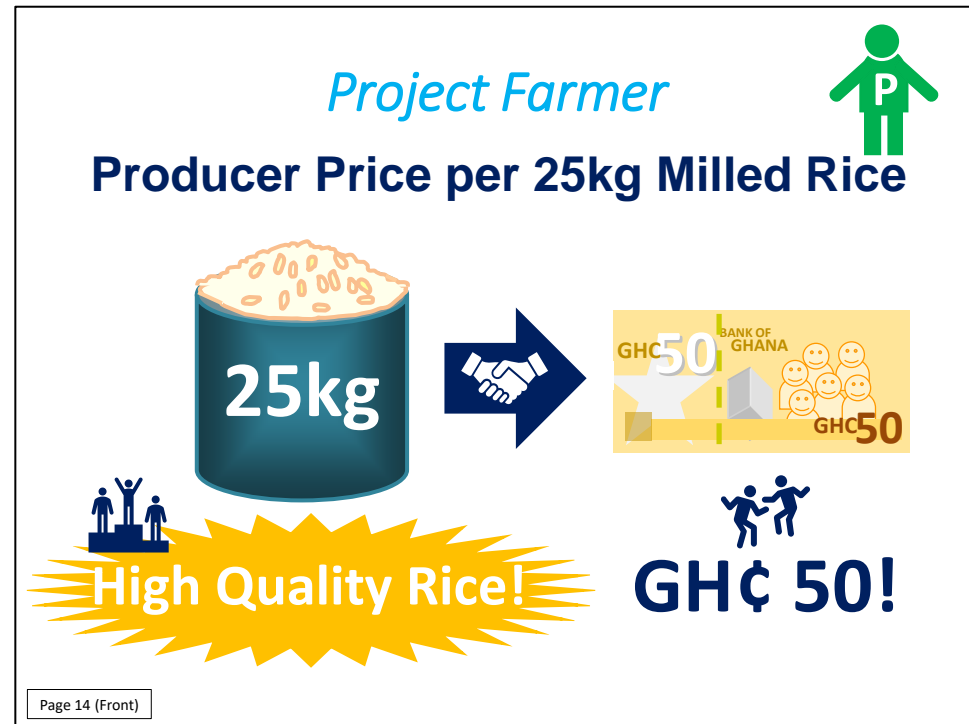
5 ½ bags paddy  
(462kg)

11 gawaa of  
milled rice (275kg)



# Producer Price per 25kg Milled Rice

- Quality of the Project Farmer's rice was very high. The milled rice was pure without foreign matter such as stones, husks and different varieties.
- An aggregator agreed to buy the rice at GHC 50 per grawaa.
- **Ask farmers: What is the price difference between the low quality and the high quality milled rice?**



# Project Farmer



## Producer Price per 25kg Milled Rice



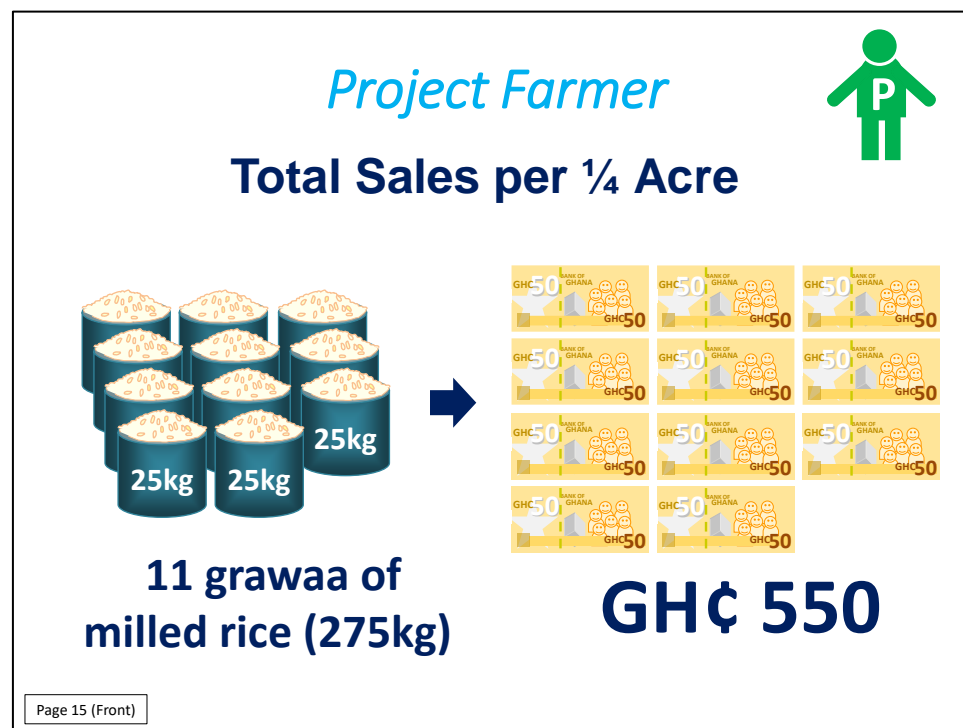
**High Quality Rice!**



**GH¢ 50!**

# Total Sales per ¼ Acre

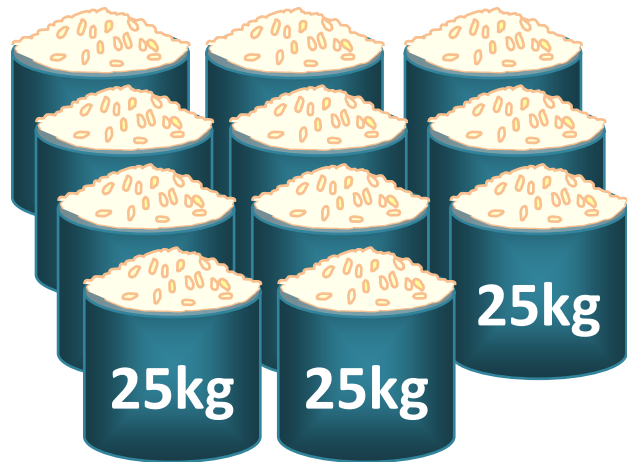
- In total, the Project Farmer gained GHC 550 from 11 grawaas of milled rice.
- Ask farmers:  
Is his income big or small??



# Project Farmer



## Total Sales per 1/4 Acre



**11 grawaa of  
milled rice (275kg)**

**GH¢ 550**

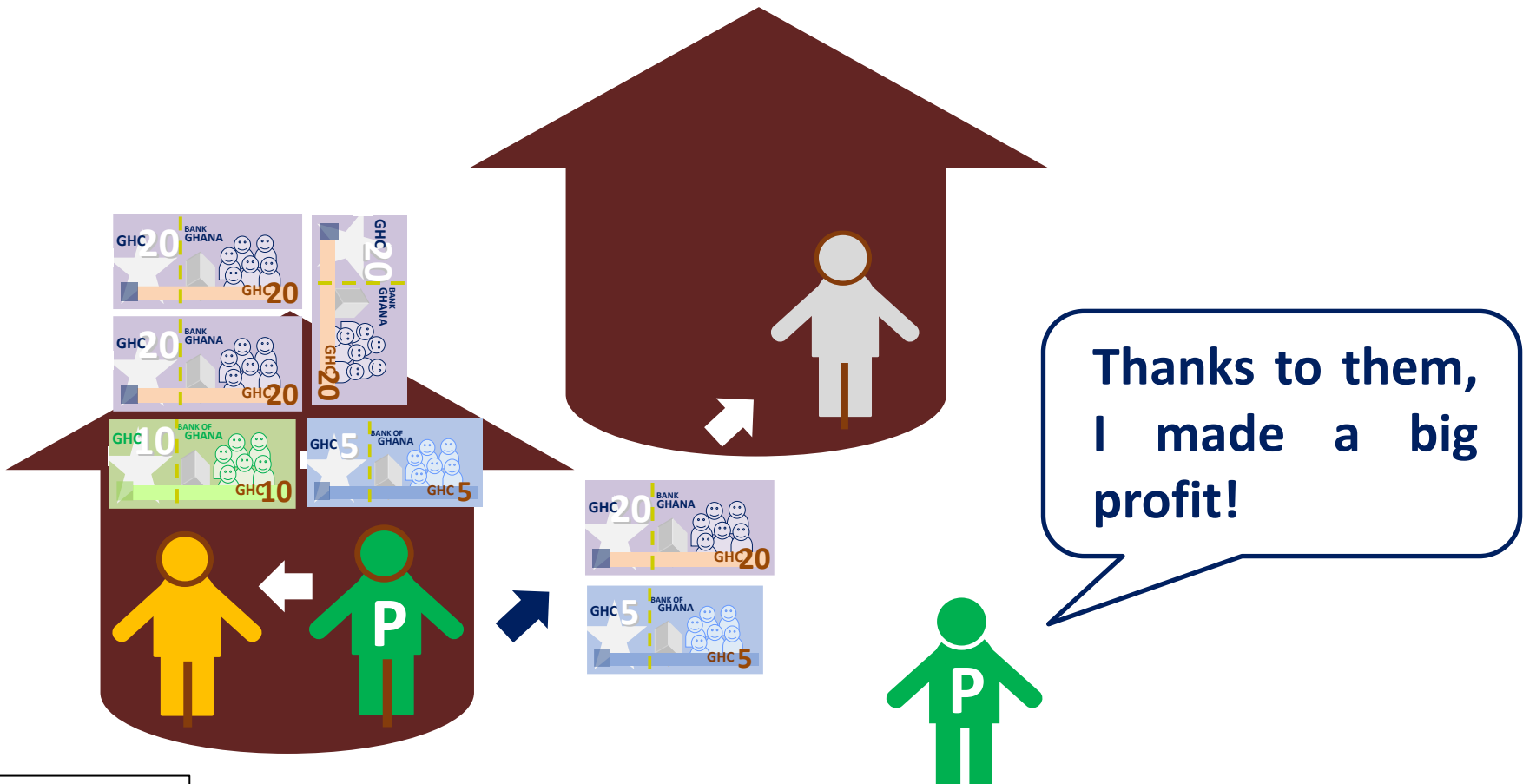
# Then, the Project Farmer never forgot to repay the loans even with interest

- He returned GHC 60 to his father with interest (GHC 15) and GHC 20 to his neighbor with interest (GHC 5). The total interest cost was GHC 20.



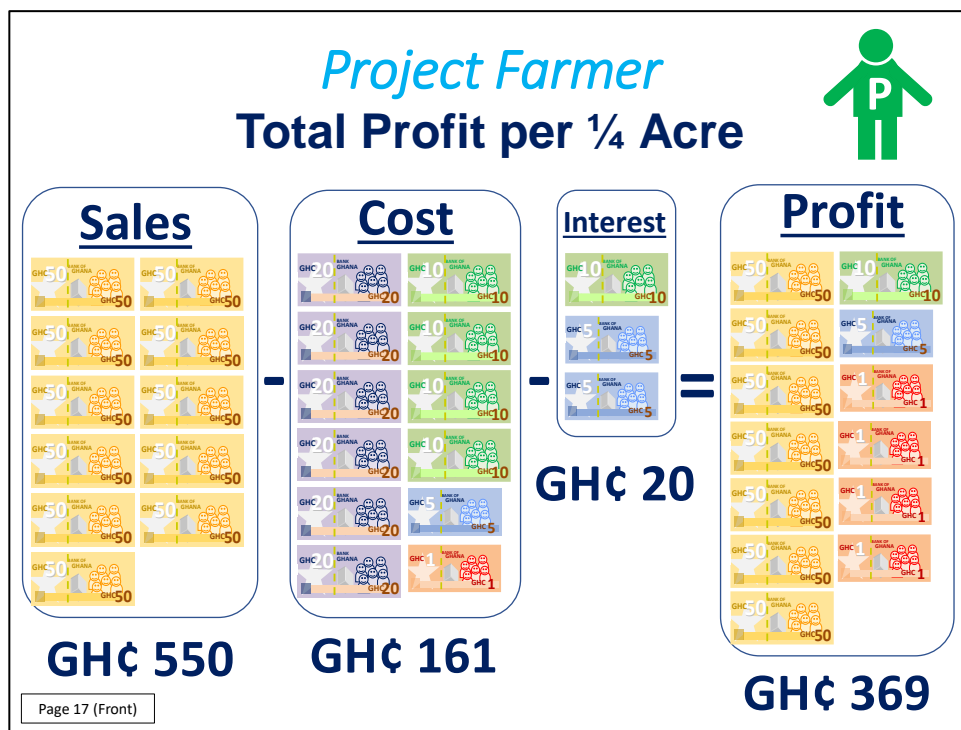


*Then, the Project Farmer never forgot to repay the loans even with interest*



# Total Profit per ¼ Acre

- Eventually, the Project Farmer got GHC 369 as a profit from rice production in ¼ acre. The profit is a difference calculated by subtracting the cost (GHC 161) and the interest (GHC 20) from the sales (GHC 550).



# Project Farmer

## Total Profit per 1/4 Acre

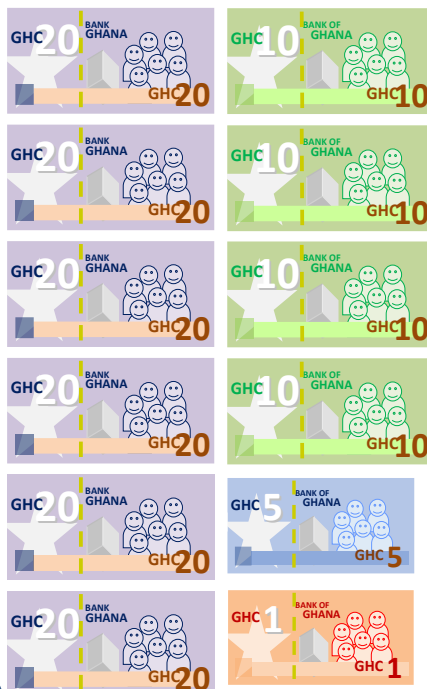


### Sales



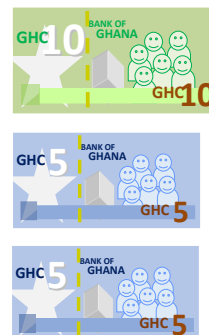
**GH¢ 550**

### Cost



**GH¢ 161**

### Interest



**GH¢ 20**

### Profit



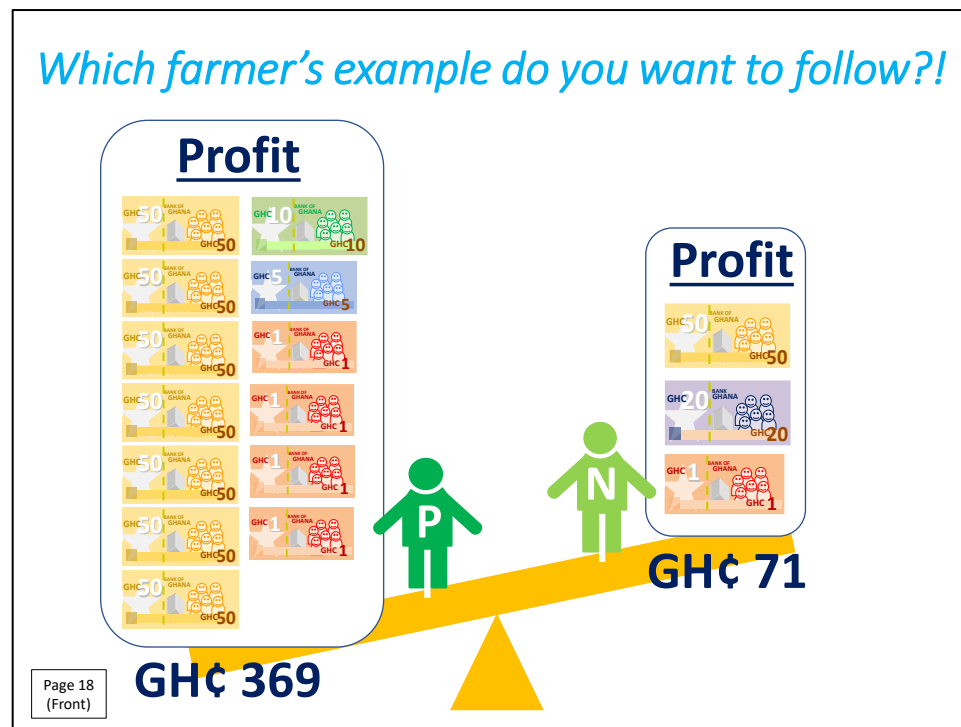
**GH¢ 369**

# Which farmer's example do you want to follow?!

Although the cost per ¼ acre for the Project Farmer's field was higher than that for the Non-Project Farmer's field, the profit from the Project Farmer's field was higher than that for the Non-Project Farmer!

Ask farmers:

- What is the difference between their profit?



# Which farmer's example do you want to follow?!

## Profit



**GH¢ 369**



## Profit



**GH¢ 71**



But sometimes, quality was not reflected to producer price...

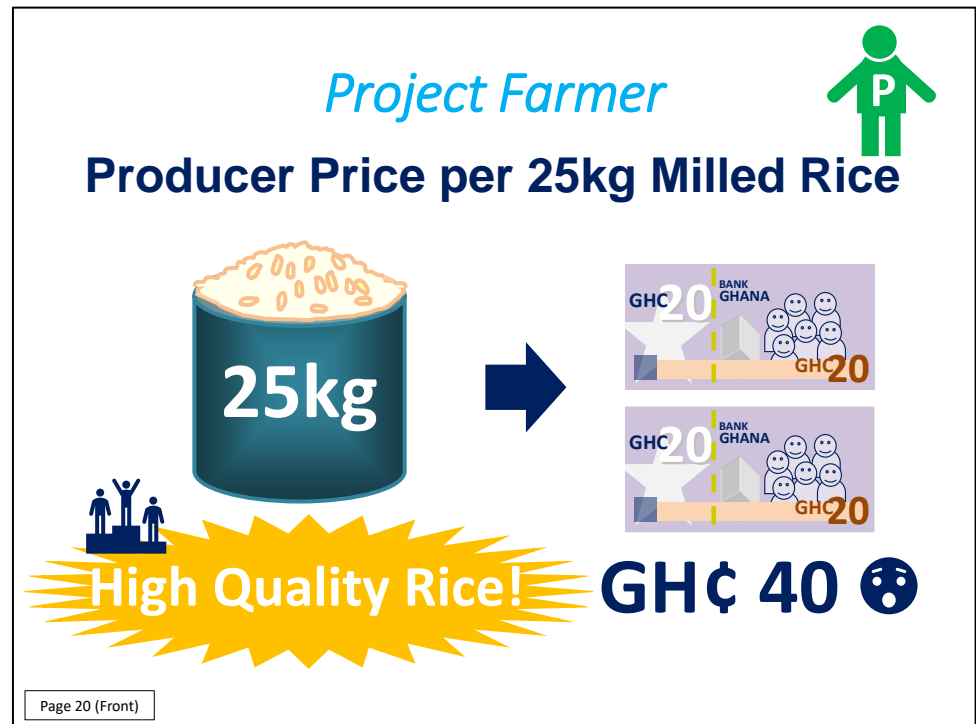


*But sometimes, quality was not reflected to producer price... 🤔*

***But sometimes, quality  
was not reflected to  
producer price... 😱***

# Producer Price per 25kg Milled Rice

- Quality of the Project Farmer's rice was very high. But an aggregator agreed to buy the rice at GHC 40 per grawaa. This is the same price as the producer price of the low quality rice.
- Ask farmers: How is your experience?



# Project Farmer



## Producer Price per 25kg Milled Rice

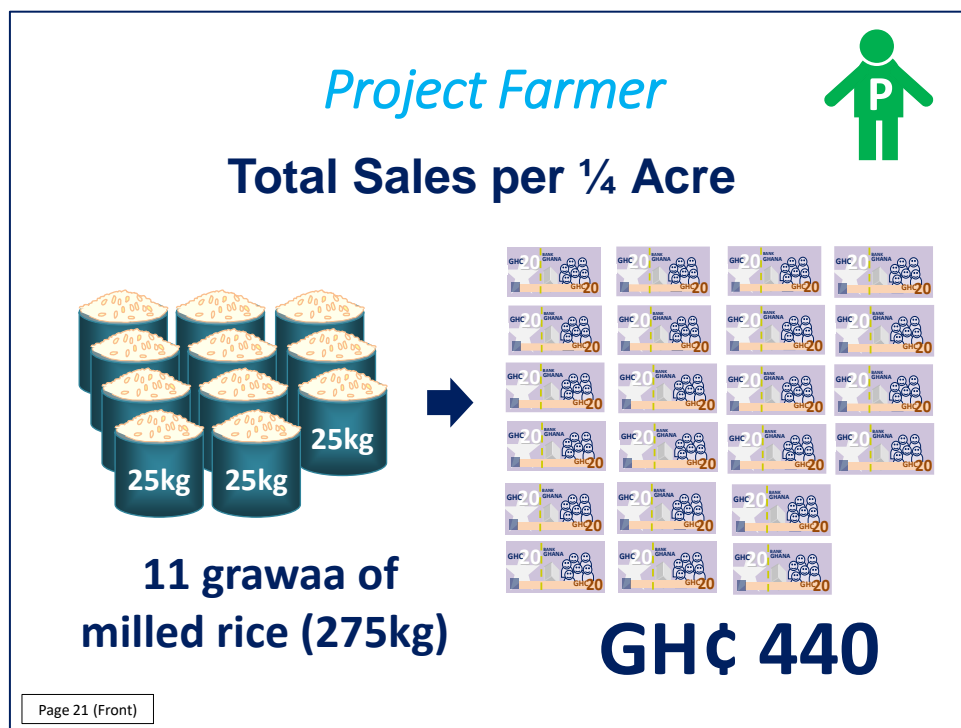


**High Quality Rice!**

**GH¢ 40** 😨

# Total Sales per ¼ Acre

- In total, the Project Farmer gained GHC 440 from 11 grawaas of milled rice.
- Ask farmers:  
Is his income big or small??

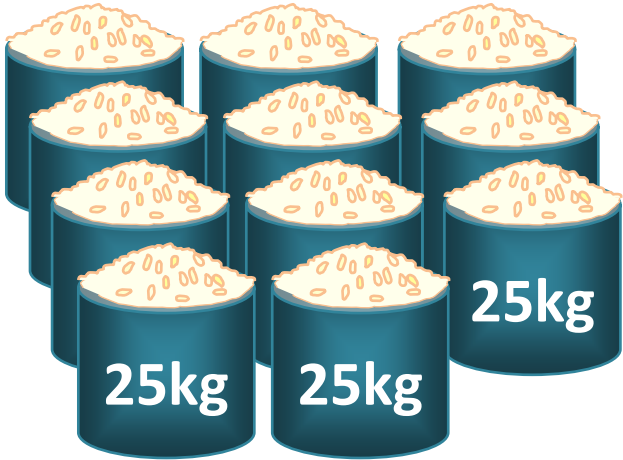




# Project Farmer



## Total Sales per 1/4 Acre

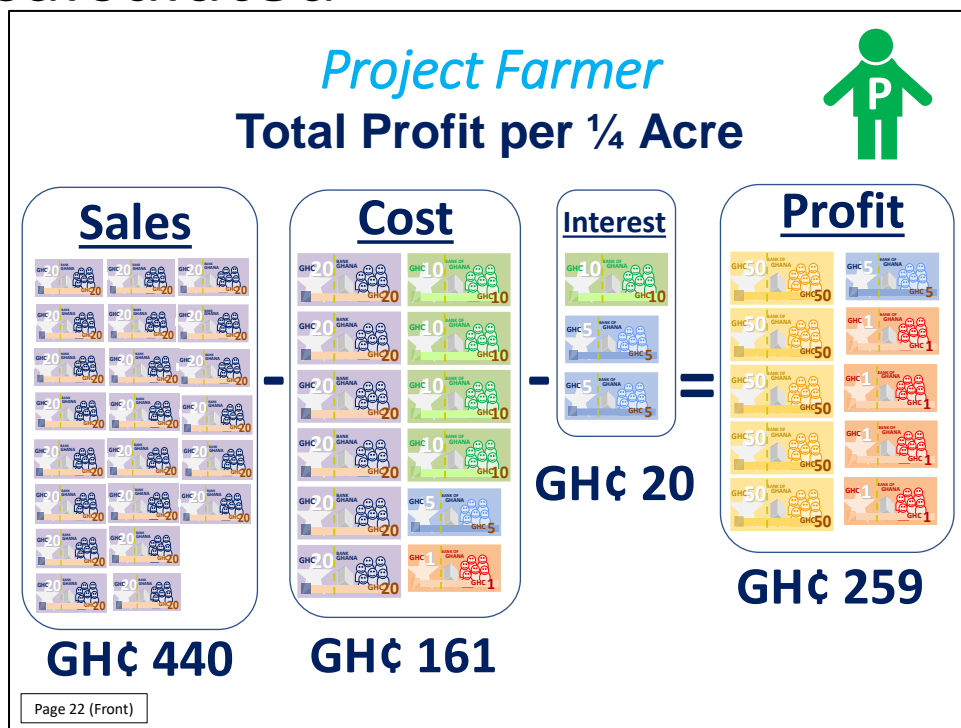


**11 grawaa of  
milled rice (275kg)**

**GH¢ 440**

# Total Profit per ¼ Acre

- Eventually, the Project Farmer got GHC 259 as a profit from rice production in ¼ acre. The profit is a difference calculated by subtracting the cost (GHC 161) and the interest (GHC 20) from the sales (GHC 440).

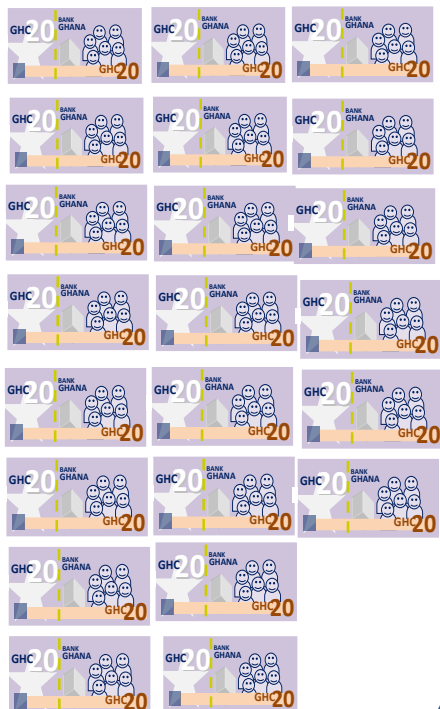


# Project Farmer

## Total Profit per 1/4 Acre

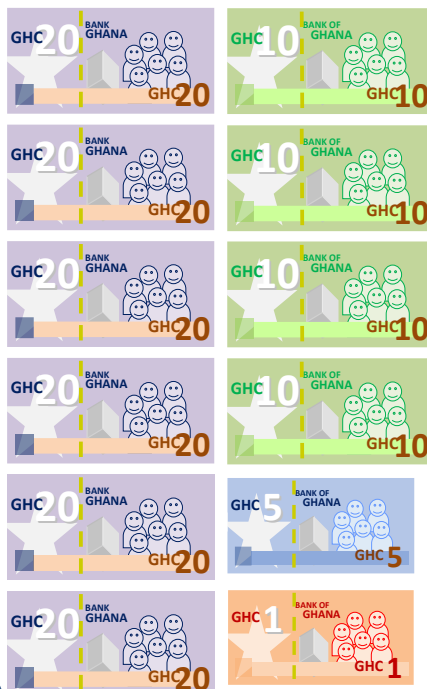


### Sales



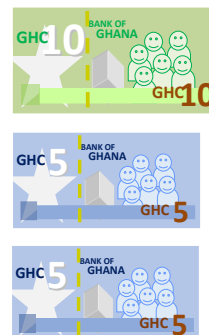
**GH¢ 440**

### Cost



**GH¢ 161**

### Interest



**GH¢ 20**

### Profit

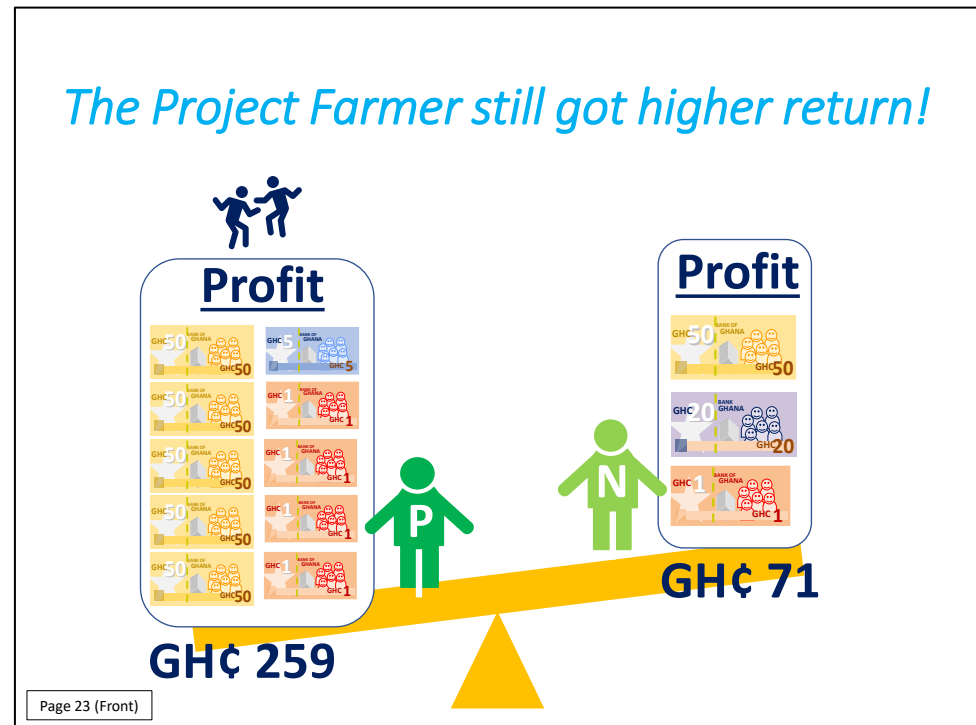


**GH¢ 259**

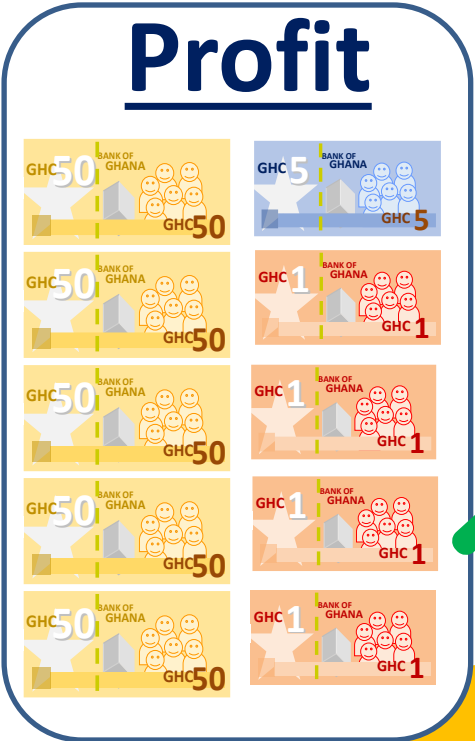
# The Project Farmer still got higher return!

- Although the produce price of the Project Farmer's high quality rice was same as the one of the Non-Project Farmer's low quality rice, the profit from the Project Farmer's field was still

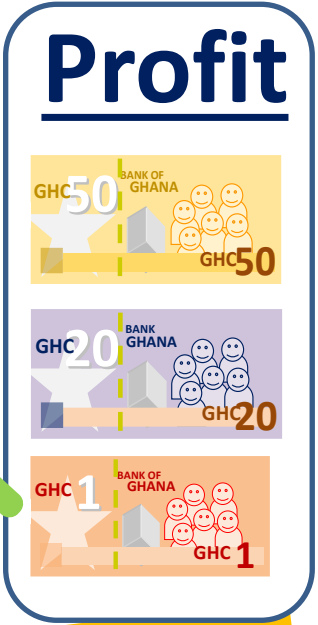
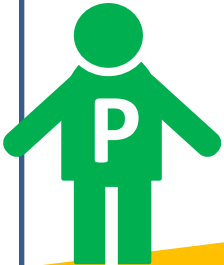
higher than that from the Non-Project Farmer's field!



# The Project Farmer still got higher return!



**GH¢ 259**



**GH¢ 71**





After a few seasons, the Non-Project Farmer started to follow instructions of the Project Farmer.

And they lived happily ever, continuing to produce rice every season through the TENSUI methods...

- This is the end of the story.

*After a few seasons, the Non-Project Farmer started to follow instructions of the Project Farmer.  
And they lived happily ever, continuing to produce rice every season through the TENSUI methods...*



***AFTER A FEW SEASONS, THE NON-PROJECT FARMER STARTED TO FOLLOW INSTRUCTIONS OF THE PROJECT FARMER.***

***AND THEY LIVED HAPPILY EVER, CONTINUING TO PRODUCE RICE EVERY SEASON THROUGH THE TENSUI METHODS...***





# Now, let's check your profit!

- Ask farmers:

Are you keeping record of a cost and income for your rice production? If yes, let's calculate profit. How is the difference between profits before and after starting the TENSUI methods?

If not keeping record, it's not too late yet! Let's remember what you have learnt in the first On-site training (record keeping sheet).

*Now, let's check your profit!* 

***Now, let's check your profit!***



Back side

- 3<sup>rd</sup> on-site training should be conducted before harvesting season.
- 3<sup>rd</sup> on-sit training includes 3 topics;
  1. Bird scaring & timing of harvest
  2. Harvesting & Post harvesting
  3. A tale of two farmers

Face



MOFA/JICA TENSUI RICE PROJECT

Rice  
Cultivation

## 3<sup>rd</sup> Onsite Training



Sustainable Development of Rain-fed Lowland Rice Production  
MOFA/JICA TENSUI RICE PROJECT